

## Interest Rates and Corporate Leverage: A Panel Data Evidence Quoted Manufacturing Firms in Nigeria

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### **Abstract**

*This study examined the relationship between interest rates and corporate leverage of quoted manufacturing firms in Nigeria. Panel data were sourced from financial statement of 32 quoted manufacturing firms and Central Bank of Nigeria Statistical Bulletin from 2014-2023. Multiple regression model was formulated to explore the relationship between interest rate and corporate leverage of the quoted manufacturing firms. Corporate leverage was used as dependent variables while prime lending rate, maximum lending rate, savings rate, money market rates and monetary policy rate were used as independent variables. The study employed panel data Ordinary Least Square Methods. After cross examination of the validity of the pooled effect, fixed effect and the random effect, the study accepts the fixed effect model. The study found that interest rate explained about 59.4 percent systematic variations of corporate leverage. Money interest rate, maximum lending rate and prime lending rate have negative effect on corporate leverage while monetary policy rate and savings rate have positive and significant effect on corporate leverage. From the findings; the study concludes that interest rates have significant effect on leverage of the quoted manufacturing firms. We recommend monetary policy that will reduce the volatility of interest rate to enhance corporate leverage of quoted firms in Nigeria.*

**Keywords:** Interest Rates, Corporate Leverage, Panel Data, Quoted Manufacturing Firms, Nigeria

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### **INTRODUCTION**

Financial leverage is the mixes that exist within debt security with equity in its capital structure (Cheng & Tzeng, 2010). Financial leverage also refer to the amount of debt to equity in the capital structure of a firm. The leveraging decision of a firm influences the risk and returns of the shareholders as well as the market value of the firm (Banafa, 2016). The financial leverage of a company is typically analysed using a leverage ratio. A leverage ratio is a financial metric which is used to determine the extent of debt a business or company incurs as against several other accounts in the statements of financial position, statement of financial performance, or the statement of cash flows.

The Leverage ratio indicates the extent to which a business utilizes its debts, as well as evaluates the capital structure and solvency of the company. Succinctly, it indicates the extent to which the company's assets and business is financed with either debt or equity. As such, a company with higher leverage is exposed to a higher financial risk (Corporate Finance Institute, 2021). The debt element in the capital structure is described as the financial leverage. Velnampy and Niresh (2012) pointed out that the proportion of debt and equity in the capital structure is a strategic choice of corporate managers. Pandey (2010) asserted that capital structure decision is a significant managerial decision because it influences the shareholders' return and risk, and the market value of a share may be affected by the capital structure decision.

The interest rate is a significant factor for corporate financing as it can cause a negative rate of return. Investors often get discouraged to invest due to a higher opportunity cost if interest rates are increased (Mills et al, 1995). This is because the cost of borrowing money from the bank increases. Saving money in the bank will most likely provide for a higher rate of return. However, in the case of a capital-intensive firm often have higher debt due to the beneficial tax reductions that are applicable (Obute, Adyorough, & Itodo, 2012). The size of the firm must be taken into consideration greatly. The capital structure of a capital-intensive industry such as manufacturing may differ from another industry.

The manufacturing sector is becoming more digitized than the rest of the world is. However, due to its nature, there is only so much digitalization to be done. This means that the firms in the manufacturing sector experience hardship with adjusting to short-run issues that might occur (Badiru, 1996) This sector works according to a very rigid timeline, which allows for shorter flexibility to adjustment, whether it be fiscal issues, data issues or product issues. As a result, this creates a risk of great loss in capital for the firms and further financial pressure depending on if debt capital is used or equity capital. Management teams in all corporations are constantly aware of their monetary assets for the purpose of investing, expanding, and constantly growing their revenue. To be fiscally responsible, corporations need to understand the underlying facts of what capital is used and from where the capital is gained.

