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Leverage and Corporate Financial Distress in Nigeria: A Panel Data Analysis

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Abstract
This study examined the effect leverage on corporate financial distress of quoted manufacturing firms in Nigeria. The objective is to examine if financial leverage have any effect on financial distress of the Nigeria firms. Cross sectional data was sourced from financial statement of ten quoted manufacturing firms. Z-Score and Changes in operating profits was proxy for corporate financial distress while debt equity ratio, short, long term debt and total debt to total assets were proxy for leverage. After cross examination of the validity of the pooled effect, fixed effect and the random effect, the study accepts the fixed effect model. Findings reveal that financial leverage have positive effect on financial distress measured by the z-score while total debt ratio and debt equity ratio have positive effect on financial distress measured by changes on operating profits while short term debt and long term debt have negative effect on operating profits. From the regression summary, the study concludes that leverage have significant effect on corporate financial distress. We recommend that Financial structure of the manufacturing firms ought to be adequately planned to safeguard the interest of the equity holders, shareholders and financial requirements of the firm and the firms should formulate policies of increasing its equity capital as oppose to debt and that Implementable investment policies should be formulated and the business environment should be well examined. Recognizing faults of investment might be paramount to develop the business's financial performance, since it specifies the loopholes which corrective decision can be applied.

Keywords: Leverage, Corporate Financial Distress, Nigeria, Panel Data Analysis.

I. Introduction
Traditional views of the causes of financial distress, which have over time been partially confirmed by empirical results, provide some evidence that financial distress arises in many cases from endogenous risk factors, such as mismanagement, high leverage and a non-efficient operating structure in place. The correlation of these factors and financial distress is, according to capital market theory, of unsystematic nature (Celli, M. (2015). The term financial distress is used in a negative connotation in order to describe the financial situation of a company confronted with a temporary lack of liquidity and with the difficulties that ensue in fulfilling financial obligations on schedule and to the full extent. Very often, financial distress is determined in terms of failure, default, bankruptcy, or distressed restructuring, dependent on the underlying methodology and the objectives of the overall research. Corporate organizations have financial goals and strategy which are the expression of a corporate mission and strategy that are determined by the long-term planning system as a trade-off between conflicting and competing interests. Corporate objective relates to four corporate fundamental goals of maximizing corporate profitability, maximizing Returns on Investment, maximizing corporate growth and availability of fund (Pandey, 2005).

The financial leverage degree is increased by increasing use of external financing sources, and financial leverage can be increased by non-traditional financial instruments, such as the use of financial options and futures contracts. (Fahmi.2008). Some consider financial leverage as one if the terms invented by institutional mental for packaging undesired or negative things or to give a nice appearance, instead of saying borrowing or indebtedness which is a term that Inspires risk and weakness (Nibal, Qasaba, 2010).The preliminary review of the theory and empiricism has highlighted that the analysis of financial distress from the capital market perspective produces more questions than it is capable of answering (Celli, 2015). Default risk embedded in the context of the traditional portfolio theory does not capture its specific attributes associated with financial distress and,

consequently, provides incorrect information in the case of the valuation of distressed companies. Rare empirical studies account for distress risk and show a negative deviation in value of up to 36% in comparison to the value estimated according to classic portfolio theory and the CAPM.

Theoretically, M&M indicate that companies can maximize their value by employing more debt due to tax shield benefits allied with the use of debt. Firms benefit from taking on more leverage. M&M show that firm value and firm performance is an increasing function of leverage due to the tax deductibility of the interest payments at the corporate level (Modigliani & Miller, 1963). In reality, markets are inefficient, due to taxes, information asymmetry, transaction costs, bankruptcy costs, agency conflicts and any other imperfect elements. The Static Trade-Off Theory by Kraus and Litzenberger (1973) opined that the static trade-off theory assumes that firm's trade-off the benefits and costs of debt and equity financing and find an optimal capital structure after accounting for market imperfections such as taxes, bankruptcy costs and agency costs. The theory stated that there is a benefit to financing with debt, specifically the tax benefit. However there is also a cost of financing with debt, namely the indirect bankruptcy costs and the more direct financial distress costs of debt. The theories are appealing but failed to explain the issue of financial distress in a developing financial market like Nigeria. Lucky (2017) have considered the classical assumption of perfect market as an irony. While factors that determine financial distress has well been studied (Celli, 2015). the effect of financial leverage on corporate financial distress in Nigeria is scanty. This study therefore examined the effect of leverage on corporate financial distress of quoted Nigeria manufacturing firms.

2. Literature Review

2.1 Conceptual Review

Financial distress is defined as the inability of a firm to pay its financial obligations as they mature Beaver (1966) was one of the first researchers to point out that financial distress can have different forms of appearance. Dependent on the type of the event occurring, bankruptcy, bond default, an overdrawn bank account, or nonpayment of a preferred stock dividend can represent the operational form of financial distress. Similar definitions of financial distress can be found in Andrade and Kaplan (1998), Baldwin and Mason (1983), and Brown, James and Mooradian (1992). These authors interpret financial distress as a crucial event whose occurrences separates the time of a company's financial health from the period of financial illness and requires undertaking corrective actions in order to overcome the troubled situation. Andrade and Kaplan (1998) identify two forms of financial distress: the first one is default on a debt payment, and the second one is an attempt to restructure the debt in order to prevent the de-fault situation. Brown, James and Mooradian (1992) classify a company as financially distressed if it is going to implement restructuring measures with the purpose to avoid a default or as a response to the anticipated default on a debt contract.

