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Corporate Governance and Corporate Failure Likelihood in Nigeria: A Heckman Model Approach

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Authors' Contributions

This work was carried out in collaboration among all authors.
All authors read and approved the final manuscript.

Research Article

ABSTRACT

The study examined corporate governance and the likelihood of corporate failure with particular focus on non-financial companies in Nigeria. The objectives were to determine the likely effect that board size, board independence and board gender diversity will have on financial failure of corporate organisations. The Altman Z score model was used as indicator for failure likelihood and the research design used was the ex-post facto research design. The study adopted a positivism research philosophy and examined 75 non-financial companies listed on the Nigerian Exchange Group. The study adopted the binary regression technique for the initial estimation and then for robustness, this study uses the Heckman selection model for sample selection, which simultaneously tackles discrete/continuous modeling issues, unobserved heterogeneity, selectivity bias, and endogeneity issues. From the results, at 5% level of significance, board size shows a positive effect on failure likelihood. Secondly, an increase in board independence will result into a decrease in corporate failure since board independence is negative in both the response and selection equations. Thirdly, despite being insignificant at 5%, Board gender diversity is negative in both the response and selection equations, which implies that increasing the level of board gender diversity will result in reducing the likelihood of corporate failure. However, caution is exercised in drawing inferences due to the non-statistical significance of the variable. The study recommends that listed firms may need to cut down their board sizes. Secondly, the study recommends that corporate boards should increase their board independence levels. Thirdly, the study recommends that boards need to look at their board gender diversity levels.

Keywords: Altman Z score model, corporate failure likelihood, corporate Governance, Heckman model, non-financial companies,

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INTRODUCTION

The danger of corporate failure poses a serious concern to businesses, irrespective of size or operations. Recent data have revealed that the statement that a firm is too big to fail is no longer valid, since both large and small businesses may collapse if the foundations are not adequately managed (Nicoleta & Mara, 2020). As a result, it's no wonder that during the previous four decades, the field of business failure prediction has grown in importance (Manduku, Mulwa, Omolo & Lari, 2020). Globally, and particularly in after the 2007-2008 financial crisis, countries and economic blocs are placing a greater emphasis on rethinking issues that may constitute substantial risk to corporate failure (Wahua, 2017). This includes not only strategies to address corporate failure, including bailouts and government action, but also re-examining the drivers that can lead to high corporate failure risk for companies around the world.

The focus on corporate governance is justified since board failure has been established as a key driver of not just business failures but also bankruptcy (Mujih, 2018; Tsekpo & Wahua, 2023). When the corporate governance of organisation is weak, it may result to a decline in performance of organisations which can jeopardize the organisation's existence. As a result, flaws in corporate governance should be rectified to avoid failure and eventual collapse. In this context, one of the most important lessons learned in the aftermath of the crisis is the significance of efficient corporate governance processes (Symes & Nosworthy, 2020; Ozili, 2020). Perhaps, therefore the corporate governance law places a greater emphasis on the board of directors than on other aspects of corporate governance (Chenchehene, 2019; Tsekpo, Wahua, Ngwenya, Akpomeyoma & Brobbey, 2024). As a result, the influence of corporate governance on corporate failure was examined in this study.

Extant literature has looked at the relationship among corporate governance and corporate failure, with mixed results. For example, while such as Simpson and Gleason (2019) found that CEO duality is linked to a

lower probability of financial distress, Sharma (2001) finds that CEO duality is not associated with financially distressed status, and CEO duality on the occurrence of financial distress did not lead to significant results in a study by Brédart (2018). Furthermore, according to Nahar (2018), his results of board independence not being connected with financial distress status contradict Elloumi and Gueyié's (2019) results. According to Chenchehene (2019), the components of board composition is significantly and negatively associated to a company's likelihood of failure. Nonetheless, board size, and board independence show positive association to a company's corporate failure. Also, between 2007 and 2012, Manzanque et al. (2019) in their study on board size financial distress in Spain discovered a negative association among board size and corporate failure. Manduku, Mulwa, Omolo and Lari, (2020), conducted their study and it was determined that the board independence and size significantly and negatively affect financial distress of organisation. On the other hand, board diversity has a positive association with firms' corporate failure. This contradicts those of Ud-Din, Khan, Javeed and Pham (2020) who submitted that there is a strong and positive connection between board size and corporate failure.