Interest rates play a crucial role in the efficient allocation of resources aimed at facilitating growth and development of an economy and such as a demand management technique for achieving both internal and external balance. According to Ocnenon (1973) interest rate policy is among the emerging issues in current economic policy in Nigeria in view of the role it is expected to play in the deregulated economy in inducing savings which can be channel to investment and thereby increasing employment, output and efficient financial resource utilization. Also, interest rates can have a substantial influence on the rate and pattern of economic growth by influencing on the volume and disposition of saving as well as the volume and productivity of investment (Obute, Adyorough & Itodo, 2012).

The subject of corporate leverage has occupied researchers for many years. Since the path-breaking work of Modigliani & Miller (1958, 1963), researchers have continued to examine how

specific market imperfections such as taxes, bankruptcy costs, information and agency effects affect capital structure choice and by extension the cost of capital and investment behaviour of firms. Practitioners view the possibility that macroeconomic shocks could adversely affect their firms' access to capital markets and therefore macroeconomic conditions could constitute a vital factor in their capital structure choice.

Studies on capital structure in Nigeria have emphasized the following issues namely: empirical tests of competing views of capital structure, that is, the pecking order theory against the trade-off theory (Adesola, 2009); the impact of capital structure on performance (Olokoyo, 2012; Akinyomi, 2013, Adesina, Nwidobie & Adesina, 2015); avoiding corporate failure through optimal structure (Adenikinju, 2019); agency effects (Ezeoha & Okafor, 2010); tax effects (Adelegan, 2006; Amah & Ezike, 2023); and the role of firm-specific characteristics (Aregbeyen & Periola, 2011). This study focused on interest rates and corporate financial leverage of quoted firms in Nigeria.

## LITERATURE REVIEW

### Interest Rates

The interest rate is the cost of borrowing money, hence the cost for the borrower to borrow from a lender which is usually expressed as an annual percentage of the total sum (Prisvault, 2012). Therefore as the interest rate changes, so does the cost of borrowing. Like any other expense, it can become cheaper to borrow or it can become more expensive to borrow. If the interest rate is low, then the cost of borrowing is lower and generally will result in higher capital, because less money is paid back to the bank in the form of interest. When the interest rate is high, generally it will cause less capital as the cost of borrowing is higher and thus the amount of capital retained by a firm is less. In this study we are examining the interest rate from 2010 to 2020, specifically to see if there is significance in the timeline. This timeline is quite extraordinary in the sense that in 2010 the world was starting to recover from the financial crises and in 2020 the world was yet again going into crisis this time a global health crisis.

The two main sources of financing are debt and equity. With both come separate branches that need to be considered, advantages and disadvantages. As mentioned earlier in this study, it would be incorrect to assume the same for all. Corporations in certain sectors which are capital intensive may hold a higher debt ratio to receive financially beneficial taxative deductions (Talberg et al, 2008). In this way, holding a higher debt than equity capital becomes more profitable than it would for a corporation in a labor-intensive sector. The above statement is present within the manufacturing sector. There are different types of interest rate as discussed below:

### Lending Rate

In Nigeria, over the years, lending rates have remained persistently high and have continued to raise concerns among policy makers, investors and other economic agents. The high lending rates have been attributed largely to the high cost of raising funds by DMBs. In a bid to influence the availability and cost of credit in the economy, the CBN stipulated the composition of cost of funds for commercial banks to include the following; i) interest expense; ii) insurance Premium; iii) cash

and clearing; iv) cost of liquidity; v) overheads recovery rate; vi) cost of risk; and vii) minimum profit margin. The cost of funds includes cost items (i) to (iv), while the remaining are termed other costs (Jibrin, et. al., 2015). Interest expense was identified as a direct cost, while the indirect cost of funds includes overhead (salaries, other costs), statutory cost such as NDIC premium and Cash Reserve Ratio (CRR), opportunity cost of holding liquid assets in excess of the minimum requirement, cost of holding non-earning assets and target return on equity. Overhead costs previously included were advertising

Consequently, the CBN excluded overhead costs from subsequent modifications to the frameworks for computing the bank's cost of funds (Jibrin, et. al., 2015). The 2014/2015 CBN Monetary, Credit, Foreign Trade and Exchange Policy Guidelines excluded overhead costs from the framework in determining banks' cost of funds and computed the cost of funds by employing the weighted average cost of funds computation framework. According to the guidelines, banks should include banks' interest cost on the different types of deposit liabilities, borrowings from the inter-bank funds market, payments in respect of deposit insurance premium and costs due to reserve requirements.

