IJAAR PUBLISHING®
DOI: 10.46654

Research Journal of Management Practice | ISSN: **2782-7674**
Vol. 2, Issue 2 (February, 2022) | www.ijaar.org

BOARD STRUCTURE AND CORPORATE SOCIAL RESPONSIBILITY PERFORMANCE IN LISTED MANUFACTURING FIRMS IN NIGERIA: A DOUBLE HURDLE REGRESSION APPROACH

Eneh, Onyinye M.
Department of Accountancy
Nnamdi Azikiwe University, Awka
Mail: o.eneh@unizik.edu.ng

Amakor, Ifeoma C.
[1]Department of Banking and Finance,
Nnamdi Azikiwe University, Awka
Mail:*ic.amakor@unizik.edu.ng*

Abstract

The research investigated the Board Structure and Corporate Social Responsibility Performance in Listed Manufacturing firms in Nigeria using a double hurdle methodological path. A longitudinal research design and simple random sampling technique were used for the study. The study's sample consists of 45 manufacturing enterprises with public and accessible yearly reports covering the study period. The information was gotten from corporate yearly companies' reports quoted on the Nigeria Stock Exchange from 2010 to 2019 financial years. The data analysis method employed in this work is the Dual-Hurdle model which is the parametric generalization of the P-Tobit model, in which two distinct stochastic processes and consequently two equations determine the decision to take and intensity of adoption. This means that in an independent double hurdle model factors affecting the two-stage choice concerning the disclosure decision and level of CSR can be expressed. The first hurdle coefficients reflect how a variable decision influences a firm's likelihood (probability) of disclosing CSR data. How decision variables affect the level of disclosure is shown in the second hurdle. The first hurdle result shows the effect of board structure variables (BDIND, BDS and BGD) on CSR disclosure likelihood and as observed the estimation results reveals that for BDS (-0.0189, p=0.2910) and hence board size is not significant in the 1st hurdle in determining CSR disclosure decision of firms in the sample. For board independence, BDIND (0.8748, p=0.2568), the result also shows that the variable is also not significant in the 1st hurdle and so is board gender diversity (BGD) (0.2354, p=0.201). However, in the 2nd hurdle estimation, BDS (-0.0058, p=0.2910), board independence, BDIND (0.1514, p=0.0099) and board gender diversity, BGD (-0.3232, p=0.000) indicating that board independence and board gender diversity is significant in determining the extent of disclosure as shown in the 2nd hurdle. Hence, the study recommends that firms should improve the quality of their board structure by increasing the number of independent directors and gender diversity of the boards.

Keywords: Board Structure, Corporate Governance, Corporate Social Responsibility, Hurdle Regression Approach

1. Introduction

Corporate social responsibility (CSR) continues to be very germane to corporations because of the implications it has on stakeholders and society in general. Paine (2020) noted that the Covid 19 pandemic has further revealed the dependence of society on well-functioning companies to be socially responsible and that companies do not exist only to maximize shareholder rewards. Thus, more than ever before, corporate social responsibility of firms has become a dimension of corporate accountability (Paine, 2020). According to Aguinis and Glavas (2017), CSR encompasses "context-specific structural arrangements and strategies that include stakeholders' expectancies and the three bottom lines of economic, social, and environmental performance." In addition to profit-maximization goal, the term stresses the importance of considering a wider array of stakeholders than just shareholders, as well as the incorporation of social and environmental causes in addition to profit maximization goals.

Prior research has shown many strategies for the CSR performance of corporations from the resource dependency point of view (Sundaramurthy & Lewis, 2003) and an agency/control perspective (Golden & Zajac, 2001). The notion of a resource-based perspective is that the board structure offers the company with a broad pool of experts who can contribute significantly to the company's leverage and competitive advantage. According to Waldman et al., (2006), corporate boards are responsible for defining corporate strategy and often work intensively to promote their company's image through social responsibility. Some researchers have acknowledged that company governance has an essential role in understanding CSR's diversity (Bansal & Roth, 2000; Cordano & Frieze, 2000; Delmas & Toffel, 2008; Sharma, 2000).