The lack of significant results in prior studies in this research area amongst other issues may be attributed to failure of studies to effectively control for sample selection bias and endogeneity. Sample selection bias presents a huge challenge to most empirical corporate governance studies when analyzing limited dependent variables using either truncated distribution or censored data to infer the untruncated or uncensored distribution for the entire population (Greene, 2003) as is used in this study. The study thus addresses this gap and makes a contribution in the area of statistical modelling by employing the Heckman's sample selection to simultaneously control for both sample selection bias and endogeneity using both regression equation considering mechanisms determining the outcome variable and the

selection equation considering a portion of the sample whose outcome is observed and mechanisms determining the selection process (Heckman, 1978, 1979).

THEORETICAL FRAMEWORK

From the resource dependence theory, a firm's survival is dependent on its ability to establish control over its critical resources (Pfeffer & Salancik, 1978). Where a firm lacks critical resources, it becomes reliant on the external environment, and this dependence creates uncertainty that is harmful because it obscures the firm's control of resources and choice of strategies obstructing everyday functioning thereby affecting the firm's performance and its likelihood of financial distress (Rivas 2012). When a firm can cope effectively with uncertainty, it leads to power (Pfeffer & Salancik 1978) and an increase in its survival likelihood. The supporters of this theory argue that the board depends on the resources of the organization and explore how board capital contributes to the capability of firms to provide resources needed for survival. According to the resource dependence theory, directors are expected to give advice and counsel, bring legitimacy and access to significant constituents outside the firm, serve as channels for communicating information between external companies and the firms, and help in strategic development (Haynes and Hillman 2010). Thus, from the resource dependence theory (Pfeffer, 1973; Kiel & Nicholson, 2003), the board of directors links their companies to the external environment, which reduces uncertainties and facilitates securing critical resources including finance, information, and reputation (Ntim et al. 2015).

EMPIRICAL REVIEW / HYPOTHESES

Board Size and corporate Failure

There has been discussion in literature concerning the relationship between the likelihood of corporate crisis and size of organisation's board. Empirical research is also increasing in this regard but usually

shows that the relationship is pretty heterogeneous. For instance, Adams and Ferreira (2007) used logistic regression analysis to evaluate the link between corporate governance and financial hardship or default. This study compared the financial performance of firms that remain viable compared to those that are experiencing difficulties, utilizing financial indicators as a benchmark. According to the study, when the board of directors increases, there is a corresponding increase in the likelihood of company failure and financial loss for the company. The conclusion of the study is therefore in favour of the use of lesser number on the board. Similarly, Muqaddas, et al., (2018) examined distressed and non-distressed firms in Pakistan between 2006 and 2010, concentrating on the manufacturing sector. The technique employed in the study is the logit regression techniques which identified financially distressed companies as companies with negative EPS for five years in a row. The statistics on board size suggest a confident impact, indicating that when board size increases, the tendency of a firm going into financial difficulty also increases.

Darrat et al. (2016), on the other hand, found a negative correlation between board size and company failure, supporting the idea that a larger board reduces the likelihood of bankruptcy for complex companies. This suggests that a larger board has access to additional connections, expertise, experience, and knowledge. Additionally, Manzaneque et al., (2015) investigated the effect of corporate governance on the risk of financial distress in Spanish publicly traded companies. The data used in the analysis started included 308 observations starting from 2007 to 2012. The data was divided into two equal parts, 50% were classified as financially viable while the remaining 50% as not financially viable. Using conditional logistic modelling, the researchers established a non-positive relationship between board size and likelihood of corporate distress.

Based on the above, the hypothesis below is examined.