### **Savings Rate**

Keynes (1936) defined savings as the excess of income over expenditure on consumption. Meaning that savings is that part of the disposable income of the period which has not passed into consumption (Umoh, 2003 and Uremadu, 2005). Given that income is equal to the value of current output; and that current investment (Gross Capital Formation) is equal to the value of that part of current output, which is not consumed, savings is equal to the excess of income over consumption. Keynes maintains that on the aggregate, the excess of income over consumption (otherwise called savings) cannot differ from the addition to capital equipment (i.e. Gross Fixed Capital Formation or Gross Domestic Investment). Savings is therefore a mere residual and the decision to consume and the decision to invest between them determine volume of national income accumulated in a period. In the Keynesian view therefore secularly rising income would result in higher savings rates. As a matter of fact, savings is regarded as being complementary to the consumption function. In its simplest form, the savings function is derived from the linear consumption function when the autonomous consumption expenditure is separated off (Omoh, 2003). Keynes (1936), however, brought in the opportunity cost variable, the rate of interest; which the classical economists now regard as the major determinant of savings (Olusoji, 2003; Chete, 1999; McKinnon, 1973 and Shaw, 1973).

### **Monetary Policy Rate**

This is just a fancy word for the interest rate at which banks can borrow from the central bank. And it is how the CBN influences the rate at which banks can lend to companies and customers. The higher the rate the less favourable terms you will get for loans from banks. Currently, in Nigeria, it is 12%. In 2011, it was 8% and has steadily risen since then to 13% towards the end of last year, then briefly dropped to 11% and for a while now has been 12%. In Nigeria, the Central Bank (CBN) Monetary Policy Council (MPC) which derives its legal backing from the various statutes of the bank (CBN Act 1958; Decree No. 3 1997; CBN Act 2007), adopted a new

anchor for monetary policy action on December 11, 2006 with the ultimate goal of achieving stability in the domestic currency, prices and ultimate economic stability through interest rates stability around a benchmark called MPR. The transmission of monetary policy action is often effected through interest change. Being a cost for borrowing and a reward for lending, the interest rate is an important economic variable which need to be guided so as to achieve economic stability.

In a bid to ensure price and financial stability, the Central Bank of Nigeria (CBN) Monetary Policy Committee (MPC) adopted the Monetary Policy Rate (MPR) in place of Minimum Rediscount Rate (MRR) to controls the movement of market interest rate by benchmarking it against the MPR. Generally, a tight monetary policy tends to increase interest rate which impacts the economy by increasing the cost of borrowing and by so doing cut back on investment and the general price level. The reverse situation applies to an easy monetary policy but this may not be the actual behaviour of interest rate in practices. In the wake of the 2007-2008 global financial crises, the CBN reduced the MPR in an attempt to avert the global uncertainty of recession. The puzzle in the response of market interest rate to monetary policy actions has left economic analyst with the profound question of the effectiveness of monetary policy in tracking other rates and target variables in Nigeria.

### **Real Interest Rate**

A real interest rate is an interest rate that has been adjusted to remove the effects of inflation to reflect the real cost of funds to the borrower and the real yield to the lender or to an investor. The real interest rate of an investment is calculated as the amount by which the nominal interest rate is higher than the inflation rate. While the nominal interest rate is the interest rate officially assigned to the product or investment, the real interest rate is a reflection of the change in purchasing power derived from an investment based on shifts in the rate of inflation.

