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-RESEARCH ARTICLE-

ASSESSING THE MARGINAL EFFECTS OF CORPORATE GOVERNANCE ON CORPORATE CREDIT RATINGS: EVIDENCE FROM JORDANIAN FIRMS

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─Abstract─

This study investigates the extent to which corporate governance arrangements influence corpo-rate credit ratings within an emerging-market setting, drawing on evidence from companies listed on the Amman Stock Exchange (ASE) in Jordan. Although the relationship between governance structures and corporate creditworthiness has been extensively examined in developed economies, empirical understanding of this association in emerging markets remains comparatively limited, particularly concerning the magnitude of governance-related effects on credit rating outcomes. To address this gap, binary logistic regression (LR) is employed to evaluate the relationships between board independence (BRD_IND), chief executive officer duality (R_D), board expertise (BRD_EXPERT), board stock ownership (BRD_STOCK) and board size (BRD_SIZE) and corporate creditworthiness, measured using World'Vest Base (WVB) credit ratings. Beyond identifying statistically significant associations, the analysis incorporates Marginal Effects at the Mean (MEM) and Average Marginal Effects (AME) to estimate how variations in governance characteristics correspond to changes in the probability of obtaining higher credit ratings. The investigation is subsequently extended across the four WVB rating categories, employing Fisher's least significant difference (LSD) procedure and homogeneity tests to examine variations in governance-related effects between rating groups. The findings reveal statistically significant positive associations between credit ratings and both BRD_EXPERT and BRD_SIZE, whereas BRD_IND and BRD_STOCK exhibit significant negative relationships. Conversely, R_D demonstrates no statistically significant association with creditworthiness. Collectively,

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these results indicate that particular dimensions of board governance are important in explaining differences in corporate credit ratings within Jordan's emerging capital market.

Keywords: Credit Ratings, World' Vest Base (WVB), Amman Stock Exchange, Corporate Governance, Jordanian Firms.

INTRODUCTION

Corporate governance encompasses the institutional arrangements, regulatory principles and organisational practices through which companies are managed, supervised and held accountable. Its fundamental purpose is to address potential conflicts between corporate managers and shareholders by establishing mechanisms that promote responsible decision-making and align managerial conduct with ownership interests. Well-functioning governance arrangements can improve organisational performance, strengthen financial resilience and limit exposure to financial risk. They also promote greater transparency, accountability and oversight, thereby reinforcing confidence among shareholders, lenders and other stakeholders. An important indicator of corporate financial risk is creditworthiness, which is commonly evaluated through credit ratings. Such assessments reflect the likelihood that an organisation will fulfil its contractual financial commitments and its capacity to access, employ and repay borrowed funds under agreed conditions. Accordingly, effective corporate governance can contribute to reducing default exposure, strengthening market confidence and improving access to external capital. Despite the considerable academic attention devoted to corporate governance in developed financial markets, its implications for corporate creditworthiness remain comparatively underexplored in emerging economies, including Jordan. Existing empirical investigations have established relationships between governance arrangements and corporate performance (Alzwi et al., 2025; Haniffa & Hudaib, 2006), market valuation (Al-Khouri, 2006) and creditworthiness (Ashbaugh-Skaife et al., 2006; Bhojraj & Sengupta, 2003). Nevertheless, much of this evidence originates from developed economies, while relatively few emerging-market studies quantify the probability-based implications of individual board characteristics for corporate credit ratings. In particular, the limited application of marginal effects analysis has restricted understanding of the practical magnitude of governance-related changes in creditworthiness. Furthermore, studies relying exclusively on binary credit rating classifications may overlook meaningful differences across intermediate levels of financial risk.

Jordan provides a particularly relevant institutional environment in which to investigate these relationships. Companies listed on the ASE operate within a predominantly bank-oriented financial system, where commercial lending constitutes the principal source of external funding and the corporate bond market remains relatively underdeveloped.

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Corporate ownership is frequently concentrated among families and substantial block holders, many of whom maintain direct representation on company boards (Al-Khouri, 2006; HUSSEIN & Idris, 2023; Rahman, 2026; Sourial, 2004). Under these conditions, boards of directors represent an important internal monitoring mechanism through which creditors may assess managerial accountability and financial discipline. Although governance codes have been introduced for Jordanian listed companies, evidence remains limited regarding the extent to which actual board practices contribute to lower credit risk. Ineffective board oversight may increase borrowing costs and constrain corporate access to external financing.

A further methodological consideration concerns how governance-related effects are expressed and interpreted. Conventional empirical studies frequently report logistic regression coefficients or odds ratios, which identify the direction and relative magnitude of associations but do not directly communicate their implications in probability terms. From the perspective of creditors, credit rating analysts and regulatory authorities, a more practically relevant question concerns the extent to which changes in board characteristics alter the likelihood of obtaining a favourable credit rating. Marginal effects provide a means of addressing this question. Specifically, MEM estimates the probability change for a representative company evaluated at the sample means, whereas AME captures the average probability change across the observed firms (Best, 2013). Against this background, the present investigation seeks to quantify how five board-level governance characteristics influence the probability that Jordanian listed companies attain higher credit ratings. The analysis incorporates BRD_IND, R_D, BRD_EXPERT, BRD_STOCK and BRD_SIZE, employing MEM and AME to evaluate the magnitude of their respective associations with corporate creditworthiness. The empirical sample comprises ASE-listed companies, while credit risk is assessed using WVB ratings, which reflect both firm-specific microeconomic conditions and broader macroeconomic influences. The rating framework extends from D, representing elevated default risk, to BB, indicating comparatively lower default exposure, thereby providing a differentiated assessment of corporate financial strength.

The remainder of the manuscript is structured as follows. Section 2 examines the relevant theoretical and empirical literature and formulates the research hypotheses. Section 3 explains the sample construction, research design and analytical procedures. Section 4 presents and interprets the empirical findings, while Section 5 concludes by discussing policy implications and opportunities for further investigation.

REVIEW OF RELEVANT LITERATURE

Corporate governance constitutes an important institutional determinant of managerial conduct, organisational performance and corporate financial exposure. Early developments in financial risk assessment can be traced to the bankruptcy prediction framework proposed by Altman (1968), which introduced the Z-score through multiple

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discriminant analysis (MDA). By demonstrating the predictive value of accounting indicators and financial ratios in identifying corporate bankruptcy risk, this contribution established an analytical foundation for subsequent investigations into financial distress, default probability and creditworthiness.

Subsequent scholarship has increasingly examined how corporate governance arrangements influence financial and organisational outcomes. Empirical research has documented significant associations between governance mechanisms and corporate performance (Haniffa & Hudaib, 2006), firm valuation (Al-Khouri, 2006; HUSSEIN & Idris, 2023; Rahman, 2026; Sourial, 2004) and creditworthiness (Ashbaugh-Skaife et al., 2006; Bhojraj & Sengupta, 2003). However, much of this literature considers governance dimensions individually, particularly BRD_IND, and draws predominantly on evidence from developed financial systems. Consequently, the combined implications of multiple board characteristics for corporate credit ratings remain insufficiently understood in emerging-market environments. The empirical relationship between governance quality and creditworthiness is not universally consistent. Some investigations suggest that effective governance improves financial discipline and strengthens companies' capacity to honour debt obligations, thereby contributing to more favourable credit ratings (Bhojraj & Sengupta, 2003). Other studies, however, emphasise the possibility of conflicting incentives between shareholders and creditors. Governance arrangements that enhance shareholder influence may encourage corporate policies that increase financial risk or redistribute economic benefits away from debt holders. In this regard, Fich and Shivdasani (2006) highlight the potential for excessive shareholder influence to facilitate decisions that favour equity holders at the expense of bondholders.