In this study, we narrow down on three board attributes to board size, board independence and board gender diversity (BDG). According to Al-Qahtani and Elgharbawy's (2020) research, boards with few numbers of member are frequently thought to be more successful at supervising and managing administration compare to boards with more members. Empirically, previous studies are mixed concerning whether a large board size or a small board size is positively associated with CSR (Al Fadli, 2020; Majumder, Akter, & Li, 2017; Zeeshan, Rehana, Waris, Zubair, & Tahira, 2018; Ozordi, Uwalomwa, Obarakpo, Ikumapayi, & Gbenedio, 2018). Though it is likely that with a larger board, more stakeholder interest may be represented and this can spill over to CSR considerations.

In the study of the management and behaviour of the firm and in taking on social duties and honouring obligations that fulfil stakeholder interests, the independent board would seem to be more objective (Michelon & Parbonetti, 2012). The findings of previous studies on the above assertion have been mixed (Abdul & Mustafa, 2016; Al Fadli et al., 2020; Muttakin & Subramaniam, 2015). Concerning board gender diversity, some researchers say that the addition of female members in the board has increased their commitment to the CSR problem, because women are highly conscious of social issues (Chapple & Moon, 2005) and that CSR and charity donations have enhanced the reputation of the firm (Charbel et al., 2017). As logical as the arguments may sound, the empirical findings are also mixed (Al-Qahtani & Elgharbawy, 2020; Atif, Hossain, Alam, & Goergen, 2020).

However, the constraint and deficiency for all of the previous research described above is the fact that either the modelled outcome of CSR and (binary) categorized models such as probit and logit are used or that multiple regressions are considered to be the continuous outcome. One methodological weakness with these approaches is that they all assume that CSR disclosure decisions and the extent of CSR disclosure are the same. It is assumed that the one-step strategy is limiting and so restrictive. The present study takes the Cragg Alternative (1971) double-hurdle model, which in different areas is used to circumvent this constraining supposition. The first being the decision to participate in CSR and the second, the level of participation. Aside from the study Ekundayo, Jamani and Odhigu (2021) which has used the Craigg double hurdle model to examine corporate governance and environmental disclosure decision in Nigeria, it may be difficult to explain the usefulness of the two-step approach with a single study. The rest of this work is organised in the following themes: Section 2 entails literature review and the formation of hypotheses, the theoretical framework is dealt with in Section three, Section four presents and interprets data while conclusion and recommendation is presented in Section 5.

2. Literature and Hypotheses

2.1 Board size and CSR performance

The need to bring the required human resource to provide strategic direction that can move a firm forward is often the rationale behind the way the board size is structured though several firm-specific factors can influence the board size (Al-Qahtani & Elgharbawy 2020). As previously said, when it comes to deciding whether a board should be small or large, lesser boards are frequently thought to be more successful in supervising and monitoring management compare to greater boards. They are projected to have the advantage of effective communication and harmonization, higher commitment level and accountability from different board members, due to their small size. Yoshikawa and Phan (2003) recommend that the board of directors, which includes seven and eight individuals, should be more effective and should ensure speedy decision-making. Empirical study shows that size of board related with CSR positively (Al Fadli, 2020; Majumder et al., 2017; Ozordi et al., 2018; Zeeshan et al., 2018). Coffie et al. (2018) observed that the board of directors had a favourable association with CSRD in 33 listed companies in developing countries between 2008 and 2013. Larger boards, therefore, promote the CSRD level. According to Nwude & Nwude (2020), large boards of directors support an advanced level of corporate social responsibility (CSR). Conversely, it was discovered that larger boards respond adversely to CSR (Zou et al., 2014). The magnitude of the board is immaterial to Lakhal (2005). Orazalin (2019) shows that CSR level does not have any effect on board size. Based on the resource dependency theory, this study expects a significant positive relationship to hold between board size and CSR performance disclosures. Thus, we predict the following hypothesis:

H*$_{01}$*: Board size has a significant positive effect on CSR performance disclosure in the Nigerian manufacturing firms.