The nominal interest rate is generally the one advertised by the institution backing the loan or investment. By adjusting the nominal interest rate to compensate for the effects of inflation, you are identifying the shift in purchasing power of a given level of capital constant over time. The anticipated rate of inflation is reported by the Central Bank of Nigeria on a regular basis and includes estimates for a minimum three-year period. Most anticipatory interest rates are reported as ranges instead of single point estimates. As the true rate of inflation may not be known until the time period corresponding with the holding time of the investment has passed, the associated real interest rates must be considered predictive, or anticipatory, in nature, when the rates apply to time periods that have yet to pass. In cases where inflation is positive, the real interest rate is lower than the advertised nominal interest rate. For example, if funds used to purchase a certificate of deposit (CD) are set to earn 4% in interest per year and the rate of inflation for the same time period is 3% per year, the real interest rate received on the investment is  $4\% - 3\% = 1\%$ . The real value of the funds deposited in the CD will only increase by 1% per year, when purchasing power is taken into consideration. If those funds were instead placed in a savings account with an interest rate of 1%, and the rate of inflation remained at 3%, the real value, or purchasing power, of the funds in savings will have actually decreased, as the real interest rate would be  $-2\%$ , after accounting for inflation.

## Corporate Leverage

Leverage has been defined as the ability of a company to use the assets or funds that have a fixed load to increase the level of income for the owner of the company (Syamsudin, 2001). Leverage is used to determine the amount of financial resources needed to consider the finances of a company that aims at increase profit. Financial leverage is a measure of how much a firms use 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, Chuck & Alison, 2002). Pandey (2010) asserted 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. Companies that are highly levered are at the risk of going into bankruptcy if they fail to pay interest on the debt and will not be able to get loans in future time period. Financial leverage is often considered as negative indicator for the company. It can increase the wealth of the shareholders of the company and there is also tax advantages associated with the borrowing leverage. As financial leverage is increased, finance cost is also increased as a result. In the math of high finance cost, Earnings per Share (EPS) are also affected negatively. As Earnings per Share (EPS) decreases because of high interest payments as a result of increased financial leverage.

## Irrelevant and Relevant Theory

Modigliani and Miller (MM), 1958 illustrates that under certain key assumptions, firm's value is unaffected by its capital structure. Capital market is assumed to be perfect in Modigliani and Miller's world, where insiders and outsiders have free access to information; no transaction cost, bankruptcy cost and no taxation exist; equity and debt choice become irrelevant and internal and external funds can be perfectly substituted. The M-M theory (1958) argues that the value of a firm should not depend on its capital structure. The theory argued further that a firm should have the same market value and the same Weighted Average Cost of Capital (WACC) at all capital structure levels because the value of a company should depend on the return and risks of its operation and not on the way it finances those operations. Miller brought forward the next version of irrelevance theory of capital structure. He appealed that, capital structure decisions of firms with both corporate and personal taxes circumstances are irrelevant (Miller, 1977).

### **Trade-Off Theory**

Scholars who developed the trade-off theory (TOT) proposed that firms supported by both equities and debts deal with two fundamental concepts of financial and agency costs (Aabi, 2014; Serrasqueiro et al., 2016). According to the TOT, financial leadership consists mainly of maximizing investors' equity by increasing the market value of the company (Aabi, 2014; Serrasqueiro et al., 2016). Proponents of the TOT have suggested that an optimal capital structure maximizes the value of a firm by balancing the prices and benefits of an additional unit of debt (Ghazouani, 2013; Serrasqueiro et al., 2016). In trade-off theory, the interests of agents are dependable and valuable to the leader (Aabi, 2014). Firms achieve an optimal level of debt by balancing the benefits and costs of debt (Serrasqueiro et al., 2016).