Opler and Titman (1994) defined financial distress more broadly as a costly event that affects the relationship to debt holders and non-financial stakeholders. As a consequence, a company gains an impaired access to new capital and bears the increasing costs of maintaining this stricken relationship. Gestel et al. (2006) characterize financial distress and failure as the result of chronic losses which cause a disproportionate increase in liabilities accompanied by shrinkage in the asset value. Hendel (1996) gives a probabilistic definition of financial distress as "the likelihood of bankruptcy, which depends on the level of liquid assets as well as on credit availability. The development of the theory of financial distress as a process having specific dynamics began with an article by Gordon (1971). Gordon highlights that financial distress is only one state of the process, followed by failure and restructuring, and should be defined in terms of financial structure and security valuation. The corporation enters this state when its power to generate earnings is becoming weak and the amount of debt exceeds the value of the company's total assets. Financial distress is characterized by yields of bonds lower than the risk free interest rate and significant difficulties in obtaining additional external financing.

2.2 Financial Leverage

Financial leverage is a measure of how much firm uses equity and debt to finance its assets. As debt increases, financial leverage increases. Management tends to prefer equity financing over debt since it carries less risk (Matt, 2000). Financial leverage takes the form of a loan or other borrowing (debt), the proceeds of which are re-invested with the intent to earn a greater rate of return than cost of interest. An unlevered firm is an all-equity firm, whereas a levered firm is made up of ownership equity and debt (Andy, Chuck & Alison, 2002). Leverage allows a greater potential returns to the investor than otherwise would have been available, but the potential loss is also greater if the investment becomes worthless, the loan principal and all accrued interest on the loan still need to be repaid (Andy *et. al.,* 2002).

Pandey (2010) opined that the financial leverage employed by a company is intended to earn more return on the fixed-charge funds than their costs. The surplus (or deficit) will increase (or decrease) the return on the owners' equity. The rate of return on the owners' equity is levered above or below the rate of return on total assets. Thus, financial leverage is considered as a double-edged sword because it provides the potentials of increasing the shareholders' earnings as well as creating the risks of loss to them.

2.3 Measures of Financial Leverage

2.3.1 Total Debt Ratio

Total debt ratio measures the amount of a firm's total assets that is financed with external debt. This measure encompasses all short term liabilities and long-term liabilities. Nwude (2003) contend that this measures portion of the firm's assets that is financed by creditors. As the total debt ratio increase, so do a firm's fixed-interest charges, if the total debt ratio becomes too high, the cash flow the firm generates during economic recessions may not be sufficient to meet interest payments. In terms of its significance to a firm, theoretical literatures predict that debt is positively correlated with level of investment. For example, long and Malitz (1985) found a significant positive relationship between the rate of investment in fixed plant and equipment and level of borrowing. The total debt ratio is measured by dividing total debt with the total assets of the firm. This proxy variable remained most notable measure of leverage ratio of a firm as adopted in many empirical studies (Zeitun and Tian, 2007; Onaolapo and Kajola, 2010; Tze-Sam and Heng, 2011; Kasozi and Ngwenya, 2010; Baker and Wurgler, 2002; Ju et al., 2004; and Booth et al., 1999; Khan, 2012; Azhagaiah and Gavoury, 2011).

$$\text{Total Debt ratio} = \frac{\textit{Total Assets}}{\textit{Total Debt}} \quad 1$$

2.3.2 Debt Equity Ratio

Debt equity ratio is similar to the debt ratio and relates the amount of a firm's debt financing to the amount of equity financing. Actually, this measure of leverage ratio is not actually a new measure; it is simply the debt ratio in a different format. Debt equity ratio is the quantitative measures of the proportion of the total debt to residual owners' equity (Nwude, 2003). Thus, it is an indicator of company's financial structure and whether the company is more reliant on borrowing (debt) or shareholders capital (equity) to fund assets and activities. Many empirical studies in different jurisdictions have employed this measure of financial structure in their various studies (Zeitun and Tian, 2007; Majumdar and Chhibber, 1999; Azhagaiah and Gavoury, 2011) among others.

$$\text{Debt equity ratio} = \frac{\textit{Shareholders Funds}}{\textit{Total Debt}} \quad 2$$

2.3.3 Long Term Debt Ratio

Although this measure is incorporated in the last two measures highlighted above, some analysts generally use this measure because most interest costs are incurred on long-term borrowed funds, and because long-term borrowing places multi-year, fixed financial obligations on a firm. Titman and Wessels (1988) contend that significant results are good reason for employment of different measures of leverage ratio because some of the theories of financial structure have different implications for not combining them as aggregate "debt ratio". Long term debt ratio is measured by dividing long term debt with the total assets of the firm, and has been adopted in several empirical studies (Titman and Wessels, 1988; Zeitun and Tian, 2007; Tze-Sam and Heng, 2011; Long and Malitz, 1985; Booth et al., 1999).

$$\text{Long term debt ratio} = \frac{\textit{Total Assets}}{\textit{Long Term Debt}} \quad 3$$

2.3.4 Short Term Debt Ratio

Short term debts are debt obligations that mature within one accounting year. This measure is very appropriate to be included in the measures of leverage ratio due to the important of short term funding to a firm. This may be one of the reasons that led to adoption of different measures of leverage ratio rather than narrow measure of financial structure by some scholars. Titman and Wessels (1988) contend that theories have different empirical implications in regard to different types of debt instruments. Thus, mismatching funds is a situation when long term investments are financed by short term debt rather than long term debt. Apparently, the occurrence of this is prone to default as payment of interest and repayment of principal may fall due when the proceeds (cash inflow) from the investment are not readily available. The inability of the firm to repay the principal will expose it to the embarrassments resulting from legal actions. This measure however, indicates the magnitude of current liabilities (obligations) to changes in the value of overall assets of a firm. Schinasi (2000) contends that leverage is the magnification of the rate of return whether positive or negative on a position or investment beyond the rate obtained by a direct investment of own funds in the market.