H₀₁: Board size has no significant impact on corporate failure likelihood of firms in Nigeria.

Board Independence and Corporate Failure/Distress

Several researches have been conducted on board independence and corporate failure. However, the results from these researches are still mixed, while some show positive correlation, others show negative correlation. In a positive correlation, when the board size is higher, the tendency for corporate failure is also higher, and in this sense, a positive board independence coefficient from the regression. Conversely, a negative correlation shows that when the board size is increased, the less likely the corporate failure will be.

Reviewing extant literature, studies showing a positive relationship includes those of Chang (2009) which discovered a positive relationship between the number of independent directors on a board and the likelihood of bankruptcy. This means, more independent directors in the company will lead to a greater likelihood of bankruptcy. Hanani and Dharmastuti (2015) studied the influence of board independence on the likelihood of bankruptcy in a similar vein. The study which looked at the association between the independence of the board and corporate failure, collected records from 30 firms in the consumer product sector from 2010 to 2012 in Indonesia. The study employed a linear regression fixed effect model and vector decomposition to analyze the data. The study concluded that when the number of independent directors increases, this may likely increase the risk of corporate failure.

Younas, et al (2021) evaluated the influence of the Pakistan Stock Exchange's corporate governance index (PAKCGI) on financial distress for a sample of 152 non-financial businesses listed on the PSX from 2003 to 2017. A random effect model is used to evaluate the influence of PAKCGI on financial distress (Altman Z-Score). The PAKCGI uses Altman Z-score model to

represent corporate distress. The PAKCGI is an index created from five fundamental elements of corporate governance standards which include, shareholders' rights; board of directors; disclosure; risk management; and audit committees;. According to the results of the study, PAKCGI improves the likelihood of companies going into financial distress.

However, there are other studies that show that board independence is linked to corporate failure. Take, for example, Fich and slezak's (2008) looked at the connection among board independence and bankruptcy risk of organisations. They found a strong correlation between independence of the board and bankruptcy risk of firms under study. Specifically, they found that the independence of the boards increases when there are directors from outside the organisation and this is more likely to reduce their chances of bankruptcy. Manzanque, et al., (2015) investigated the effect of board independence on the risk of financial crisis in publicly traded Spanish companies. The study collected 308 observations between 2007 and 2012. Half of them were distressed and half non-distressed, using different conditional logistic models. The result showed a strong connection between independent directors and bankruptcy risk of companies. Therefore, an increase in the size of independent directors has influence on the possibility of corporate failure. Similarly, Atosh (2016) examined the influence of corporate governance standards on financial hardship among Nairobi Securities Exchange-listed businesses. The study used the Altman Z Score model to represent corporate failure. The study used the simple least square regression to analysed the data and discovered a negative but significant relationship between non-executive directors and financial distress. Based the foregoing, the hypothesis is formulated below.

H₀₂: Board independence has no significant impact on corporate failure likelihood of firms in Nigeria.

Board Gender Diversity and Corporate Failure/distress

While there is still gap in knowledge to be filled on the connexion between board gender diversity and business failure, some empirical evidence from researches carried out so far has mix findings. The results of some studies show that there is positive correlation between both variables and some also show negative correlation. Murhadi et al. (2018) found evidence of positive correlations using 337 businesses with 1,685 observations as a sample, based on secondary data of non-financial enterprises listed on the Indonesian Stock Exchange (ISE) between 2011 and 2015. This evidence demonstrates a significant and statistically positive connection between board gender diversity and corporate failure. Additionally, Atosh (2016) examines the influence of corporate governance standards on financial distress among Nairobi Securities Exchange-listed businesses, using the Altman Z score model as a proxy for financial hardship. The study revealed that the diversity of the board had a positive but insignificant impact on corporate failure. In a similar vein, Chandra (2017) examines the effect of corporate governance on the capacity of consumer products businesses in Indonesia and Malaysia to avoid financial difficulty. The study discovered a significant connection between gender diversity and poverty in Indonesia and Malaysia.