An additional limitation concerns the treatment of credit ratings as binary outcomes, commonly distinguishing defaulting from non-defaulting companies. Such classifications may conceal important differences in creditworthiness because corporate financial risk generally varies across multiple intermediate levels rather than being confined to two distinct conditions. Furthermore, relatively few studies incorporate marginal effects to quantify how changes in governance characteristics alter the likelihood of assignment to particular rating categories. This omission reduces the practical interpretability of regression findings and limits their usefulness for financial decision-making (Alzwi et al., 2025). These research gaps are especially relevant to emerging economies, where governance arrangements and financial institutions frequently differ from those in developed markets. Although governance–creditworthiness relationships have been investigated in several international settings, including Gulf Cooperation Council countries (Mili & Alaali, 2023) and India (Kaur & Dey, 2025), evidence specific to Jordan remains relatively scarce. The Jordanian corporate environment is distinguished by concentrated shareholding, substantial family involvement and a particular regulatory structure. Comparative international findings further indicate that the consequences of governance arrangements depend on

institutional and market conditions. Research undertaken in Thailand (Connelly et al., 2012), Iran (Chalaki et al., 2012) and the wider Middle East (Arouri et al., 2014) demonstrates that governance-related performance outcomes may vary considerably across national environments. Additional evidence concerning governance and corporate credit ratings has been reported for South Korea and India (Kaur & Dey, 2025; Mali & Lim, 2019). Nevertheless, existing research remains concentrated in relatively large or developed markets, leaving smaller emerging economies inadequately represented in empirical assessments.

By combining probability-based interpretation with a differentiated rating structure, this methodological framework provides a more detailed assessment of governance-related creditworthiness patterns than approaches relying exclusively on binary classifications. The study therefore contributes to the existing literature by generating additional evidence on the relationship between board governance and corporate credit ratings in Jordan. Its integration of multiple governance indicators, marginal effects estimation and rating-group comparisons offers a more comprehensive basis for understanding these associations within an emerging-market environment. The resulting evidence may assist investors, regulatory institutions and corporate boards in evaluating governance arrangements and their potential implications for credit risk and financial stability.

The following subsections examine the theoretical foundations and empirical evidence associated with each selected board characteristic, establish its anticipated relationship with corporate creditworthiness and present the corresponding hypotheses.

Board Independence and Credit Ratings

From an agency-theoretical perspective, independent directors provide an essential mechanism for supervising managerial activities and safeguarding the interests of external capital providers (Jensen & Meckling, 1976, Fama & Jensen, 2019; Jensen & Meckling, 2019). Their separation from executive management is expected to strengthen oversight, constrain opportunistic managerial behaviour and improve the reliability of financial disclosures. These functions may also reduce the likelihood of creditor losses by promoting prudent corporate financial decisions. Empirical findings from developed economies broadly support this interpretation. Bhojraj and Sengupta (2003) report that companies with greater representation of outside directors tend to receive more favourable bond ratings and incur lower borrowing yields, while Ashbaugh-Skaife et al. (2006) identify a positive association between BRD_IND and corporate credit ratings. Nevertheless, the effectiveness of independent directors is not consistent across institutional settings (Haniffa & Hudaib, 2006; Weir & Laing, 2001). In emerging economies characterised by concentrated ownership and substantial controlling-shareholder influence, formally independent directors may encounter constraints that weaken their monitoring capacity (Black et al., 2010). Consequently,

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whether greater BRD_IND contributes to improved corporate credit ratings in Jordan requires empirical examination. Accordingly, the following null hypothesis is tested:

H01: *BRD_IND has no effect on the credit ratings of Jordanian firms.*

CEO Duality and Credit Ratings

R_D arises when the chief executive officer simultaneously occupies the position of board chairperson. Agency theory suggests that combining executive leadership and board oversight within a single individual concentrates decision-making authority and potentially compromises the board's independence from management (Fama and Jensen, 1983). From a creditor perspective, such concentration may weaken accountability and increase the likelihood of managerial decisions that prioritise executive interests over long-term corporate solvency. Supporting this argument, Ashbaugh-Skaife et al. (2006) document a negative relationship between executive power and corporate credit ratings. Stewardship theory, however, provides an alternative interpretation, proposing that unified leadership may improve organisational coordination and encourage executives to act in the company's broader interests (Donaldson & Davis, 1991). Empirical findings from emerging markets likewise remain inconclusive regarding the consequences of leadership duality (Arouri et al., 2014; Haniffa & Hudaib, 2006). Accordingly, the following null hypothesis is tested:

H02: *R_D has no effect on the credit ratings of Jordanian firms.*

Board Expertise and Credit Ratings

BRD_EXPERT is operationalised in this investigation as the number of independent directors who simultaneously hold directorships in other companies. Resource dependence theory proposes that directors with external board appointments can provide valuable professional knowledge, managerial experience and interorganisational connections that facilitate access to strategically important resources, including external finance (Pfeffer and Salancik, 1978). Multiple directorships may additionally strengthen directors' reputational incentives to maintain effective governance standards and exercise appropriate managerial oversight. Consistent with these expectations, Ashbaugh-Skaife et al. (2006) report a positive relationship between BRD_EXPERT and credit ratings. Conversely, extensive external commitments may constrain directors' availability and reduce their capacity to discharge monitoring responsibilities effectively. Fich and Shivdasani (2006) demonstrate that companies with heavily committed boards tend to exhibit weaker governance arrangements. The overall relationship between BRD_EXPERT and creditworthiness may therefore depend on whether the benefits of accumulated experience and external networks exceed the limitations associated with competing professional responsibilities. Accordingly, the following null hypothesis is tested:

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H03: *BRD_EXPERT has no effect on the credit ratings of Jordanian firms.*

Board Stock Ownership and Credit Ratings

Agency theory maintains that directors' equity participation can reduce conflicts between corporate decision-makers and shareholders by linking their financial incentives more closely to ownership outcomes (Jensen & Meckling, 1976, Jensen & Meckling, 2019). Such alignment may encourage stronger oversight, greater managerial accountability and lower agency costs. In support of this perspective, Ashbaugh-Skaife et al. (2006) identify a positive association between BRD_STOCK and corporate credit ratings. Nevertheless, closer alignment with shareholders does not necessarily imply improved protection for creditors. Directors holding substantial equity interests may favour investment or financing strategies that increase shareholder returns while exposing lenders to greater downside risk. These concerns may become particularly pronounced in ownership-concentrated markets, where influential directors can exercise considerable control over corporate decisions. Evidence from Jordan and other institutional settings indicates that the consequences of ownership arrangements vary according to shareholder identity and the concentration of equity holdings (Elgergeni et al., 2018,Nuzula & Lokuwaduge, 2017). Accordingly, the following null hypothesis is tested:

H04: *BRD_STOCK has no effect on the credit ratings of Jordanian firms.*

Board Size and Credit Ratings

The implications of BRD_SIZE for corporate outcomes remain theoretically contested. Resource dependence theory suggests that larger boards may enhance organisational capabilities by incorporating a broader range of professional expertise, external relationships and strategic perspectives, thereby improving access to financial resources (Pfeffer and Salancik, 1978). In contrast, Jensen (1993) argues that increasing board membership may complicate coordination, delay collective decisions and strengthen the chief executive officer's influence over board proceedings. Similarly, Yermack (1996) reports an association between smaller boards and higher corporate market valuations. Empirical findings concerning BRD_SIZE in emerging economies are also mixed (Arouri et al., 2014; Haniffa & Hudaib, 2006). From the standpoint of creditors, additional directors may improve oversight and diversify the expertise available for evaluating financial decisions. However, these advantages may diminish when excessive board membership creates communication difficulties and reduces decision-making efficiency. Accordingly, the following null hypothesis is tested:

H05: *BRD_SIZE has no effect on the credit ratings of Jordanian firms.*

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RESEARCH DESIGN AND METHODOLOGY

This section establishes the empirical framework employed to investigate the relationship between board-level corporate governance arrangements and corporate creditworthiness. It describes the underlying data sources, sample construction procedures, operational definitions of the study variables and statistical specifications adopted for the analysis.

Sample and Data

The empirical investigation draws upon annual reports published by companies listed on the ASE during the 2015–2017 period. Corporate creditworthiness is evaluated using ratings provided by WVB. The final dataset comprises 192 publicly listed companies observed over three consecutive years, yielding 576 firm-year observations. Complete information is available for each observation concerning corporate credit ratings, annual financial reports and the selected board governance characteristics. Consequently, the analytical sample contains no missing values for the variables included in the investigation.

Methodology

Figure 1 presents the analytical framework, which comprises four sequential stages designed to evaluate the relationships between corporate governance characteristics and credit rating outcomes. Directional arrows connect the stages and indicate the progression of the empirical procedures.