Theoretically, it is argued that short term measure is a good measure of leverage ratio in transition economy with less developed debt market where most firms' external debt finance are majorly commercial bank loans. Lucey and Zhang (2011) are of the view that market liberalization at the country level decreases the use of long-term debt, and debt maturity shifts to short term. Empirical investigation by Khan (2012) revealed that engineering sector firms in Pakistan are largely dependent on short debt but debts are attached with strong covenants which affect the performance of the firm. A good number of authors have

employed this measure in their empirical studies (Timan and Wessels, 1988; Zeitun and Tian, 2007; Long and Malitz, 1995; Khan, 2012) among others. This is measured thus;

$$\text{Short term debt} = \frac{\textit{Total Assets}}{\textit{Short Term Debt}} \quad (4)$$

2.4 Theoretical Review

2.4.1 Modigliani-Miller Hypothesis

The origin of the early literature on the relationship between bankruptcy and corporate capital structure decisions can be found in the seminal work of Modigliani and Miller (1958, 1963). Their initial analysis establishes that, in perfect and frictionless capital markets, firm value is unaffected by financial policy. The original proof of the celebrated Modigliani-Miller (MM) theorem is predicated on the assumption of riskless debt. The theorem was later generalized by Stiglitz (1974) and others who argue that, in perfect and frictionless markets, the irrelevance of corporate financial policy extends beyond the issuance of riskless debt and equity securities to other forms of securities, including risky debt, preferred stock, and all kinds of hybrid securities. The theorem holds in both a single-period framework and a multi-period framework so that firm value is also independent of debt maturity structure decisions. The corollary of the MM theorem is that corporate bankruptcy is inconsequential to firm value, since the investment decisions are completely separable from the financing decisions.

In the perfect and frictionless MM world, the amount of corporate indebtedness has no effect on the value of the firm's assets or on the risk of the total cash flow stream generated by the firm's assets. The capital structure of the firm simply determines how the total cash flow is partitioned between equity holders and debt holders and thus the risk borne by each class of capital providers. Bankruptcy is essentially a transfer of ownership from equity holders to debt holders when the value of assets drops below the value of debt. The complete separation between financing decisions and investment decisions implies that there is no necessary linkage between bankruptcy and the firm's operating performance. Bankruptcy does not cause economic distress or poor economic performance.

The crucial consideration is whether an identical but otherwise not financially distressed firm (due to low financial leverage) would face similar deterioration in its operating performance. It is also worthwhile to note that financial distress is distinct from financial constraint. Confusion about the two may arise because financially distressed firms are usually also financially constrained. Financial constraint refers to a case when it is costly or even impossible for the firm to access external financing due to reasons such as asymmetric information, intangibility of assets, and risk. In fact, the firm can be financially constrained even without any debt on its balance sheet. Thus, a financially constrained firm is not necessarily financially distressed. Moreover, liquidation and bankruptcy are often discussed in the literature as though they are related. Liquidation is the process of dismantling the firm's assets and selling them (either piecemeal or in their entirety) to new management teams. Liquidation is optimal when the value of the firm's existing resources is higher in alternative uses. Hence liquidation should be viewed as a capital budgeting decision that is independent of the way in which the firm is financed. Liquidation and bankruptcy are separate, independent events (Haugen and Senbet (1978) for further discussion on this issue).

2.4.2 Capital Structure Theory

The Tradeoff Theory If corporate bankruptcy is costly and then it fills an important void between the corner result of the Modigliani-Miller tax-adjusted model and the observed limitations on the amount of debt financing employed in practice. Although corporate capital structure decision is not the primary subject of this paper, it is appropriate to highlight what has come to be known as the 'trade-off theory' of capital structure. Modigliani and Miller (1963) argue that the tax code favors debt over equity financing by allowing the firm's interest expense to be deducted from gross income for corporate tax purposes, but disallowing deductibility of payments to equity holders (dividends are not tax deductible on the personal account). Since an additional dollar of debt generates the marginal benefit of a tax deduction without any offsetting cost in this framework, the firm value is maximized by utilizing as much debt as possible to finance corporate investment decisions.

Leland (1994) develops a unified analytical framework with closed-form solutions to understand the value of corporate debt and optimal capital structure. Leland's model is rich enough to permit a detailed analysis of the behavior of corporate bond prices and optimal leverage ratios as corporate tax rates, bankruptcy costs, firm asset value, firm risk, and risk-free interest rate change. In Leland's framework bankruptcy can either be determined endogenously as the result of an optimal decision by equity holders or be triggered by the violation of a positive net-worth covenant. The author shows that the tradeoff between the tax benefit of debt and the bankruptcy costs determines the value of corporate bond, the bond yield, the optimal leverage ratio, and the optimal timing of bankruptcy. Leland's model also provides important insights about the tradeoff between the tax benefit of debt and the agency cost of debt. When the firm is in the vicinity of financial distress and bankruptcy, equity holders have incentives to increase the firm's risk through asset substitution, which transfers wealth from bondholders to equity holders. Corporate bonds with positive net-worth covenants (or short-term rollover debt financing) tend to mitigate this agency problem, because stockholders cannot gain by increasing firm risk when debt is protected by the covenant. Thus, protected debt

may be the preferred form of financing for firms that are more exposed to the agency cost of debt, despite having lower potential tax benefits.

2.4.3 Information Asymmetry

Asymmetric information exists in any transaction where one party knows more about the true value of the asset than does another party. In corporate finance, corporate managers are typically assumed to possess private information about the true economic value of the firm. In the case of financially distressed firms, corporate insiders and outside investors may simply disagree about the true value of the firm because they have different information. Insiders may also have an incentive to intentionally misrepresent the firm value in order to convince bondholders to agree to exchange their existing claims for lower valued securities. The asymmetric information problem suggests that a greater proportion of the securities offered in a distressed exchange offer should contain contingent payment features. The reason is that the future values of contingent payment securities will adjust more readily to the revelation of information about the true value of the firm.