2.2. Board independence and CSR performance

The study of the company's management and behaviour by an independent board appears to be more impartial. They are willing to take on social duties and fulfil obligations that are in the best interests of stakeholders (Adawi & Rwegasira, 2011; Michelon & Parbonetti, 2012; Adawi & Rwegasira, 2011). Having more independent directors, according to Lim et al. (2007), improves corporate social responsibility and reduces information unevenness among owners and managers. Independent boards better represent the concerns of stakeholders and enable firms to meet their social goals. According to several studies, board independence is positively associated with CSRD (Al Fadli, Sands, Jones, Beattie, & Pensiero, 2020; Bravo et al., 2015; Muttakin & Subramaniam, 2015). As reported in Bangladeshi corporations annual report, Khan, Muttakin, and Siddiqui (2013) investigated how board independence promotes organizational CSRDs and discovered that board independence has a positive substantial influence on CSRDs. This confirms that independent directors will possibly back CSR disclosure to lessen information unevenness between insiders and outsiders.

However, Shamsul et al. (2011) and Majumder et al. (2017) report a negligible positive correlation between board independence and CSRD, whereas Mohd-Said et al. (2018) report no correlation between the two concepts. According to Orazalin (2019), board independence does not affect the level of CSR performance disclosure. Habbash (2016) looked at the impact of board independence on CSR performance practices in Saudi Arabia, a developing Arab country, from 2007 to 2011, and realized it to be a negative factor of CSR. According to Coffie et al. (2018), rising in the number of independent directors does not guarantee improved CSR performance disclosure. In the light of the above, the hypothesis is specified as follows;

H_{02}: Board independence *has a significant positive effect on CSR performance disclosure in the Nigerian manufacturing firms.*

2.3 **Board gender diversity and CSR performance**

The discourse regarding the gender effect on board and the influence on CSR is a very topical one (Setó-Pamis, 2015). Chapple & Moon, (2005) have argued that women' presence at corporate boards has increased the attention given to welfare, the board's commitment to CSR and firm social awareness. Some empirical research supports the gender-based premise that women participation on corporate boards improves CSR performance (Al-Qahtani & Elgharbawy, 2020; Atif et al., 2020; Ayman & Hong-Xing, 2019; Mohd-Said et al., 2018). Bear et al. (2010) discovered that female board involvement has a beneficial impact on CSR. BDG has a positive significant relationship with CSR exposure (Umoh-Daniel and Urhoghide, 2018). According to Ekundayo, Jamani, and Odhigu (2021), while BGD is not a major predictor of whether or not corporations reveal environmental information in yearly reports, it is a strong predictor of the scope of environmental disclosure information when firms choose to reveal. Conversely, Majumder et al. (2017) revealed a negligible favourable relationship between BGD and CSR. According to Orazalin (2019), board gender diversity improves CSR reporting. In the light of the above, the hypothesis is specified as follows:

H_{03}: Board gender diversity *has a significant positive influence on CSR performance disclosure in Nigerian manufacturing firms.*

2.4. Theoretical Framework-Agency Theory

From Jensen and Meckling's (1976) agency theory paradigm, the connection between corporate governance and reporting stems. This holds that management may utilize information unevenness to behave in ways that are unfavourable to shareholders' benefits (Rao & Tilt, 2013). Jensen and Meckling make known agency theory in 1976, which proposes that egocentric individuals or agents are 'opportunistic', thus, not probable to guard the attention of principals or proprietors then more prone to focus on personal interests such as building of empire, excessive utilization of corporate resources, evasion of ideal risk investments, and manipulation of monetary values (Dey, 2008). Nwude and Nwude (2020) using the agency theory argued that large boards support a higher level of corporate social responsibility (CSR). Also, Michelon & Parbonetti, (2012) argue that independent board seems to increase managerial monitoring and self-serving tendencies which results from agency misalignment and thus allowing firms to pursue societal responsibilities and honour duties that will lighten stakeholder interests. In general, an agency perspective is used to describe why boards would be prepared to be more responsive to both employees and stakeholders to eliminate knowledge disparity caused by inequalities in ownership and management.