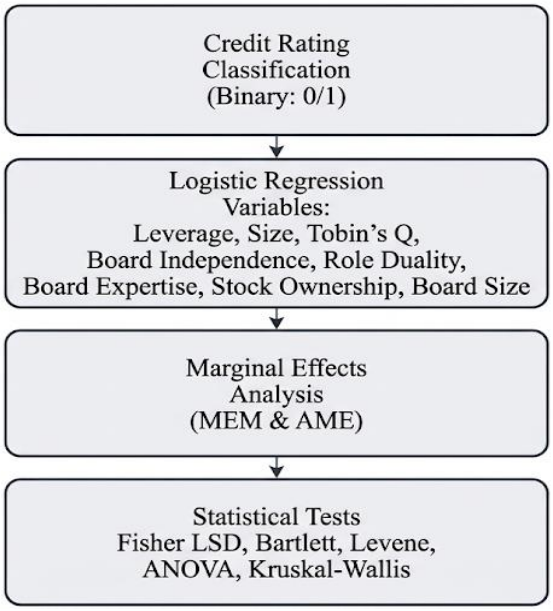

Figure 1: Methodology Workflow

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Credit Rating Classification

The initial stage transforms the original WVB credit rating categories into a binary dependent variable representing two levels of corporate creditworthiness:

- 1 = higher creditworthiness, comprising ratings of B and above (BB3–BB and B3–B).
- 0 = lower creditworthiness, comprising ratings within the C3–C and D categories.

This recoding establishes the dichotomous outcome required for subsequent LR estimation.

LR Regression

The second stage estimates the probability that a company belongs to the higher credit rating category. The regression framework incorporates the relevant study variables, distinguishing between the dependent measure of corporate creditworthiness and the independent governance characteristics used to explain differences in rating outcomes.

Variable Measurement

This section outlines the dependent and independent variables incorporated into the empirical analysis and specifies their operational measurement. Corporate creditworthiness constitutes the dependent variable, whereas the explanatory variables capture the selected board-level governance characteristics potentially associated with variations in credit rating outcomes.

Dependent Variable

Credit Rating: The principal outcome variable reflects corporate creditworthiness as evaluated through WVB credit ratings. These ratings provide an assessment of a company's capacity to fulfil its contractual financial commitments and serve as an indicator of its overall exposure to credit risk.

Independent Variables – Corporate Governance Measure

- BRD_IND: Measured as the total number of independent directors serving on the board. Greater independent representation is generally expected to strengthen corporate oversight, constrain managerial entrenchment and promote more effective organisational decision-making.
- RD: A dichotomous indicator assigned a value of 1 when the chief executive officer simultaneously holds the position of board chairperson and 0 otherwise. R_D reflects the concentration of executive and supervisory authority, which may affect governance effectiveness and, consequently, corporate creditworthiness.
- BRD_EXPERT: Operationalised as the number of independent directors who

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concurrently occupy board positions in other companies. This indicator represents the professional experience, external connections and institutional knowledge that such directors may contribute to corporate supervision and governance effectiveness.

- BRD_STOCK: Defined as the number of directors holding equity interests in the company. Share ownership may strengthen directors' incentives to protect shareholder interests, potentially improving managerial accountability, governance practices and corporate creditworthiness.
- BRD_SIZE: Represents the total membership of the board of directors. Although larger boards may provide broader expertise and more diverse perspectives, increasing membership can also introduce coordination difficulties and reduce decision-making efficiency. Its relationship with corporate credit ratings therefore warrants empirical investigation.

Model Specification

The empirical specification is developed in accordance with the study objectives and proposed hypotheses. LR is employed to estimate the probability of a binary credit rating outcome conditional on multiple explanatory variables. This approach enables the investigation to assess how differences in board governance characteristics are associated with the likelihood of obtaining a higher credit rating.

Marginal Effects Analysis

Following estimation of the LR model, marginal effects are computed to express the relationships between explanatory variables and predicted creditworthiness in probability terms.

- MEM (Marginal Effect at the Mean): Estimates the effect of an explanatory variable on the predicted probability when the remaining explanatory variables are evaluated at their respective sample means.
- AME (Average Marginal Effect): Calculates the marginal effect for each observation and subsequently averages these effects across all companies in the sample.

These measures facilitate a more accessible interpretation of the LR estimates by translating model coefficients into changes in predicted probabilities. Specifically, they quantify how a one-unit variation in a governance characteristic is associated with the probability of attaining a higher credit rating, thereby identifying the relative practical importance of individual board attributes.

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Statistical Tests

Additional statistical procedures are employed to examine differences across credit rating groups, evaluate relevant distributional assumptions and assess the robustness of the empirical comparisons. The following methods are incorporated:

- Fisher LSD Test: Conducts pairwise comparisons to identify statistically significant differences in group means.
- Bartlett & Levene Tests: Assess whether the variances of the variables under examination are homogeneous across comparison groups.
- ANOVA F-Ratio: Evaluates whether statistically significant differences exist among the means of multiple groups.
- Kruskal-Wallis Test: Provides a non-parametric alternative to ANOVA for examining differences among groups when parametric assumptions may not be adequately satisfied.

Collectively, these procedures support the evaluation of group-level differences and relevant statistical assumptions. Their application also helps determine whether non-parametric comparisons are appropriate when the conditions required for conventional parametric tests are not met.

Comprehensive Model Descriptions

LR provides a statistical framework for examining the association between a dichotomous dependent variable and one or more explanatory variables. Rather than directly estimating the numerical value of the outcome, the approach models the probability that the dependent variable (Y) assumes a specified category, conditional on the observed characteristics represented by the explanatory variable vector (X). As already said, we consider five explanatory variables, denoted by the vector $X=\{X_1,X_2,\ldots,X_k\}$, where k is the number of regression parameters (in our case, $k=5$). The explanatory variables include leverage, company size, Tobin's Q, BRD_IND, R_D, BRD_EXPERT, BRD_STOCK, and BRD_SIZE.

Let $X_i=\{X_{i1},X_{i2},\ldots,X_{ik}\}$ represent the explanatory variables for observation i (i.e., firm i), where $i=1,2,\ldots,n$, and n is the total number of observations (sample size). Here, X_{ik} denotes the k-th explanatory variable for observation i.

Let Y be a binary response variable, indicating the presence or absence of a characteristic, in our case, a firm's credit rating. The LR model estimates the probability that this characteristic is present. Thus, the dependent variable Yi can take on only two possible values:

- $Y_i=1$, if the characteristic is present in observation i.
- $Y_i=0$, if the characteristic is not present in observation i.

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The LR regression model is defined as follows (Sasidharan and Menéndez, 2014):

$$ln\left(\frac{p_i}{1\text{-}p_i}\right)=f(X_1,\ldots X_k)+\varepsilon=\alpha+\sum_{k=1}^{p}\beta_k X_{ik}+\varepsilon, i=1,\ldots.n \quad (1)$$

Where:

- P_i is the probability that Y_i=1
- α is the intercept term
- β_k are the regression coefficients
- ε is the independently and identically distributed error term

The probability P_i can be expressed as:

$$P_i=\frac{1}{(1+e^{-(\alpha+\beta_1X_1+\beta_2X_2+\ldots+\beta_kX_k)})} \quad (2)$$

This expression gives the estimated probability that a given observation belongs to category 1 (i.e., that the characteristic is present), rather than category 0.

Marginal Effects of the LR Regression

Marginal effects provide a probability-based measure of the relative contribution of corporate governance characteristics to credit rating outcomes. By estimating the extent to which variations in individual governance attributes are associated with changes in the likelihood of obtaining a higher credit rating, these measures facilitate a more meaningful assessment of the explanatory importance of each determinant (Ashbaugh-Skaife et al., 2006). Within the LR framework, marginal effects quantify the change in the predicted probability associated with a one-unit increase in an explanatory variable, conditional on the remaining variables being held constant. More specifically, the probability that a company is classified within a higher credit rating category can be expressed as follows:

$$Probability(Y=1)=\frac{oddsratio}{(1+oddsratio)} \quad (3)$$

where

$$oddsratio=e^{-(\alpha+\beta_1X_1+\beta_2X_2+\ldots+\beta_kX_k)} \quad (4)$$

Therefore, for a unit change in X, the partial change in the probability (Y=1) is given by:

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$$\frac{\partial p}{\partial X} = \frac{\partial}{\partial X}\left[\frac{e^{(\alpha+\beta_1 X_1+\ldots+\beta_k X_k)}}{1+e^{(\alpha+\beta_1 X_1+\ldots+\beta_k X_k)}}\right] \quad (5)$$

$$\frac{\partial p}{\partial X} = \beta * \left[\frac{e^{(\alpha+\beta_1 X_1+\ldots+\beta_k X_k)}}{1+e^{(\alpha+\beta_1 X_1+\ldots+\beta_k X_k)^2}}\right] = \beta * p * (1\text{-}p) \quad (6)$$

The probability *p* and *(1-p)* are evaluated at their mean value for the independent variables.