2.5 Empirical Review

Gennaioli and Rossi (2011) showed that judicial biases may not be random, because career concerns of bankruptcy judges induce a pro-debtor bias. Judges would over-reorganize bankrupt firms to establish a pro-debtor reputation so as to attract future bankruptcy filings (by debtors). The authors show that strong creditor protection in reorganization is crucial to improve judicial incentives to resolve financial distress efficiently.

Lubben (2000) used a sample of 22 firms from 1994 and calculates that the cost of legal counsel in Chapter 11 bankruptcy is on average about 1.8% of the distressed firm's total assets, and can be as high as 5%. Altman and Hotchkiss (2006) provide a nice summary of the estimates of the direct bankruptcy costs in the literature. The findings in all these studies suggest that direct bankruptcy costs are unlikely to represent a significant determinant of the firm's capital structure decision.

Gilson, John and Lang (1990) provided extensive evidence on the incentives of financially distressed firms to choose between private debt restructurings and formal bankruptcy proceedings. Their sample consists of 169 distress reorganizations during 1978–1987. They find that a private workout is more likely when the distressed firm has fewer distinct classes of debt outstanding and the firm relies more heavily on bank debt than public debt, both of which indicate a less severe holdout problem and less information asymmetry. Private reorganization is also more likely when a greater proportion of the firm's assets are intangible. For such a firm, failure to renegotiate the firm's impaired credit obligations will result in substantial destruction of going concern firm value. This creates a strong incentive for different classes of creditors to reach agreement and avoid costly bankruptcy reorganization. Their findings suggest that asset and financial characteristics jointly affect the firm's choice between these alternative reorganization mechanisms.

Eberhart et al.(1990) examined the relationship between share price reactions and subsequent APR violations, and find that the equity markets generally anticipate and price these deviations. Garlappi, Shu, and Yan (2008) showed that shareholder advantage, in violation of the APR, can explain the cross-section of equity returns. For firms with strong shareholder advantage (e.g., those subject to large magnitudes of APR violations), a higher probability of default can be associated with a lower expected equity return. This is because in the presence of 37 shareholder advantage, default probability does not adequately represent the risk of default to equity holders.

Bharath, Panchapegesan, and Werner (2010) documented a secular decline in the frequency of APR violations from 64% before 1990 to 26% in the 1990s, and to about 9% in the 2000—2005 period. The average value received by equity holders in the APR violations also declines from 3.6% before 1990 to 0.6% in the 1990s and to 0.44% in the 2000s. At the same time, management turnover is observed in about 38% of the cases, a 65% increase from the level before 1990. Ayotte and Morrison (2009) examined 153 bankruptcy filings by both private and public companies in the latter half of 2001. The authors also find that APR violations are rare, occurring in only 8% of the cases. In 82% of the confirmed reorganization plans, equity holders receive nothing. If APR violations mainly result from the debtor-friendly features of the bankruptcy code, then the substantial decrease in the frequency and magnitude of APR violations in the last two decades should reflect growing power of creditors in the US corporate bankruptcies.

Dahiya et al. (2003) found that firms, that obtain DIP financing, are more likely to emerge from bankruptcy than firms that do not. They also take a shorter time to resolve their bankruptcy filing. These findings are even more pronounced if the DIP lenders are well informed about the debtor through prior lending relationship. These results are consistent with both a screening role and a monitoring role played by DIP lenders. Skeel (2004) argued that the control and governance by DIP lenders is achieved mainly through the lenders' influence over managerial personnel in the distressed debtor, and the active use of affirmative and negative covenants in the loan agreement. DIP lenders can insist on changing the management of the distressed debtor at the outset of the loan. Several studies find evidence of a sharp increase in CEO turnover in recent bankruptcy reorganizations.

Bharath et al. (2010) found that management turnover is observed in 38% of the cases after 2000, a 65% increase from the level before 1990. The turnover rate is significant even among Bernstein (2006) finds that 48% of the bankrupt firms in his sample experience CEO turnover within two years of the filing. Ayotte and Morrisen (2009) found that 70% of CEOs in their sample are replaced within two years of the bankruptcy filing. All these studies suggest that no longer provides a safe harbor for entrenched managers. DIP lenders do exert control and governance in the distressed firms by pressing for a change in the management. A DIP loan is generally structured as a revolving credit agreement with short maturity (the median loan maturity is 1.5 years) and strict conditions on each new round of financing. This loan structure gives the lender significant leverage over the debtor's decision-making throughout the reorganization process.

Altman (2000) amended Z-Score model to develop ZETA model for appraising bankruptcy risk of firms. It is based on data more relevant to current conditions and to a larger number of industrial firms. The potential applications of the ZETA bankruptcy identification model are to assure credit worthiness of firms for financial and non-financial institutions, identification of undesirable investment risk for portfolio managers and individual investors and to aid in more effective internal and external audits of firms with respect to going-concern considerations, among others.

Grice et al; (2001) seeks to validate the application of Z-score model current scenario. They tested the model for predicting bankruptcy of non-manufacturing firms as it was originally developed for manufacturing firms. They also examined whether the model was useful for predicting financial stress other than bankruptcy. They established the fact that the model was more subtle in estimating bankruptcy of manufacturing firms com-pared to non-manufacturing firms. Also the model was insensitive to predict other forms of distress.