The problems of lack of access to resources by firms are mainly the effect of lack of informational transparency (Aabi, 2014). The lack of information transparency on the part of firms creates difficulty for external agents to identify their financial circumstances (Aabi, 2014). The information distortion, which characterizes the effect between banks and firms, leads to exposure to credit control (Aabi, 2014). There are conflicts of interest between the various parties involved in financing and borrowing (Aabi, 2014). Firms have difficulty accessing credit, and the key constraint players are credit institutions (Aabi, 2014).

Debt level at the other side increases the risk of bankruptcy or as we call it the bankruptcy costs because as the debt to equity ratio increases the debt holders will require higher interest rates but also the shareholders will pretend higher profits for their investments (Brealey and Myers, 2003). According to Brealey and Myers (2003) financial managers often think of the firm's debt equity decision as a trade-off between interest tax shields and the costs of financial distress. Companies with safe, tangible assets and plenty of taxable income to shield ought to have high target ratios. Unprofitable companies with risky, intangible assets ought to rely primarily on equity financing. If there were no costs of adjusting capital structure, then each firm should always be at its target debt ratio (Brealey & Myers, 2003). According to the trade-off theory, companies' capital structure decisions point towards a target debt ratio, where debt tax shields are maximized and bankruptcy costs associated with the debt are minimized. According to Myers (2001) debt offers firm a tax shield. The advantage is because the interest on debt is deductible before paying taxes (Modigliani and Miller, 1963).

This means, among other things, that the tax advantages of debt financing are somewhat greater than originally suggested (Modigliani & Miller, 1963). So, firms increase the level of debt in order to gain the maximum tax benefit but at the other side they increase the risk of a possible bankruptcy. According to the static trade-off hypothesis, a firm's performance affects its target debt ratio, which in turn is reflected in its choice of securities issued and its observed debt ratios (Hovakimian et al., 2001). The standard presentation of static trade-off theory is provided by Bradley et al. (1984). They made the following conclusion based on their static trade-off model:

- i. An increase in the costs of financial distress reduces the optimal debt level.
- ii. An increase in non-debt tax shields reduces the optimal debt level.
- iii. An increase in the personal tax rate on equity increases the optimal debt level.

- iv. At the optimal capital structure, an increase in the marginal bondholder tax rate decreases the optimal level of debt.
- v. The effect of risk is ambiguous, even if uncertainty is assumed to be normally distributed.

The effect of debt and volatility is negative. This theory has been both criticized and supported focusing on the fact that this theory is based on the assumption of perfect knowledge in a perfect market (Myers, 1984). Also, the theory predicts that highly profitable firms will have higher debt levels in order to maximize taxation benefits and increase the availability of capital. Different studies have been developed to prove if the companies, in reality, follow the trade of theory (Sogorb and López, 2003; Hackbarth, Hennessy and Leland, 2007; Serrasqueiro and Nunes, 2010).

### **Static Trade-Off Theory**

The basic concept behind the static trade-off theory is to minimize the cost of capital by employing an appropriate debt and equity financing. Firms are partly financed by debt and equity and the main benefit of debt financing is the tax benefit of that debt, while on the other hand, the disadvantage of debt financing is cost of debt or returns which company pays on debt which is referred as bankruptcy cost. The static tradeoff theory of capital structure states that in order to maintain the balance between the pros and cons of debt and equity financing, the firm must choose the mixed type of financing. Moreover, the cost of capital cannot be minimized by increasing the debt level because at a specific point, the cost of debt will become more expensive than the cost of equity because it increases the leverage level and due to which the risk of creditor increases because of which their required rate of return increases.

Furthermore, the increased amount of debt also makes the investors and shareholders' financial position riskier. Hence, up to a certain limit, the cost of capital can be decreased by increasing debt. However, after that limit, the cost of capital will start increasing. Therefore, firms usually use the mixture of debt financing and equity financing in order to minimize the average cost of capital and to increase the market value per share. The static tradeoff theory of capital structure of firms varies from sector to sector. Industries, whose firms are more tangible tend to borrow more rather using the equity because assets of these industries are collateral and considered relatively safe. By using trade off theory, Rajan&Zingales (1995) concluded that there is a positive correlation between Leverage, and profitability of a firm, whereas tangibility of assets and the size of the firm found positively correlated with firm's Leverage. Under static trade off theory, de Mesquita& Lara conducted a research and concluded that the debt of the firm and Leverage was positively correlated in the short run whereas, their correlation was found inverse in the long run.