Marginal effects are commonly estimated using two distinct approaches:

Marginal Effect at the Mean (MEM)

This approach determines the marginal effect by evaluating the explanatory variables at their respective sample mean values, thereby representing the estimated probability change for a hypothetical firm characterised by average predictor values.

Average Marginal Effect (AME)

This method first estimates the marginal effect separately for each observation and subsequently calculates the arithmetic mean of these individual effects across the entire sample.

The mathematical formulations of these two approaches are presented as follows:

$$MEM = \frac{\partial p}{\partial X} = g(x'\beta)\beta \quad (7)$$

$$AME = \frac{\sum_{i=1}^{n} g(x'\beta)}{n}\beta, \quad (8)$$

Where the function g () is defined as:

$$g = \left[\frac{e^{(\alpha+\beta_1 X_1+\ldots+\beta_k X_k)}}{1+e^{(\alpha+\beta_1 X_1+\ldots+\beta_k X_k)^2}}\right] \quad (9)$$

The AME demonstrates particularly favourable statistical properties when explanatory variables follow approximately normal distributions. Evidence from Monte Carlo simulations indicates that this estimator can effectively account for scale-related effects while generally exhibiting limited bias, even when the distributions of explanatory variables are substantially skewed. An additional advantage concerns its straightforward interpretation: the AME represents the average change in the predicted probability of attaining a higher credit rating associated with a one-unit increase in a particular explanatory variable, holding the remaining characteristics constant.

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Consequently, the AME is frequently preferred to odds ratios when the objective is to communicate probability-based effects, particularly because of three important properties:

- Robustness: Its capacity to provide relatively stable estimates under different distributional conditions.
- Simplicity of interpretation: Its direct expression of estimated relationships as changes in predicted probabilities.
- Additivity: Its suitability for expressing marginal probability changes on a common, additive scale (Best, 2013).

Within corporate credit rating analysis, marginal effects offer a valuable means of evaluating how sensitive, predicted creditworthiness is to variations in board governance characteristics. This probability-based interpretation facilitates the identification of governance attributes exhibiting the strongest associations with the likelihood of obtaining more favourable credit ratings.

Fisher's Least Significant Difference (LSD) Test

This procedure is employed to determine whether differences between group means are statistically significant. The null hypothesis, H0, is rejected when the calculated *p* value falls below the predetermined significance threshold α. Accordingly, the statistical significance of the observed mean differences is evaluated using the following test statistic:

$$LSD=t_{df,\alpha}*\sqrt{MS_w*\left(\frac{1}{n_1}+\frac{1}{n_2}\right)} \quad (10)$$

where $t_{df,\alpha}$ is the t-critical value for the *t*-distribution with significant level (α and degree of freedom(df) within group from the ANOVA table. MS_w is the mean squares within groups. The sample sizes of each group defined as n_1 and n_2.

Homogeneity of Variance Tests

This section evaluates the assumption of variance homogeneity (homoscedasticity) using several statistical criteria. The assessment determines whether the variances across the comparison groups can be regarded as statistically equivalent. When the resulting p-value falls below the predetermined significance threshold, the null hypothesis of equal variances is rejected, indicating statistically significant evidence of variance heterogeneity (heteroscedasticity).

Bartlett's Test Criterion: This criterion is calculated as (Arsham & Lovric, 2011).

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$$\chi^2=\frac{(N-k)ln\left(S_p^2\right)-\sum_{i=1}^{k}(n_i-1)ln(S_i^2)}{1+\frac{1}{3(k-1)}\left[\sum_{i=1}^{k}\frac{1}{n_i-1}-\frac{1}{N-k}\right]} \tag{11}$$

where $k$samples with sizes n_i and sample variance S_i^2. The $N=\sum_{i=1}^{k}n_i$ and

$$S_p^2=\frac{1}{N-k}\sum_{i=1}^{k}(n_i-1)S_i^2$$

is the pooled estimate for the variance.

Levene‘s Test (LT) Criteria: This criteria is denoted as:

$$W=\frac{(N-k)}{(k-1)}*\frac{\sum_{i=1}^{k}N_i(Z_{i.}-Z_{..})^2}{\sum_{i=1}^{k}\sum_{j=1}^{N_i}N_i\left(Z_{ij}-Z_{i.}\right)^2} \tag{12}$$

where k is the number of different groups to which the sampled cases belong,$N_i$is the number of cases in the ith group, N is the total number of cases in all groups, Y_{ij} is the value of the measured variable for the jth case from the ith group, andY_i is a mean of the ith group, where $Z_{i.}=\frac{1}{N_i}\sum_{j=1}^{N_i}Y_{ij}-\overline{Y}_{i.}\vee$ and $Z_{..}=\frac{1}{N}\sum_{i=1}^{k}\sum_{j=1}^{N_i}Y_{ij}-\overline{Y}_{i.}\vee$.For more details see (Derrick et al. 2018).

ANOVA F-Ratio (AF) Criteria: These criteria is defined as:

$$F=\frac{\sum_{i=1}^{K}n_i\left(\overline{Y}_{i.}-\overline{Y}\right)^2/(K-1)}{\sum_{i=1}^{K}\sum_{j=1}^{n_i}\left(\overline{Y}_{ij}-\overline{Y}_{i.}\right)^2/(N-K)} \tag{13}$$

Where $\overline{Y}_{ij}$ is the jth observation in the ith out of K groups, $\overline{Y}_{i.}$ denotes the sample mean in the ith group, $\overline{Y}$ denotes as the overall mean of the data, n_i is the number of observation in the ith group, and N is the sample size.

Kruskal-Wallis Test Statistic (K-W) Criteria: This criteria is defined as:

$$H=(N-1)\frac{\sum_{i=1}^{K}n_i\left(\overline{Y}_{i.}-\overline{Y}\right)^2}{\sum_{i=1}^{K}\sum_{j=1}^{n_i}\left(\overline{Y}_{ij}-\overline{Y}_{i.}\right)^2} \tag{14}$$

Where $\overline{Y}_{ij}$ is the jth observation in the ith out of K groups, $\overline{Y}_{i.}$ denotes the average rank in the ith group, $\overline{Y}$ denotes as the overall average of all Y_{ij}, n_i is the number of observation in the ith group, and N is the sample size .

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The Kruskal–Wallis test is a non-parametric alternative to one-way ANOVA, used to determine whether there are statistically significant differences between the distributions of independent groups.

EMPIRICAL ANALYSIS

This section investigates the economic implications of corporate governance characteristics for firms' credit ratings by employing a dichotomous classification of creditworthiness. The empirical assessment integrates the LR framework with marginal effects estimation to evaluate both the statistical relationships between governance mechanisms and credit rating outcomes and the magnitude of their associated probability changes.

LR Model Results

Table 1 reports the LR estimates obtained from the sample of companies using the recoded binary dependent variable, which distinguishes between outcomes '0' and '1'. To facilitate interpretation, the estimated regression coefficients are exponentiated and expressed as odds ratios. An odds ratio exceeding 1 indicates that a one-unit increase in an explanatory variable X_k is associated with higher odds of the outcome Y=1, whereas a value below 1 indicates a reduction in those odds. The direction of this relationship is determined by the sign of the underlying logistic coefficient: positive coefficients produce odds ratios greater than 1, while negative coefficients yield values below 1. The empirical findings identify BRD_EXPERT and BRD_SIZE as statistically significant positive predictors of higher corporate credit ratings (Y=1). Conversely, BRD_STOCK and BRD_IND exhibit statistically significant negative associations with the likelihood of attaining a higher rating. The estimated coefficient for R_D, however, is statistically insignificant, suggesting insufficient empirical evidence of a systematic relationship between leadership duality and corporate creditworthiness within the examined sample.

Table 1: LR Regression Results of the Effects of Corporate Governance on Firm Credit Ratings (Dependent Variable = B Category of WVB_CR

Variables	Estimated Coefficient	S.E	*t*-Ratio	*p*-Value
Constant	-1.821	0.549	3.317	0.001
BRD_IND	-1.252	0.648	1.932	0.053*
R_D	0.087	0.23	0.378	0.704
BRD_EXPERT	1.405	0.425	3.306	0.001***
BRD_STOCK	-1.776	0.42	4.229	0.000***
BRD_SIZE	0.256	0.044	5.818	0.000***
Chi-square (Model): 66.875*** -2Log likelihood: 650.939 Cox and Snell R Square: 0.109 Nagelkerke R Square : 0.154				

Note: *** Significant at the 1%, ** Significant at the 5% and *Significant at the 11% significance level.