Platt et al; (2002) analyzed automotive supplier industry and suggested that the early warning model successfully discriminated between distressed firms and healthy firms. They claimed that model should include all firms within a population; otherwise it could result in choice-based sample bias.Chava et al; (2004) paper scrutinized the dominance of Shumway's model (2001) over Altman's model (1968) and Zmijewski's in forecasting bankruptcy by collecting extensive data. They substantiate the fact that industry groupings will remarkably influence the bankruptcy risk rate in the model.

Kwak et.al. (2005) employed data mining technique called Multiple Criteria Linear Programming (MCLP) to identify the bankrupt firms. The outcome was com-pared with Altman's multi discriminant model and Ohlson's logit model. They claim that MCLP model has superior prediction rate than Altman model and similar result as Ohlson's model.Dawkins et al., (2007) analysed the fluctuations in share price after firm has filled bankruptcy. They employed event study methodology and controlled firms' financial condition by using Altman's z-score model. It was observed that there was increase in share price even when firm filed bankruptcy because of prevailing bull market conditions. Huge transactions were commanded by large trader's post-bankruptcy filing as investors were abnormally optimistic.

Fich et al; (2008) investigated the association between firm's governance practices and capability to avoid bankruptcy. They predicted the bankruptcy of firms using Altman's Z-score model along with interest coverage ratio. It was found that during firm distress situation bad governance will misrepresent accounting information and will not have ability to handle the situation. This often occurs if they are independent boards than inside directors.

Agarwal et al; (2008) compared the accuracy of predicting bankruptcy using market base model with accounting Z-score model. It was found that neither of the models had adequate information for predicting failure as they were unique. However, it was concluded that accounting based models account for credit risk since accounting statements capture performance for several years.

Shen, et al; (2010) compares logit model with robust logit developed based on Altman's z-score. They found robust logit model was superior even when the sample included statistical outliers (firms that are doing extremely good or bad). However, robust logit model was vigorously allocating firms as default. Ray (2011) evaluates financial health of automobile industry during from 2003 to 2010 in India using Z-score model. The multiple discriminant frameworks has depicted moderate picture. The Z-score lies within "Grey Zone" suggesting credit risk associated with the industry. The study indicates alarming situation where Z score is declining after global recession hits Indian economy (2007).

Chen et al., (2012) analyzed the effect of pricing of corporate debt due to "unionized workers" in financially distressed and healthy firms. They employed five different indicators including Altman's Z-score model to identify if firm is in distress. Using all five alternative models of distress, it was found that "unionized workers" and Distress has negative relation which is statistically significant. This is because labour unions try to shield creditor's wealth even though they support firm policy to reduce creditors' wealth during distress.

Singhal et al; (2013) examined the relationship between bankruptcy and diversification strategy of firms. Altman Z-score used to represent the likelihood of bankruptcy which is highly correlated with leverage. It was found that focused firms are more likely to go bankrupt than diversified firms.

Li (2014) explored the application of Altman's bankruptcy model in construction industry. The origi-nal five set variable is expanded to 14 set variable. The conclusion drawn is that Altman's model stands both valid and effective in context of bankruptcy prediction for sample selected. Celli (2015) found that the Z-score degree of reliability is relatively high and still

works quite adequately in predicting listed industrial company failure in Italy. It proved a precious tool in the detection of company operating and financial difficulties up to 3 years before the default.

Altman et al. (2016) re-examined the original version of the Z-Score model using data of different countries. They re-estimated values using another statistical method and additional variables to assess the effect of classification performance when the data are heterogeneous. The evidence indicates that the original Z-Score model executes well at an international context till date. The conclusion from the review is that although the Z-Score model was developed nearly five decades ago and many alternative failure prediction models exist, the Z-Score model continues to be used worldwide as a main or supporting tool for bankruptcy or financial distress prediction and analysis; both in research and in practice. This paper focuses on accounting-based versions of the Z-Score models, which even though they are occasionally outperformed by other models, do not rely on market data.

3. Research Methodology

Descriptive and longitudinal design was employed with a view to making statistical inferences on the effect leverage on corporate financial distress of manufacturing firms. A Sampling frame of 15 quoted manufacturing firms was selected using random sampling techniques. The required cross-sectional data were sourced from annual reports of the firms and stock exchange fact book from 2008-2017.

$$Y_{it} = \beta X'_{it} + \alpha Z'_{i} + \varepsilon_{it} \qquad 5$$

3.1 Analytical Framework and Empirical Model Specification

This analysis is carried out within a panel data estimation framework. The preference of this estimation method is not only because it enables a cross-sectional time series analysis which usually makes provision for broader set of data points, but also because of its ability to control for heterogeneity and endogencity issues. Hence panel data estimation allows for the control of individual-specific effects usually unobservable which may be correlated with other explanatory variables included in the specification of the relationship between dependent and explanatory variables (Hausman and Taylor, 1981). The basic framework for panel data regression takes the form:

Where:

Y	=	dependent variable
D	=	independent variable
β_o	=	intercept
β_i	=	coefficient of the explanatory variable
e	=	error term
I	=	cross-sectional variable
T	=	time series variable

In the equation above, the heterogeneity or individual effect is Z^i which may represent a constant term and a set of observable and unobservable variables. When the individual effect $Z'i$ contains only a constant term, OLS estimation provides a consistent and efficient estimates of the underlying parameters (Kyereboah-Coleman, 2007); hut if Z'_i is un-observable and correlated with X_{it}, then emerges the need to use other estimation method because OLS will give rise to biased and inconsistent estimates. Similarly for endogeneity issues, it is generally assumed that the explanatory variables located on the right hand side of the regression equation are statistically independent of the disturbance ε_{it} such that the disturbance term ε_{it} is assumed to be uncorrelated with columns of the parameters X_{it} and Z_{it} as stated in equation (1), and has zero mean and constant variance $\sigma^2\eta$ (Hausman and Taylor, 198). If this assumption is violated, then OLS estimation will yield biased estimates of the underlying parameters of β (Mayston, 2002).Hence, endogeneitv problems arise when the explanatory variables are correlated with the disturbance term ε_{it} (Mayston, 2002; Hausman and Taylor, 1981). In order to circumvent these problems, panel estimation techniques of fixed and random effects will be adopted in this study, in addition to the traditional pooled regression estimation. Decisions will be made between the fixed and random effect models using the Hausman specification test. The panel model for the study is specified base on the modified model of Lucky (2018).