On the other hand, Atosh and Iraya (2018) investigated the link between corporate governance and the financial distress status of Kenyan-listed businesses. The study found a significant but inverse connection between the compensation of non-executives and financial distress. Measures used to represent corporate governance include; size of the board, composition of non-exec directors, ownership structure, and number of women and men on the board. Kalyani et al. (2019) examined the link between board gender diversity and financial distress using a sample of 100 top-ranking businesses from the years 2015–2016. The data extracted from the 100 firms were

selected using judgmental sampling and the study used the correlation method and other statistical techniques such as the discrete statistic, regression analysis, Altman z-score model and so on. It was discovered from the study that there is a significant but inverse correlation between gender diversity of board members and corporate failure risk. Therefore, the hypothesis below is formulated;

H₀₃: Board gender diversity has no significant impact on corporate failure likelihood of firms in Nigeria.

METHODOLOGY

In this study, the design of the analysis will be based on the ex post facto approach. In total, the study looked at companies listed in the Nigerian Exchange Group from 2018 to 2022 (5 years) with particular focus on the non-financial sector. The technique used for analysing the data in the study is the logistic regression. Logistic regression is a probabilistic function that assists in the prediction of outcome variable such as the likelihood of fraud, which can be binary, ordinal, or multinomial. The rationale for using this kind of technique is based on the characteristics employed in this study. In this example, financial distress likelihood which represents the dependent variable is a dichotomy variable and assumes a value of "1" when $Z \geq 2.67$. This is regarded as safe and does not represent a high likelihood of corporate failure, and 0 when using an Altman Z score. This approach is consistent with the practice in several studies (Adams and Ferreira, 2007; Muqaddas et al. 2018; Younas, et al 2021) The binary regression technique was adopted for the initial estimation and then based on the limitation's binary models due to the fact that the models divides the data into zero state and non-zero state automatically instead of by model self-selection process. For robustness, the Heckman selection model was employed in this study to address both the discrete and continuous modeling issues as well as issues of undetected heterogeneity and selectivity biases/endogeneity simultaneously.

Model Specification

- i. $P_{jt}(\text{CFL} = \text{Altman Z-score}) = 1 / (1 + e^{-z})$
- ii. $= 1 / \{1 + \exp [\text{Corporate Governance}]\}$

The model is broken down into its indicators to provide an overview of corporate governance.

- iii. $P_{jt}(\text{CFL} = \text{Altman Z-score}) = 1 / \{1 + \exp [-\beta_0 + \beta_1 \text{BDS} + \beta_2 \text{BDIND} + \beta_3 \text{BDG} + \beta_4 \text{FSIZE} + \mu_{it}]\}$

- board size will reduce the likelihood of corporate financial distress;
- ii. $\beta_2 < 1$ for Board independence, which indicates that an increased number of independent board members of the board of directors will reduce the chance of corporate financial distress, and
- iii. $\beta_1 < 1$ for Board gender diversity, which implies that an increased presence of board members of the gender category will reduce the risk of financial distress.

Where:

- BDS = Board size
- BDIND = Board independence
- BDG = Board gender diversity
- μ = residual

The Aprilori expectations for this study are as follows:

- i. $\beta_1 < 1$ for the slope of Board size, which indicates that a larger

PRESENTATION OF RESULTS

Table 1 illustrates the regression estimation for corporate governance and corporate distress probability. The indicator for financial distress probability is the Altman Z-scores. As previously noted, the Altman's model is employed variously to detect fraudulent reporting.