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Figure 2 provides a graphical representation of the regression coefficients reported in Table 1, incorporating error bars to illustrate their associated standard errors and markers to distinguish estimates according to their statistical significance.

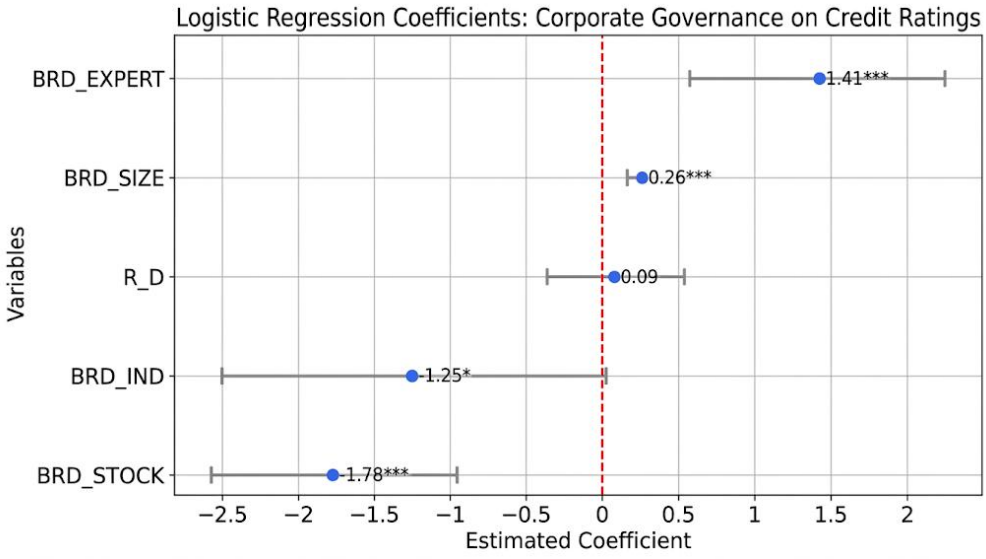

Figure 2: The Effect Plot

The estimated governance coefficients reveal substantial differences in both the direction and magnitude of their associations with corporate creditworthiness. BRD_EXPERT exhibits a positive coefficient that is statistically significant at the 1% level. Its corresponding odds ratio, exp(1.405) = 4.076, indicates that each one-unit increase in BRD_EXPERT is associated with approximately 4.08 times greater odds of obtaining a higher credit rating. Similarly, BRD_SIZE demonstrates a statistically significant positive relationship at the 1% level, with an odds ratio of 1.292, suggesting that the addition of one board member corresponds to an approximately 29% increase in the odds of achieving a higher rating. Conversely, BRD_STOCK displays a negative coefficient that is statistically significant at the 1% level. The estimated odds ratio, exp(−1.776) = 0.169, implies that a one-unit increase in BRD_STOCK is associated with an approximately 83% reduction in the odds of receiving a higher credit rating. BRD_IND likewise exhibits a negative association, reported as significant at the 11% level, with an odds ratio of 0.286 (exp(−1.252)). This estimate indicates that each additional unit of BRD_IND corresponds to an approximately 71% decrease in the odds of attaining a higher credit rating.

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Marginal Effects Results

Marginal effects are estimated using two complementary approaches that differ in how the explanatory variables are evaluated. The first, MEM, calculates the effect on predicted probability by assigning all explanatory variables their respective sample mean values.

Table 2: Assessment of Marginal Effect of Corporate Governance (AME)

Variables	Average Marginal Effect (AME)
BRD_IND	-0.2387*
R_D	0.0167
BRD_EXPERT	0.2680***
BRD_STOCK	-0.3387***
BRD_SIZE	0.0488***

Note: ***Significant at the 1%, ** Significant at the5% and * Significant at the 11% significance level.

The second, AME, estimates observation-specific marginal effects before averaging them across the entire sample. Compared with odds ratios, AME offers several interpretative advantages, particularly its robustness, straightforward probability-based interpretation and additivity.

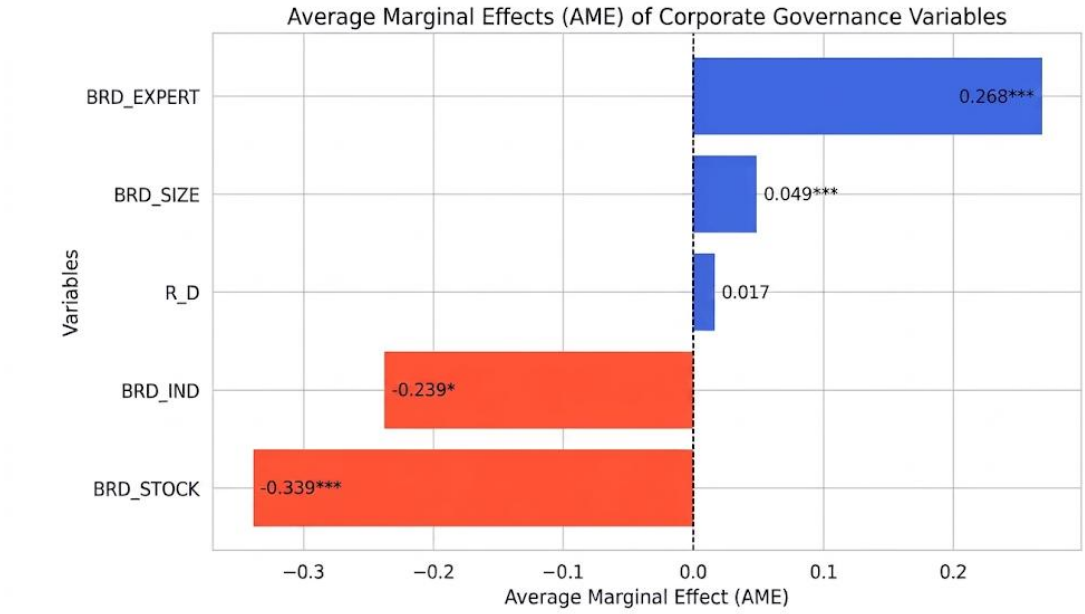

Figure 3: AME

Tables 2 and 3 present the AME and MEM estimates derived from the LR model, respectively, while Figures 3 and 4 illustrate the corresponding results graphically.

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Table 3: Assessment of Marginal Effect of Corporate Governance (MEM)

Variables	Marginal Effect at Mean (MEM)
BRD_IND	-0.2590*
R_D	0.0183
BRD_EXPERT	0.2908$***
BRD_STOCK	-0.3676***
BRD_SIZE	&0.0530***

Note: ***Significant at the 1%, ** Significant at the 5% and * Significant at the 11% significance level.

The AME estimates presented in Table 2 indicate that a one-unit increase in BRD_SIZE is associated with a 0.0488 increase in the predicted probability of obtaining a higher credit rating.

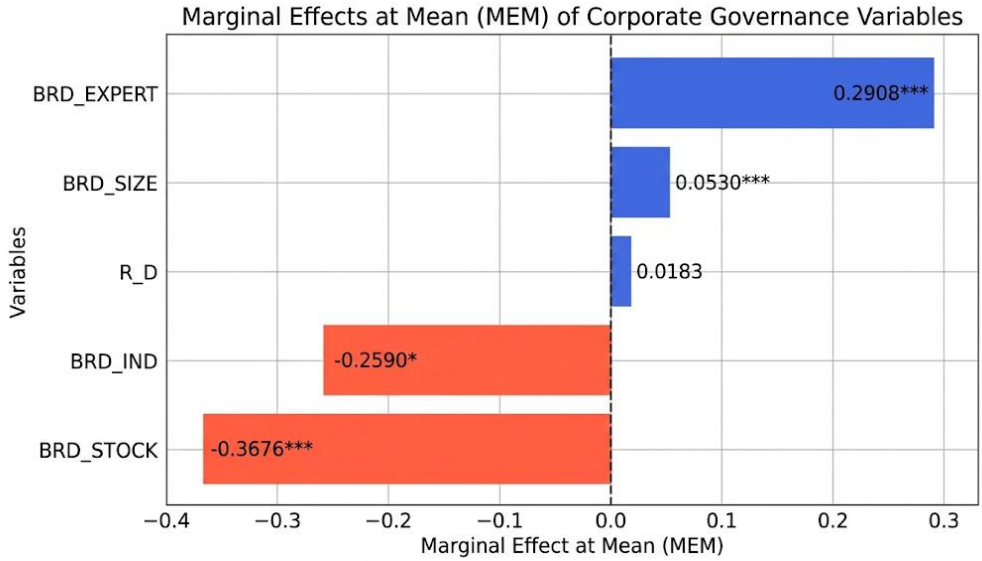

Figure 4: MEM Plot

The sample mean of BRD_SIZE is 8.27 directors, suggesting that additional board membership contributes a relatively modest improvement in predicted creditworthiness. The limited magnitude of this probability change may indicate diminishing benefits around the observed average board size, although it does not independently establish an optimal board composition.