3.2 Model Specification

3.2.1 Pooled regression specification

$$Z - SCORE_i = \alpha o + \alpha_1\ DER_{1i} + \alpha_2\ STD_{2i} + LTD_{3\,it} + \alpha_3 TD/TA_{4it} + \mu \quad 6$$

$$\Delta OP_i = \alpha o + \alpha_1\ DER_{1i} + \alpha_2\ STD_{2i} + LTD_{3\,it} + \alpha_3 TD/TA_{4it} + \mu \quad 7$$

3.2.2 Fixed Effect Model Specification

$$Z - SCORE_{it} = \alpha o + + \alpha_1\ DER_{1i} + \alpha_2\ STD_{2i} + LTD_{3\,it} + \alpha_3 TD/TA_{4it} + \sum_i^9 = 1\ \alpha_i\ idum + \varepsilon 1_{it} \quad 8$$

$$\Delta OP_{it} = \alpha o + + \alpha_1\ DER_{1i} + \alpha_2\ STD_{2i} + LTD_{3\,it} + \alpha_3 TD/TA_{4it} + \sum_i^9 = 1\ \alpha_i\ idum + \varepsilon 1_{it} \quad 9$$

3.2.3 Random effect model specification

$$Z - SCORE_{it} = \alpha o + \alpha_1 + \alpha_1\ DER_{1i} + \alpha_2\ STD_{2i} + LTD_{3\,it} + \alpha_3 TD/TA_{4it} + + \mu i + \varepsilon 1_{it} \quad 10$$

$$\Delta OP_{it} = \alpha o + \alpha_1 + \alpha_1\ DER_{1i} + \alpha_2\ STD_{2i} + LTD_{3\,it} + \alpha_3 TD/TA_{4it} + + \mu i + \varepsilon 1_{it} \quad 11$$

Where

Z-SCORE = Altman Z-score measure for Financial distress

ΔOP = Variation in operating profits of the manufacturing firms

DER = Debt Equity Ratio

STD = Short term debt

LTD = Long term debt

TD/TA = Total debt to total assets

μ = Stochastic or disturbance/error term.

t = Time dimension of the variables

α 0 = Constant or intercept.

3.3 Estimation Techniques

3.3.1 Panel unit root test result

The data were checked for the presence of unit root using the ADF Fisher Chi-Square andPhiliperon Fisher Chi-Square, which is based on the well-known Dickey–Fuller procedure. The null hypothesis for these tests is that there is a presence of non-stationary series against the alternative hypothesis of stationary series. The unit root test is important because non-stationary series regression estimation leads to spurious regression estimations with the wrong magnitude and sign of the parameter of the regressors, with wrongly inferred implications. The study assumes an absence of a time trend; hence it is tested for stationarity allowing for constant only. Stationarity denotes the non-existence of unit root. We shall therefore subject all the variables to unit root test using the augmented Dickey Fuller (ADF) test specified in Gujarati (2004) as follows.

$$\Delta y_t = \beta_1 + \beta_2 + \delta y_{t-1} + \alpha i \sum_{i-1}^{m} \Delta y_{t-1} + Et \quad 12$$

Where:

Δy_t = change time t

Δy_{t-1} = the lagged value of the dependent variables

Σ_t = White noise error term

If in the above δ =0, then we conclude that there is a unit root. Otherwise there is no unit root, meaning that it is stationary. The choice of lag will be determined by Akaike information criteria.

3.3.2 Decision Rule

t-ADF (absolute value) > t-ADF (critical value) : Reject H_0 (otherwise accept H_1)

Note that each variable will have its own ADF test value. If the variables are stationary at level, then they are integrated of order zero i.e I(0). The unit root problem earlier mentioned can be explained using the model:

$Y = Y_{t-1} + \mu_t$ 13

Where Yt is the variable in question; μ_t is stochastic error term. Equation (a) is termed first order regression because we regress the value Y at time "t" on its value at time (t- 1). If the coefficient of Y_{t-1} is equal to 1, then we have a unit root problem (non stationary situation). This means that if the regression.

$Y = Y_{t-1} + \mu_t$ 14

Is run and L is found to be equal to 1 then the variable Yt has a unit root (random work in time series econometrics).

If a time series has a unit root, the first difference of such time series are usually stationary. Therefore to salve the problem, take the first difference of the time series. The first difference operation is shown in the following model:

$\Delta Y = (L-1) Y_{t-1} + \mu_t$ 15

$\delta Y_{t-1} + \mu_t$ 16

(Note: $\delta = 1-1 = 0$; where $L = 1$; $\Delta Yt = Yt - Y_{t-1}$) 17

Integrated Of Order 1 Or I(I)

Given that the original (random walk) series is differenced once and the differenced series becomes stationary, then the original series is said to be integrated of order I or I (1).

Integrated of Order 2 Or I (2)

Given that the original series is differenced twice before it becomes stationary (the first difference of the first difference), then the original series is integrated of order 2 or I(2).

Therefore, given a time series has to be differenced Q times before becoming stationary it said to be integrated of order Q or I (q). Hence, non stationary time series are those that are integrated of order 1 or greater.