Table 1:
Altman Zscore model regression result

Variable	Dependent Variable: Altman Zscore	
	Binary Logit odd ratios	Binary Logit marginal effects
C	2.3503 -1.0297 {0.051}	
BDS	1.026 -0.0293 {0.369}	0.0065 -0.0071 {0.364}
BDIND	0.99695 -0.0045 {0.493}	0.0008 -0.0011 {0.490}
BGD	0.99486 -0.0069 {0.464}	-0.00129 -0.0017 {0.458}
FSIZE	0.32077* -0.1058 {0.001}	-0.2839* -0.0812 {0.000}
Log Likelihood	-496.018	
LR chi2(5)	14.02	
Prob > chi2	0.0155	
Pseudo R ²	0.0139	
Count R ²	0.549	
Hosmer-Lemeshow Test	7.96 {0.4374}	
Mean VIF	6.7381	

Source: Researchers (2024)

A binary regression model is used in the estimation. The R² values, particularly the

pseudo R² values for binary estimations, tend to be significantly lower in Logistic

regression models when compared to other models such as the linear regression models. This is because as against trying to predict the outcome, the logistic model focuses on the probability of the outcome (Williams, 2012). However, the count R^2 is another indicator and it's at 54.9%. The odds scale or ratios are used to measure probabilities and are presented in the Table 1.

An odds ratio greater than 1 shows a "positive effect" as it increases the odds. Conversely, an odds ratio between 0 and 1 indicates a "negative effect" as it decreases the odds. An odds ratio of exactly 1 indicates a "no association". Based on the initial logistic estimate, the odd ratio of BDS (OR = 1.0260), which suggests that the higher the board members, the higher the possibility of financial statements being falsified, although this narrative is statistically insignificant ($p = 0.369$) at 5%. The odd ratios BDIND (OR=0.9969) and BGD (OR=0.995) are all less than 1 indicating that the odds of financial statement will decrease by 0.9969 and 0.995 basis points respectively with an increase in board members independence and gender diversity respectively though the estimates are all not significant at 5% with p-values of 0.493 and 0.464 respectively. The odd ratio for FSIZE (OR=0.32077) indicates

that an increase in the size of foreign firms will decrease the odds of financial statement fraud significantly at 5% ($p=0.001$) at 1%.

One of the drawbacks of binary models, such as logit, is that it splits the data into zeros and non-zeros automatically instead of model-self-selection. To capitalize on the advantages of two-step analysis and solve the issue of zero-samples at the same time, the study adopts the Heckman selection model. The Heckman selection model solves discrete/consistency modeling problem as well as problem of unobserved heterogeneity and selectivity bias/ endogeneity problem, helping to compare model suitability. The Heckman selection model results are presented below;

The results of the Heckman two stage procedures tend to be more robust and relatively different from the binary results in Table 2. In column 3, the response is presented, and column 4, the selection estimation. The IMR (inverse mill's ratio) coefficient indicates whether there is a selection bias. The presence of a selection bias is determined by the statistically significant IMR coefficient. From the results, the IMR with a p-value of 0.439 shows no bias in selection as well as endogeneity in the Heckman two-stage estimation.

Table 2:

Altman Robust Heckman two-stage estimation

Variable	Dependent Variable: Altman Zscore	
	1 st stage Response equation	2 nd stage Selection equation
C	2.2126	0.1396
	-1.3694	-0.1857
	{0.1066}	{0.4522}
BDS	0.2157*	0.0258**
	-0.0823	-0.0124
	{0.0090}	{0.0377}
BDIND	-4.0405***	-0.0057*
	-0.0223	-0.002
	{0.0698}	{0.000}
BGD	-0.0031	-0.0001
	-0.0234	-0.0033
	{0.8960}	{0.9729}
FSIZE	-2.4198**	-0.3619*
	-1.1564	-0.1347
	{0.0381}	{0.0074}
Log Likelihood	-22913 (0.000)	
Mean of dependent v.	4.3922	
S.E of regression	5.6025	
S.D of dependent V.	6.3517	
Inverse mill ratio (IMR)	0.999(0.439)	

Source: Researchers (2024)