When the chief executive officer simultaneously occupies the position of board chairperson (R_D), the predicted probability of attaining a higher credit rating increase by 0.0167. In contrast, the results for BRD_IND indicate an inverse relationship with corporate creditworthiness. Independent directors account for approximately 33% of board membership on average, and the estimated AME of −0.2387 suggests that a one-unit increase in the proportion of independent directors is associated with a 0.2387 reduction in the probability of receiving a rating of B or above. This negative

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association may reflect limitations in the effectiveness of independent directors' monitoring responsibilities, particularly their ability to ensure that managerial decisions adequately protect shareholder interests. Nevertheless, the estimate establishes an association rather than confirming the underlying governance mechanism.

A similarly negative relationship emerges for BRD_STOCK. With a sample mean of 0.85, the estimated AME of −0.3387 indicates that a one-unit increase in this variable corresponds to a 0.3387 reduction in the predicted probability of achieving higher creditworthiness. These findings suggest that greater board independence or stock ownership does not necessarily translate into improved credit ratings within the observed sample. Although the results may be consistent with limited additional benefits around prevailing governance levels, they do not provide sufficient evidence to identify an optimal level of board independence. Conversely, BRD_EXPERT exhibits a positive association with the probability of attaining a rating of B or above. The sample indicates an average BRD_EXPERT level of approximately 52%, suggesting that greater representation of directors with external board experience is associated with an increased likelihood of moving from a lower to a higher credit rating category.

Fisher and Homogeneity Tests

Table 4 reports the bivariate and one-way statistical analyses conducted for the five corporate governance characteristics. The analytical framework incorporates Fisher's LSD procedure for pairwise comparisons, alongside four complementary statistical tests: Bartlett's test (BT) and Levene's test (LT), which assess variance homogeneity; the analysis of variance (ANOVA) F-ratio (AF), which examines differences between group means; and the Kruskal–Wallis (K–W) test, which evaluates differences across groups using a non-parametric approach. The Fisher's LSD analysis encompasses six pairwise comparisons among the four WVB rating categories, extending from Pair 1 (BB3–BB versus B3–B) to Pair 6 (C3–C versus D). The findings indicate that the governance characteristics exhibit differing patterns across credit rating categories rather than maintaining uniform relationships throughout the rating distribution. This variation reinforces the study's central argument that reducing creditworthiness to a binary classification may obscure meaningful differences between firms occupying distinct risk categories. A more differentiated rating framework therefore offers additional insight into the governance–creditworthiness relationship. The following analysis examines the empirical findings for BRD_IND, R_D, BRD_EXPERT, BRD_STOCK and BRD_SIZE, focusing on their respective patterns across the credit rating categories.

The pairwise comparisons for BRD_IND reveal considerable variation in statistical significance and coefficient direction. Significant differences are identified in Pairs 1, 2, 3 and 6, with estimated coefficients of 0.047, −0.0325, 0.069 and 0.037, respectively,

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whereas Pairs 4 and 5 are statistically insignificant. The positive estimates observed in Pairs 1 and 3 contrast with the negative coefficient in Pair 2, indicating that differences in board independence are not consistent across rating-group comparisons. The supplementary statistical procedures also identify significant variation among the groups. BT produces a statistic of 7.994, while LT yields 13.183. The corresponding AF and K–W statistics are 2.629 and 2.516, respectively, with all four tests reported as statistically significant at conventional thresholds. The significant variance tests provide grounds for rejecting the null hypothesis of equal variances, while the AF and K–W findings indicate differences in group means and distributions, respectively. Importantly, the K–W result provides evidence of distributional differences without requiring the normality assumption associated with conventional parametric comparisons.

Among the five governance characteristics, R_D demonstrates the least consistent statistical significance across the Fisher's LSD comparisons. Five of the six pairwise estimates are insignificant, with the sole significant difference occurring in Pair 6 (C3–C versus D), where the coefficient equals −0.080. This negative estimate indicates a lower mean value of R_D in the C3–C category relative to the D category, according to the stated comparison order, rather than establishing a direct probability effect. The supplementary tests produce divergent findings. BT is statistically insignificant, with a value of 2.000, providing insufficient evidence to reject variance homogeneity. Conversely, LT (9.949), AF (2.463) and K–W (2.457) are reported as significant, indicating differences in variance, group means or distributions, as appropriate to each procedure. The discrepancy between BT and LT may reflect their differing sensitivities to departures from normality, with LT generally demonstrating greater robustness under non-normal distributions. Taken together, the pairwise results provide evidence of a significant difference in only one rating-group comparison, broadly aligning with the LR findings, which do not identify a statistically significant overall association between R_D and corporate creditworthiness.

BRD_EXPERT exhibits a heterogeneous pattern across the Fisher's LSD comparisons. Statistically significant negative coefficients are reported for Pairs 3, 4, 5 and 6, with respective estimates of −0.098, −0.048, −0.112 and −0.065, whereas the differences in Pairs 1 and 2 are insignificant. These results indicate that the distribution of board expertise differs across particular rating categories. Notably, the negative pairwise estimates contrast with the positive association identified through the LR model and its corresponding marginal effects. The supplementary tests further reveal differences in statistical outcomes. Neither BT (2.366) nor LT (0.862) is significant, suggesting insufficient evidence of unequal variances across rating groups. However, both AF (23.301) and K–W (22.698) are significant, indicating differences in group means and distributions. The divergence between the Fisher's LSD comparisons and LR estimates may arise from their distinct analytical specifications. Whereas the pairwise procedure evaluates differences between rating groups without adjusting for other governance

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characteristics, the LR framework estimates conditional associations while accounting for the remaining explanatory variables. The positive LR relationship is consistent with the findings of Ashbaugh-Skaife et al. (2006), although the evidence presented in Table 4 demonstrates that board expertise does not exhibit an identical pattern across all credit rating categories.

BRD_STOCK demonstrates the most widespread statistical significance after BRD_SIZE within the Fisher's LSD comparisons. Positive and significant mean differences are identified in five of the six comparisons, with coefficients of 0.074, 0.125, 0.122, 0.051 and 0.048 for Pairs 1–5, respectively. Pair 6 produces a negative estimate of −0.003, which is statistically insignificant. These findings indicate that board stock ownership differs positively across most of the specified rating-group contrasts. Nevertheless, this pattern differs from the negative association reported in the LR analysis and its marginal effects estimates. As with BRD_EXPERT, the discrepancy may reflect the distinction between unadjusted pairwise comparisons and multivariable regression estimates. All four supplementary tests are reported as statistically significant, with BT = 5.057, LT = 15.132, AF = 14.921 and K–W = 11.518. These findings indicate differences in the variability, means and distributions of BRD_STOCK across the rating categories. Consequently, board stock ownership appears relevant to distinguishing among credit rating groups, although the direction of its association with higher creditworthiness differs when other governance characteristics are incorporated into the regression specification.

The findings for BRD_SIZE reveal statistically significant differences in all six Fisher's LSD comparisons. Every estimated coefficient is negative, ranging from −0.316 in Pair 6 to −1.880 in Pair 3. These estimates indicate a consistent direction of mean differences across the specified rating-group comparisons, although their interpretation depends on the ordering of the categories. This pattern contrasts with the positive coefficient and marginal effects obtained from the LR model. The absolute magnitudes of the pairwise estimates are also greater than those reported for the other governance characteristics. The supplementary tests produce mixed findings: AF (24.457) and K–W (21.992) are statistically significant, whereas BT (2.350) and LT (1.291) are insignificant. Accordingly, the results support differences in board size across rating-group means or distributions but do not provide sufficient evidence to reject the assumption of equal variances. The contrasting findings from the Fisher's LSD and LR analyses may be attributable to differences in model specification, particularly the inclusion of other governance variables in the multivariable regression. Considering both approaches therefore provides a more comprehensive understanding of how board size relates to corporate creditworthiness.