The null hypothesis for the unit root is: Ho: a = 1;

The alternative hypothesis is Hi: a <1.

We shall test the stationarity of our data using the ADF test.

3.4 Granger Causality Test

Thus, Granger causality test helps in adequate specification of model. In Granger causality, test, the null hypothesis is that no causality between two variables. The null hypotheses is rejected if the probability of F* statistics given in the Granger causality result is less than 0.05.

The pair-wise granger causality test is mathematically expressed as:

$$Y_t \pi_o + \sum_{i=1}^{n} x_1^{\,y}\, Y_{t-1} \sum_{i=1}^{n} \pi_1^{\,x}\, x_{t-1} + u_1 \qquad 18$$

and

$$x_t dp_o + \sum_{i=1}^{n} dp_1^{y}\, Yt - 1 \sum_{i=1}^{n} dp1^{x}\, x_{y-1} + V_1 \qquad 19$$

Where x_t and y_t are the variables to be tested white u_t and v_t are the white noise disturbance terms. The null hypothesis $\pi_1^y = dp_1^y = 0$, for all I's is tested against the alternative hypothesis $\pi_1^x \neq 0$ and $dp_1^y \neq 0.$ if the co-efficient of π_1^x

are statistically significant but that of $dp1y$ are not, then x causes y. If the reverse is true then y causes x. however, where both co-efficient of π_1^x and dp_1^y are significant then causality is bi –directional

4. Presentation of Results and Discussion of Findings

The following tables explain the dynamic relationship between leverage and corporate financial distress of the selected manufacturing firms in Nigeria.

Table 1: Presentation of Level Series Result

Variable	Pooled Effect			Fixed effect			Random effect		
	MODEL I								
	β coefficient	T. stat	p. value	β coefficient	T. stat	p. value	β coefficient	T. stat	p. value
TD_TA	-0.008645	-0.600153	0.5500	0.001555	0.131724	0.8956	-0.000197	-0.016947	0.9865
STD	-7.03E-05	-0.274588	0.7843	5.05E-05	0.248474	0.8045	3.06E-05	0.152246	0.8794
LTD	0.009995	0.656396	0.5133	0.004891	0.371851	0.7111	0.005817	0.453857	0.6511
DER	0.022332	1.774702	0.0795	0.010815	1.092673	0.2782	0.012597	1.286643	0.2017
C	2.122728	2.088736	0.0397	2.434979	2.869577	0.0054	2.389538	2.798302	0.0064
R-squared	0.039020			0.571756			0.020576		
AdjR²	0.006202			0.463188			0.025515		
F-Sstatistic	0.862851			5.266306			0.446422		
F- Prob	0.489742			0.000000			0.774709		
D W	1.089989			1.834110			1.688446		
MODEL II									
Variable	Pooled Effect			Fixed effect			Random effect		
	β coefficient	T. stat	p. value	β coefficient	T. stat	p. value	β coefficient	T. stat	p. value
TD_TA	0.031223	2.073778	0.0417	0.031223	2.073778	0.0417	0.028239	1.935165	0.0563
STD	-0.004051	-0.202461	0.8401	-0.004051	-0.202461	0.8401	-0.007842	-0.421734	0.6743
LTD	-0.000192	-0.619634	0.5375	-0.000192	-0.619634	0.5375	-0.000306	-1.025563	0.3080
DER	0.011300	0.629176	0.5313	0.011300	0.629176	0.5313	-0.001072	-0.062732	0.9501
C	8.273092	6.409629	0.0000	8.273092	6.409629	0.0000	9.108714	7.432156	0.0000
R-squared	0.409636			0.409636			0.056943		
AdjR²	0.259967			0.259967			0.012564		
F-statistic	2.736936			2.736936			1.283096		
F- Prob	0.001357			0.001357			0.283076		
D W	1.46930			1.469302			1.151925		

Source: Extract From E-View 9.0, 2019

Table 2: Testing the Significance of the Models

TEST: Redundant	CHI –SQ STAT	DF	PROB
Cross-section F	6.308871	(14,71)	0.0000
Cross-section Chi-quare	72.743506	14	0.0000
TEST: Hausman	**CHI –SQ STAT**	**DF**	**PROB**
Cross-section random	2.038175	4	0.0007
MODEL II			
Cross-section F	3.021621	(14,71)	0.0011
Cross-section Chi-square	42.064478	14	0.0001
TEST: Hausman	**CHI –SQ STAT**	**DF**	**PROB**

Cross-section random	7.624983	4	0.1063

Source: Extract from E-view (9.0), 2019

In testing the validity of the models, the fixed effects on the cross section Redundant Fixed Effect- Likelihood Ratio, the P-value is 0.000 indicating that the effects are significant. Select the random effect and perform the Correlated Random Effects-Hausman test, testing the random effects model against the fixed effects model. The null hypothesis in that case is that both tests are consistent estimators and the random effects model is efficient. Under the alternative hypothesis, only the fixed effect is consistent. Since the p- value is 0.000, the null hypothesis is rejected and, therefore, the fixed effects model is to be preferred.