3. Methodology

Ex-post facto research strategy was used for the study. The study's sample consists of 46 manufacturing enterprises with public and accessible annual reports covering the study period. The simple random sample methodology was used for the sampling. Secondary data gotten from financial reports of the sampled companies quoted on the Nigeria Stock Exchange for the period 2010-2019 financial years. The panel-hurdle estimating approach is being used for statistical analysis. It has the potential to be relevant in experimental economics, as it has various natural applications such as public goods experiments and dictator games. The Double-Hurdle model is an expression with parameter simplification of the P-Tobit model in which the adoption choice and strength are established by two distinct stochastic methods and consequently two equations. Both Moffat's (2003) and Martnez (2006) Espieira's empirical data show that the Double-Hurdle model outpowers the Tobit and P-Tobit models. As a result, the study predicts the decision to disclose CSR using a Double-Hurdle model.

Double Hurdle Model

Equation 1 fits Cragg (1971) double-hurdle standard. The equations describe the participation stage of the double-hurdle model.

$$d_i^* = z_i\gamma + u_i \qquad u_i \sim N(0,1)$$

$$d_i = \begin{cases} 1 \text{ if } d_i^* > 0 \\ 0 \text{ if } d_i^* \leq 0 \end{cases} \tag{i}$$

From the preceding equations, d*i represents the unobserved latent variable reflecting the participation hurdle, and i d is the observed binary variable (di = 1 indicates that the firm takes part in CSR performance disclosure, whereas di = 0 indicates that the firm does not participate).

In the second stage, the level of CSR performance disclosure is then provided by

$$y_i^* = x_i\beta + v_i \qquad v_i \sim N\left(0,\sigma^2\right)$$

$$y_i = \begin{cases} y_i^* \text{ if } d_i = 1 \text{ and } y_i^* > 0 \\ 0 \text{ else} \end{cases} \tag{ii}$$

$$l_i(\theta) = 1[y_i 0]\log\left[1-\Phi\left(z_i\gamma\right)\right] + 1[y_i > 0]\log\left[\Phi\left(z_i\gamma\right)\right] + \\ +1[y_i > 0]\left\{-\log\left[\Phi\left(\frac{x_i\beta}{\sigma}\right)\right] + \log\left\{\phi\left[\frac{(y_i - x_i\beta)}{\sigma}\right]\right\} - \log(\sigma)\right\} \tag{iii}$$

The unobserved latent variable is represented by y*i while the actual CSR disclosure is represented by yi. When both observed CSR disclosure given by yi is equal to y*i only if the latent variable y*i have positive values and the first participation stage is met. The disclosure choice and the extent of disclosure phases in the double-hurdle model can be specified by independent sets of explanatory variables zi and xi with the appropriate vectors of parameters and evaluated. Board size, board independence, and BGD are the study's explanatory factors. These are stated as linear functions of the latent variables and are likewise considered to be uncorrelated with the error terms ui and vi. Maximizing the following log-likelihood function yields the coefficients of the double-hurdle model:

$$\text{Log}L = \sum_{0} \ln \left\{ 1 - \Phi(\mathbf{z}_i'\boldsymbol{\alpha})\Phi\left(\frac{\mathbf{x}_i'\beta}{\sigma}\right) \right\} + \sum_{+} \ln \left\{ \Phi(\mathbf{z}_i'\boldsymbol{\alpha})\frac{1}{\sigma}\phi\left(\frac{y_i - \mathbf{x}_i'\beta}{\sigma}\right) \right\}$$

4. Presentation of Result

The observed results are presented in this section and the descriptive statistics is first presented, followed by the Pearson results and the hurdle estimation results

Table 4.1: Descriptive Statistics

	Mean	Max	Min	Std. Dev.	J.B	Probability
CSR	0.499	1.000	0.000	0.500402	103.500	0.00
BDIND	0.652	1.00	0.2200	0.1522	18.186	0.000
BDS	9.0467	23.00	4.000	2.7823	330.148	0.00
BGD	0.8744	7.00	0.00	1.0225	1038.116	0.00