Overall, Table 4 yields three principal insights into the association between corporate governance arrangements and credit rating outcomes. First, governance characteristics exhibit varying patterns across the six pairwise comparisons among the four rating

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categories, demonstrating that a binary classification may conceal important differences within the creditworthiness distribution. Second, the results for BRD_EXPERT, BRD_STOCK and BRD_SIZE differ between the Fisher's LSD and LR analyses, reflecting the distinction between unadjusted group comparisons and conditional multivariable associations. Whereas Fisher's LSD identifies differences between rating-category means, LR estimates the relationship between each governance characteristic and the binary creditworthiness outcome while accounting for the other explanatory variables.

Table 4: Bivariate and One-Way Findings of Corporate Governance Variables

Variables	Fisher's Least Significant Difference Test					
	1	2	3	4	5	6
BRD_IND	0.047**	-0.032$*	0.069***	-0.015	0.022	0.037**
R_D	-0.017	0.042	-0.038	0.059	-0.020	-0.080*
BRD_EXPERT	0.014	-0.033	-0.098***	-0.048*	-0.112***	-0.065***
BRD_STOCK	0.074***	0.125***	0.122***	0.051*	0.048*	-0.003
BRD_SIZE	-0.950***	-1.570***	-1.880***	-0.620**	-0.940***	-0.316

Variables	Different Criteria Tests			
	BT	LT	AF	K-W
BRD_IND	7.994***	13.183***	2.629*	2.516*
R_D	2.000	9.949***	2.463*	2.457*
BRD_EXPERT	2.366	0.862	23.301***	22.698***
BRD_STOCK	5.057**	15.132***	14.921***	11.518***
BRD_SIZE	2.350	1.291	24.457***	21.992***

Note (1): 1=(BB3-BB) to (B3-B), 2=(BB3-BB) to (C3-C), 3=(BB3-BB) to (D), 4=(B3-B) to (C3-C), 5=(B3-B) to (D), 6=(C3-C) to (D). BT= Bartlett's Test, LT= Levene's Test. AF= ANOVA F-Ratio (Test of Means), K-W= Kruskal-Wallis test statistic.
Note (2): *** Significant at the 1%, ** Significant at the 5%, * Significant at the 11% level of significance.

Third, the supplementary tests identify differences in governance characteristics across rating groups, including evidence of variance heterogeneity for BRD_IND, BRD_STOCK and R_D, particularly according to LT. The differing outcomes obtained from BT, LT, AF and K–W emphasise the value of combining parametric and non-parametric procedures when evaluating group-level variation. Together, these findings provide a more differentiated assessment of governance characteristics across corporate credit rating categories.

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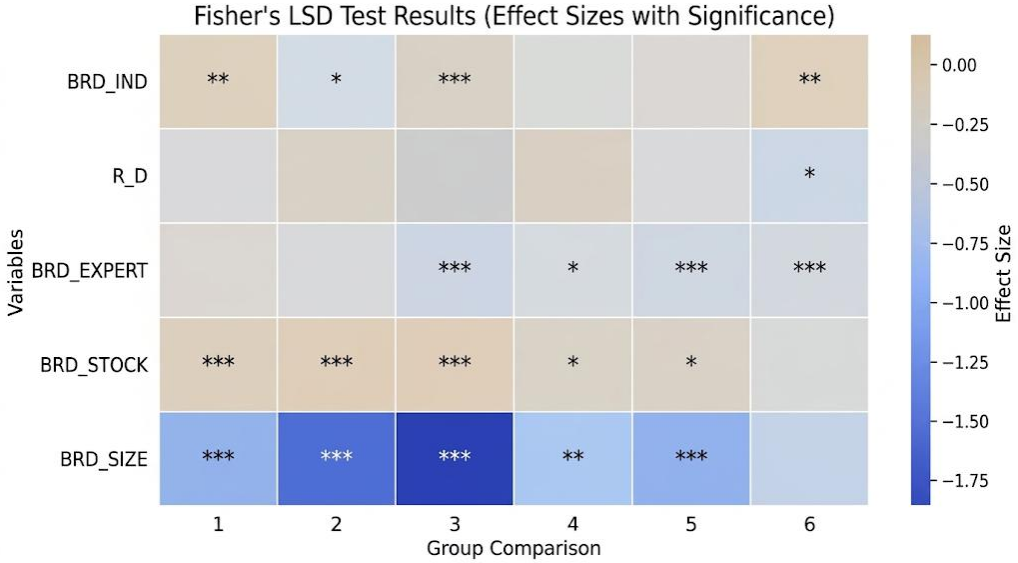

Figure 5: Heatmap of Fisher's Least Significant Difference Test

The results are additionally illustrated in Figure 5, which presents a heatmap displaying the direction and statistical significance of the Fisher's LSD pairwise comparisons, and Figure 6, which summarises the outcomes of the homogeneity tests.

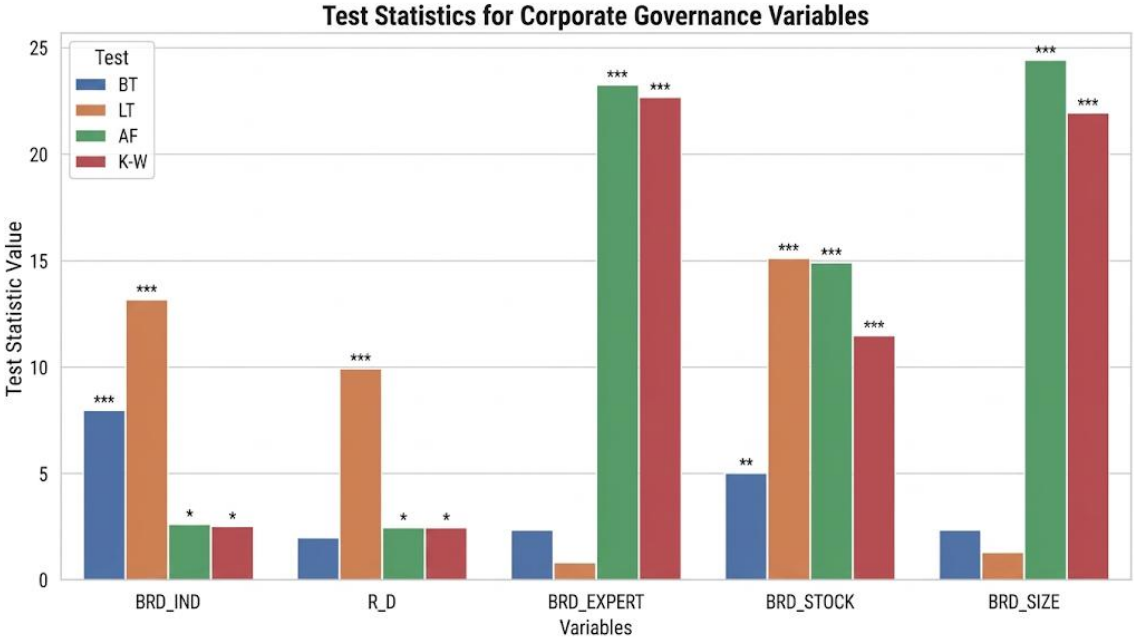

Figure 6: Bar Chart for Test Statistics (BT, LT, AF, K-W)

Figure 7 presents the relationships between corporate governance characteristics and the predicted probability of obtaining a higher credit rating. The findings indicate

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statistically significant positive associations for BRD_EXPERT and BRD_SIZE, suggesting that greater board expertise and larger board membership correspond to an increased likelihood of attaining more favourable credit ratings. Conversely, BRD_STOCK and BRD_IND exhibit negative associations, indicating that greater director share ownership and independent board representation are associated with reduced predicted creditworthiness. These patterns may reflect potential limitations associated with concentrated director ownership or board independence, although the estimates do not establish that either characteristic is excessive or directly detrimental to creditworthiness. In contrast, R_D demonstrates a comparatively small and statistically insignificant relationship with credit rating outcomes. The marginal effects estimates further clarify the relative magnitude of these associations, identifying BRD_STOCK and BRD_EXPERT as particularly influential governance characteristics in explaining variations in the predicted probability of achieving a higher credit rating.