The results shows BDS is positive (0.2157) and (0.0258) and are both significant at 1% ($p=0.0090$) and 5% ($p=0.03770$) respectively. The results confirm an increase in board size will increase the likelihood of corporate failure. The results thus support the contention that a limited number of board size efficiently managed organisations. Therefore, any increase in board size places a strain on organization resources and the decision making process is slowed down especially when there is disagreement among them. However, in some cases, these disagreements may be beneficial to management because it can lead to the protection of their vested interests. Chaganti et al. (1985) also proposed that the small board plays a significant role and has effective control over the management than the large board size. Large boards are not as well-coordinated and lose control over the management. This is why the hypothesis (H_{01}) that Board size significantly affects the likelihood of corporate failure of companies in Nigeria is correct and accepted. The finding is in tandem with Adams and Ferreira (2007) and Muqaddas, et al., (2018) study's findings indicate that a bigger size of governing board is positively and significantly associated with company failure and increases the risk of distress for the firm. On the other hand, other research, such as Darrat et al., (2016) and Manzanegue et al., (2015) found a negative link between board size and the risk of financial distress.

BDIND is negative both in the response and selection equations with coefficient of -4.0405 ($p=0.0698$) and -0.0057($p=0.000$) which signify that any increase in independence of the board members leads to a decrease in the possibility of corporate failure. Thus, this finding makes a case for the level of board independence to be increased in listed firms in Nigeria. Independent directors play a very crucial monitoring role in corporate boards and due to their independence status and reputation, they tend to be provided more objective assessment of company's activities. Consequently, the null hypothesis is rejected and the alternate accepted. It can therefore be

concluded that Board independence has significant impact on corporate failure likelihood of firms in Nigeria. This finding is in tandem with Fich and Slezak's (2008), Manzanegue, et al., (2015) and Atosh (2016) which findings indicated that board independence is significantly associated with a firm's ability to avoid bankruptcy. On the hand, the findings are in contrast with those of Chang (2009) Hanani and Dharmastuti (2015) and Younas, et al (2021).

BGD is negative both in the response and selection equation though not significant at 5% with coefficient of -0.0031 ($p=0.8960$) and -0.0001 ($p=0.9729$) which signify that any increase in gender diversity of board members leads to a reduction in the likelihood of firm failure and distress. However, caution is exercised in drawing inferences due to the non-statistical significance of the variable. Hence the hypothesis that the gender diversity of the board has no significant impact on the likelihood of financial distress of firms in Nigeria is accepted. However, in relation to the sign of the relationship, the finding is in tandem with Atosh and Iraya (2018), Kalyani et al. (2019). FSIZE is negative both in the response and selection equation and significant at 5% with coefficient of -2.4198 ($p=0.0381$) and -0.3619 ($p=0.0074$) respectively. This signify that the larger the firm, the less the possibility of corporate failure.

CONCLUSION

The study looked at corporate governance and the likelihood of corporate distress among non-financial organisations in Nigeria. The objectives are to identify the effect of corporate governance characteristics such as board independence, board size and gender diversity on the likelihood of corporate failure. The Altman Z score model was used to represent the likelihood of failure. The findings from the study show that at 5% level of significance, the size of the board has a positive influence on financial statement fraud. Also, BDIND is negative both in the response and selection equations with coefficient of -4.0405 ($p=0.0698$) and -

0.0057($p=0.000$). This suggests that when the level of board independence is increased, it will lead to a reduction in corporate failure likelihood. Furthermore, BGD is negative both in the response and selection equation though not significant at 5% with coefficient of -0.0031 ($p=0.8960$) and -0.0001 ($p=0.9729$). This suggests that when the level of gender diversity of the board is increased, it will lead to a reduction in corporate failure likelihood. However, caution is exercised in drawing inferences due to the non-statistical significance of the variable.

RECOMMENDATIONS

Based on the findings, it is recommended that; Firstly, having large boards could increase the risk of occurrence of corporate distress and hence it is recommended that listed firms may require a reduction in their board size. However, there is no consensus on the ideal size of the board but this study recommends that firms with boards that are larger than the industry average should consider reducing their board sizes. Secondly, from the study, it is recommended that corporate boards should strive to improve their level of board independence. Thirdly, the study recommends that boards need to look at their board gender diversity levels. In most cases the ratio of female-male presence on corporate boards remains very minimal and this could even account for the non-significance of the variable.

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