Source: Researcher's compilation (2021)

The descriptive statistics for the variables are revealed in Table 4.1, and as noted, the mean CSR disclosure index stood at 0.499 which is slightly below average with a standard deviation of 0.500. BDIND has a mean value of 0.65, showing that 65% of board members on average are self-regulating members having a standard deviation of 0.15. This ratio is commendable and if properly engaged can improve the board objectivity, reduce agency costs and improve board and corporate reputation. BDS has a mean of approximately nine (9) members with a standard deviation of 2.78 indicating the extent of dispersion from the mean. Though there is yet no consensus on what an optimal board size should be, the argument is that board size should reflect all stakeholder/shareholder interests. The highest and lowest values were 23 and 4, respectively. The mean for Board gender diversity (BGD) is 0.874, implying that organizations in the distribution have around one female on their boards on average. This is still a very poor gender representation in corporate boards and thus companies need to begin increasing female presence and gender mix in their boards.

Table 4.2: Pearson Correlation Result

	CSR	BDIND	BDS	BGD
CSR	1			
BDIND	0.052	1		
Prob	(0.195)			
BDS	0.2589**	0.08768**	1	
Prob	(0.00)	(0.029)		
BGD	0.1669	-0.062	0.4284**	1
Prob	(0.00)**	(0.123)	(0.000)	

The correlation statistics indicate the direction and magnitude of relationships between the variables. Positive correlations indicate that increase in one variable is associated with increases in the other and vice-versa. The Pearson correlation results show the correlations between CSR and the explanatory variables in the study. CSR stays favorably connected with BDIND (r=0.052) but not significant at 5% (p=0.195), correlated with BDS (r=0.2589) and significant at 5% (p=0.00), and also positively correlated with BGD (r=0.1669) and significant at 5% (p=0.000). Correlations, on the other hand, may not always imply functional dependence and causality. Regression analyses are more suited to this goal.

Table 4.3 Variance Inflation Factor Test

Variable	**Centered VIF**
BDS	1.5816
BDIND	1.1447
BGD	1.2935

Before proceeding with the regression, the variance inflation factor is used to test for multicollinearity between the variables (VIF). The VIF simply clarifies how much of the regressor's coefficient estimate variation has been exaggerated due to collinearity with all the other explanatory variables. Basically, VIFs greater than 10 are seen as alarming; however, no variables had VIF values greater than 10, and thus nothing provided a major indicator of multicollinearity.

Table 4.4: 1st Hurdle Regression Result

Variable	Aprori sign	Tobit Model	Ist Hurdle
C		-0.0062 (0.0502) {0.901}	1.2014 (1.3253) {0.3647}
Board Structure			
BDS		-0.0062 (0.0502) {0.901}	-0.0495 (0.0617) {0.4222}
BDIND		-0.3111 (0.6181) {0.615}	0.8748 (0.7714) {0.2568}
BGD		0.2222 (0.1471) {0.131}	0.2354 (0.1841) {0.2010}
Log Likelihood		-684.50	-409.345
LR chi2(5)		38.36	86.72
Prob> chi2		0.000	0.000
Pseudo R2		0.3525	0.549
AIC		1383.002	844.69
BIC		1408.446	891.94

Standard error ( ) p-values { }

The panel-hurdle estimation methodology was employed for data analysis in this study. The Double-Hurdle model is a parametric kind of the P-Tobit model in which adoption choice and concentration are influenced by two independent stochastic processes and consequently two equations. Cragg (1971) proposed the Double-Hurdle model, which has since been employed in several fields. Moffat (2003) and Martnez-Espieira (2006) show that the Double-Hurdle model outpaces the Tobit and P-Tobit models in empirical tests. As a result, the study predicts the decision to disclose CSR using a Double-Hurdle model. The Tobit and double-hurdle models were assessed, and the results reveal some similarities in the estimates, but the double-hurdle model is chosen over the Tobit model grounded on model selection critaria of the Bayesian and Akaike's information.