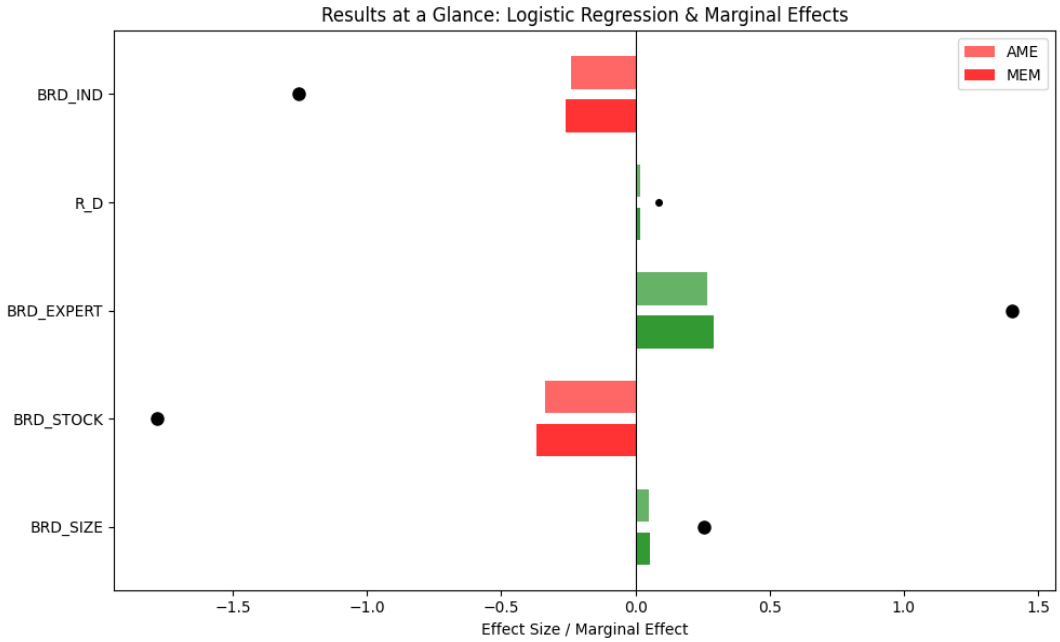

Figure 7: Results at Glance LR Regression / Marginal Effects

Findings and Interpretation

The empirical estimates provide the basis for the following findings concerning the five corporate governance characteristics and their relationships with corporate credit ratings.

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Board Independence (Hypothesis 1)

Hypothesis 1 proposes that BRD_IND has no effect on the credit ratings of Jordanian firms. The LR estimates reveal a negative association between independent board representation and corporate creditworthiness, reported as statistically significant at the 11% level. The Fisher's LSD comparisons further identify significant differences in Pairs 1, 2, 3 and 6, whereas Pairs 4 and 5 are statistically insignificant. These findings suggest that the relationship between BRD_IND and creditworthiness varies across rating categories rather than exhibiting a uniform pattern. Furthermore, the reported variance homogeneity tests provide evidence against the null hypothesis of equal variances, indicating differences in the variability of board independence across credit rating groups. Overall, the results suggest that independent director representation is associated with creditworthiness, although the strength and direction of this relationship depend on the rating categories examined.

Role Duality (Hypothesis 2)

Hypothesis 2 states that R_D, whereby the chief executive officer simultaneously serves as board chairperson, does not influence the credit ratings of Jordanian companies. The LR findings indicate that the relationship between R_D and corporate creditworthiness is statistically insignificant. Consistent with this result, Fisher's LSD comparisons identify no significant differences in five of the six rating-group contrasts, except for Pair 6 (C3–C versus D), which exhibits a significant negative coefficient. This isolated finding suggests that leadership duality may be associated with differences between credit rating categories, although the evidence does not establish a consistent relationship across the full rating distribution. Consequently, the results provide insufficient support for concluding that separating the chief executive officer and chairperson roles systematically improves or reduces corporate creditworthiness. Regarding the supplementary tests, LT, AF and K–W yield statistically significant results, indicating differences in variance, group means and distributions, respectively, while BT does not provide significant evidence of variance heterogeneity.

Board Expertise (Hypothesis 3)

Hypothesis 3 assumes that BRD_EXPERT does not influence the credit ratings of Jordanian firms. However, the LR results identify a positive relationship between board expertise and corporate creditworthiness that is statistically significant at the 1% level. This finding indicates that companies with greater representation of directors possessing external board experience are more likely to obtain favourable credit ratings. In contrast, the bivariate Fisher's LSD analysis produces statistically significant negative coefficients for Pairs 3, 4, 5 and 6, while Pairs 1 and 2 remain insignificant. The divergence between these estimates highlights the distinction between unadjusted comparisons across rating groups and the conditional associations estimated through

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multivariable regression. The positive LR finding is consistent with the evidence presented by Ashbaugh-Skaife et al. (2006), which emphasises the relevance of board expertise to corporate governance outcomes. Furthermore, AF and K–W are statistically significant, demonstrating differences in group means and distributions, whereas the variance homogeneity tests do not provide sufficient evidence to reject equal variances. Taken together, the LR findings support a positive association between BRD_EXPERT and higher credit ratings, although the pairwise comparisons indicate that this relationship is not uniform across rating categories.

Board Stock Ownership (Hypothesis 4)

Hypothesis 4 proposes that BRD_STOCK has no effect on the credit ratings of Jordanian companies. The LR estimates, however, demonstrate a statistically significant negative association at the 1% level, indicating that greater director share ownership corresponds to a lower likelihood of obtaining favourable credit ratings. This finding differs from earlier evidence suggesting positive relationships between director ownership and corporate governance outcomes (Ashbaugh-Skaife et al., 2006). Conversely, the bivariate Fisher's LSD analysis identifies significant positive mean differences in Pairs 1–5, while Pair 6 is statistically insignificant. These contrasting findings suggest that the relationship between director shareholding and creditworthiness depends partly on whether other governance characteristics are incorporated into the analytical specification. The supplementary tests also report statistically significant results across BT, LT, AF and K–W, providing evidence of differences in variances, means and distributions among the rating groups. Overall, the results indicate that greater board stock ownership does not necessarily correspond to improved corporate creditworthiness in Jordan, particularly after accounting for other governance mechanisms.

Board Size (Hypothesis 5)

Hypothesis 5 maintains that BRD_SIZE does not influence the credit ratings of Jordanian firms. The LR analysis contradicts this proposition by identifying a positive association between board membership and higher credit ratings, statistically significant at the 1% level. This finding suggests that companies with larger boards tend to exhibit greater predicted creditworthiness after accounting for the remaining governance characteristics. The bivariate Fisher's LSD comparisons, however, produce significant negative coefficients across all six rating-group contrasts, indicating differences in board size between the specified rating categories. The contrasting directions of the LR and pairwise estimates may reflect differences between adjusted regression relationships and unadjusted group comparisons. Although larger boards may provide additional expertise and monitoring capacity, potential coordination difficulties and diminishing governance benefits cannot be established directly from these estimates. The supplementary AF and K–W tests are statistically significant,

confirming differences in group means and distributions, whereas BT and LT do not indicate significant variance heterogeneity. Accordingly, the findings support a positive conditional relationship between BRD_SIZE and creditworthiness while demonstrating considerable variation across the original credit rating categories.

CONCLUSION

This study investigates the relationship between five board-level governance mechanisms (BRD_IND, R_D, BRD_EXPERT, BRD_STOCK and BRD_SIZE) and WVB credit ratings among Jordanian listed firms. Using LR, marginal effects analysis and rating-group comparisons, firms are classified into higher (B and above = 1) and lower (0) credit rating categories. The findings reveal significant positive associations between BRD_EXPERT, BRD_SIZE and higher credit ratings, whereas BRD_IND and BRD_STOCK exhibit significant negative relationships. R_D shows no statistically significant association. Notably, the negative relationship between BRD_STOCK and creditworthiness challenges agency and stewardship theory expectations, suggesting that greater director ownership does not necessarily improve corporate oversight or creditworthiness. Overall, the findings highlight the varying implications of governance mechanisms for credit risk, with board expertise and size showing more favourable associations than director ownership. These relationships may also depend on institutional conditions and interactions among governance characteristics. Future research should examine their consistency across emerging economies with different cultural and regulatory environments to deepen understanding of corporate governance, credit risk and firm performance.

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