Table3: Test for Stationarity

Variables	ADF - Fisher Chi-square/ PP - Fisher Chi-square	Statistics	Probability	REMARK	DECISION
Z-Score	PP - Fisher Chi-square	67.3305	0.0001	Stationary	Reject H0
	PP - Choi Z-stat	-3.67792	0.0001	Stationary	Reject H0
OP	PP - Fisher Chi-square	73.4606	0.0000	Stationary	Reject H0
	PP - Choi Z-stat	-2.69812	0.0035	Stationary	Reject H0
TD_TA	PP - Fisher Chi-square	88.0559	0.0000	Stationary	Reject H0
	PP - Choi Z-stat	-5.30916	0.0000	Stationary	Reject H0
STD	PP - Fisher Chi-square	100.329	0.0000	Stationary	Reject H0
	PP - Choi Z-stat	-4.89214	0.0000	Stationary	Reject H0
LTD	PP - Fisher Chi-square	67.2248	0.0001	Stationary	Reject H0
	PP - Choi Z-stat	-2.32101	0.0101	Stationary	Reject H0
DER	PP - Fisher Chi-square	92.7698	0.0000	Stationary	Reject H0
	PP - Choi Z-stat	-4.39812	0.0000	Stationary	Reject H0

Source: Extract from E-view 9.0

The table above presents the summary results of the ADF and PP panel unit root tests. The results show that the null hypotheses of a unit root test for first difference series for all the variables can be rejected at all the critical values indicating that the level series which is largely time-dependent and non-stationary can be made stationary at the first difference and maximum lag of one. Thus, the reduced form model follows an integrating order of I(1) process and is therefore a stationary process. It also reveals that the test of stationarity in the residuals from the level series regression is significant at all lags. Furthermore, this indicates that the regression is no more spurious but real. That is to say, all the variables are individually stationary and stable. At this level, all the t-statistic became significant at 5 percent.

Table 4: Test for Stationarity

Null Hypothesis:	Obs	F-Statistic	Prob.
TD_TA does not Granger Cause Z_SCORE	60	1.71074	0.1902
Z_SCORE does not Granger Cause TD_TA		0.00783	0.9922
STD does not Granger Cause Z_SCORE	60	3.28627	0.0449
Z_SCORE does not Granger Cause STD		5.68099	0.0057
LTD does not Granger Cause Z_SCORE	60	1.05415	0.3554
Z_SCORE does not Granger Cause LTD		0.36213	0.6978
DER does not Granger Cause Z_SCORE	60	2.97105	0.0595
Z_SCORE does not Granger Cause DER		1.28828	0.2839
Null Hypothesis:	Obs	F-Statistic	Prob.
DER does not Granger Cause OP	60	1.17250	0.3172
OP does not Granger Cause DER		3.31461	0.0437
LTD does not Granger Cause OP	60	0.68677	0.5075
OP does not Granger Cause LTD		0.36610	0.6951
STD does not Granger Cause OP	60	0.44158	0.6453
OP does not Granger Cause STD		1.12467	0.3321
TD_TA does not Granger Cause OP	60	5.54936	0.0064
OP does not Granger Cause TD_TA		0.35931	0.6998

Source: extract from E-view 9.0

5. Discussion of Findings

The panel corrected standard error result shown in Table I reveals that leverage affects corporate financial distress significantly. The result of the research could be linked to the high cost of debt financing in the country due to the high-interest rate charged on the borrowed fund. Majority of the manufacturing firm utilizes bank loan in financing their operation which results in a high leverage; however, over-reliance on debt financing exposes the firms to financial distress. The result of the research findings corroborates with previous research work done by (Umar et al., 2012; Perinpanatham, 2014; Vishnu et al., 2014; Muigai and Muriithi, 2017).

The result further showed that the coefficient of all the leverage measures have positive effect on corporate financial distress of the selected manufacturing firms. This implies that increase in financial leverage will increase financial distress of the firms. This finding confirms the static trade-off theory. Furthermore, the result showed that revenue growth affects corporate financial distress negatively. The implication of this is that firms with positive earnings growth employ less debt financing, hence they experience a lower level of financial distress (Thim et al., 2011).

The research is consistent with the trade-off theory which posits a positive relationship between leverage since tangible assets are easier to collateralize and they suffer less loss in value when firms go into distress (Harc, 2015). The findings negate the research outcome of Maina and Ishmail, (2014) as well as Muigai and Muriithi (2017). The panel data estimates also showed from the second model that total debt to total assets and debt equity ratio have positive relationship with the operating profits of the selected manufacturing firms while short and long term debt have negative effect on operating profits of the firms. The Durbin Watson figure of 1.83 indicates that the model is free from autocorrelation. In addition, the p-value of the F-statistics showed that the whole regression is significant and a good fit.

The stationarity properties of the variables were examined as a preliminary test prior to investigating the effect of capital structure on financial distress. As shown in table iii, the result showed that all the variables became stationary at the first difference; hence, the null hypothesis of the existence of unit root test is rejected, the granger causality test in table iii show bi-directional causality from short term debt z-score and unit directional causality from operating profit to debt equity ratio and total debt/ total assets to operating profit.

6. Conclusion

The study examined the effects of leverage on corporate financial distress of manufacturing in Nigeria between the periods of 2008 and 20167 by employing the panel corrected standard error technique. The outcome of the research revealed that leverage affects corporate financial distress significantly. The result further revealed that total debt/total assets and debt equity ratio effect positively changes in operating profit while short and long term debt effect negatively changes in operating profits of the manufacturing firms. From the findings the study concludes that leverage affect significantly corporate financial distress of the quoted manufacturing firms in Nigeria.

7. Recommendation

Based on the research, the following recommendations have been provided:

- Financial structure of the manufacturing firms ought to be adequately planned to safeguard the interest of the equity holders, shareholders and financial requirements of the firm and the firms should formulate policies of increasing its equity capital as oppose to debt.
- Implementable investment policies should be formulated and the business environment should be well examined. Recognizing faults of investment might be paramount to develop the business's financial performance, since it specifies the loopholes which corrective decision can be applied.
- Companies should depend less on short term debt, which made the main portion of their Leverage and emphasis on developing internal schemes to improve on their financial performance.
- Capital market regulators in Nigeria should enhance the operational efficiency of the capital market for better equity financing and government should encourage firms to use internally generated fund than externally generated fund by granting preferential tax treatment on their retained earnings.

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