The maximum likelihood evaluations for the independent double-hurdle model are shown in Table 4.4. The loglikelihood ratio (LR) and information criteria prove the model's dependability. This suggests that the factors influencing the two-stage choice as related to choice to report CSR and the scope of such exposure can be pronounced in the independent double hurdle model. The first hurdle’s coefficient shows how a particular decision variable impacts a firm's likely probability to reveal CSR information. Those at the second obstacle demonstrate how decision variables affect the level of exposure. The effect of board structure variables (BDIND, BDS and BGD) on CSR disclosure likelihood and as observed estimation results of the first hurdle reveal that for BDS (-0.0189, p=0.2910) and hence board size is not significant in the 1st hurdle in determining CSR disclosure decision of firms in the sample. For board independence, BDIND (0.8748, p=0.2568), the result also indicates that the variable is also not significant in the 1st hurdle in determining CSR disclosure decision of firms. For board gender diversity, BGD (0.2354, p=0.201) and thus the variable is also not significant in the 1st hurdle in determining CSR disclosure decision of firms.

Table 4.5: 2nd -Hurdle Regression Result

Variable	Aprori sign	Above- Hurdle Coefficients ( ) standard error { } p-value
C		0.2522 (0.09818) {0.0102}
BDS	-	-0.0058 (0.0039) {0.1374}
BDIND	+	0.1514* (0.0587) {0.0099}
BGD	+	-0.3232* (0.00968) {0.0008}
Log-Likelihood		8.752
LR chi2(5)		100.499
Prob> chi^2		0.000
Pseudo R^2		0.549

Standard error ( ) p-values { }

The calculations for the second obstacle show how choice variables influence the level of disclosure. Both Moffat's (2003) and Martnez (2006) Espieira's empirical data show that the Double-Hurdle model outperforms the Tobit and P-Tobit models. As a result, in this work, we use a Double-Hurdle model to predict the decision to disclose CSR. The first hurdle result demonstrates that the consequence of board structure factors (BDIND, BDS, and BGD) on CSR performance disclosure likelihood is not significant because all board variables failed the first hurdle. However, in the 2^{nd} hurdle estimation, the estimation results for board structure reveals that for BDS (-0.0058, p=0.2910), board independence, BDIND (0.1514, p=0.0099) and board gender diversity, BGD (-0.3232, p=0.000).

The estimation results imply that though board structure variables are not significant determinants of whether a firm discloses on CSR performance or not as seen in the 1^{st} hurdle results, the variables are substantial in determining the extent of disclosure as shown in the 2^{nd} hurdle especially board independence and board gender diversity. Therefore, a more independent board significantly increases the extent of CSR performance while a more gender-diverse board tends to reduce the extent of CSR performance. The study, therefore, rejects H_{01} and H_{02} and accepts H_{01}: Therefore, our results suggest that though other non-board structure related variables may determine whether a firm discloses on CSR or not but once firms decide to disclose CSR moving above that hurdle, the board independence and board gender diversity become a determinant of the extent of such disclosures.

5. CONCLUSION

As indicated earlier, corporate social responsibility (CSR) continues to be very germane to corporations because of the implications it has on stakeholders and society in general and the Covid 19 pandemic has demonstrated all too clearly that society relies on well-functioning enterprises to be socially accountable, and that businesses do not exist only to maximize shareholder rewards. Using the resource dependence approach, previous findings have highlighted several ways in which the board structure may add to a company's CSR performance. The study findings reveal that (i) though board structure variables are not significant determinants of whether a firm discloses on CSR or not as seen in the 1^{st} hurdle results, the variables are substantial in determining the level of disclosure as shown in the 2^{nd} hurdle. The following recommendations are made in light of the study's aims and findings: To begin, the study's findings show that (i) though board structure variables are not significant determinants of whether a firm discloses on CSR or not as seen in the 1^{st} hurdle results, the variables are significant in determining the extent of disclosure as shown in the 2^{nd} hurdle. Hence the study recommends that firms improve the quality of their board structure by increasing the number of independent directors and gender diversity of the boards.

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