### **Classical Theory**

This theory states that the rate of interest is determined by the supply and demand of capital. While the supply of capital is governed by time preference, the demand for capital is governed by the expected productivity of capital. Interest rate is determined at the intersection of the demand curve and the supply curve at a given level of income Yunana (2010). The theory is a real theory of interest because it is based on real forces of demand and supply side. It regards productivity on the demand side and thrift on the side of supply and completely neglects monetary influences on



interest rate. The weakness of this theory flows from its assertion that money is merely a veil, a passive factor influencing the rate of interest. This theory also completely ignores the effect of investment on income as it is based on the unrealistic assumption of full employment of resources.

### **Empirical Review**

Oluseun and Olalekan (2020) examined the impact of macroeconomic factors on the capital structures of Nigerian quoted firms. The two-stage least squares (2SLS), GMM and GARCH estimation techniques reveal that corporate borrowing is a declining function of macroeconomic conditions in Nigeria and macro-effects are significant across the 17 selected industries. Specifically, market leverage increases with debt market access and economic growth (measured by growth in GDP) but book leverage behaves counter-cyclically as it declines with equity market conditions, term spread and expected inflation. Unemployment rate, monetary policy, government borrowing have no significant impact on the borrowing behavior of firms. Taken together, the macroeconomic conditions rationalize conservative debt usage of Nigerian quoted firms and low leverage puzzle for some firms. The study recommends prudent use of debt in order to manage the overall risk of firms and preserve long-term stability.

Karimo and Ogbonna (2017) examined the direction of causality between financial deepening and economic growth in Nigeria for the period 1970-2013. The study adopted the Toda-Yamamoto augmented Granger causality test. The results showed that the growth-financial deepening nexus in Nigeria follows the supply-leading hypothesis. According to the study, this means that it is financial deepening that leads to growth and not growth that leads to financial deepening. The study recommended among others that policy effort should be geared towards removing obstacles that undermine the growth of credit to the private sector, and must restore investors' confidence in the stock market operations.

Ho, Huang, Shi and Wu (2017) studied the effect of financial deepening on innovation efficiency for various democratic levels of political institutions using panel data from 69 countries spanning 1970-2010. The study found that financial deepening promotes innovation only when a country's political institutions are sufficiently democratic. This result, according to the study, is stronger for countries with lower incomes than for countries with higher incomes. Olawumi, Lateef and Oladeji (2017) examined the effect of financial deepening on the profitability of selected commercial banks in Nigeria using secondary data. Findings revealed that each component of financial deepening indicators has a strong relationship and are statistically significant. This provides empirical evidence that financial deepening made positive contributions to the level of profitability of the selected commercial banks in Nigeria. This paper concluded that contributions of each component of financial deepening to selected commercial banks performance is strong and are statistically significance.

Wairagu (2016) studied the effects of financial deepening on entrepreneurial growth in Kenya. The financial deepening indicators comprised of credit received by entrepreneurs/SMEs, the affordable nature of interest rates, savings culture coupled with the financial sector regulation. This research study employed a descriptive survey design and data were derived from both primary and secondary sources. Primary data were collected with the aid of a questionnaire while secondary data were gathered from expressive documentary analysis. The collected data were afterwards

coded before the actual analysis with the useful aid of the Statistical Package for Social Sciences (SPSS). The results of the study were then presented in tabular form by particular use of line graphs and bar graphs. Major study findings indicated that the growth rate of the loans accessed by entrepreneurs/SMEs was on an unchanging progress in the period between 2006 and 2016. The four notable determinants (credit access, interest rates affordability, savings culture together with financial sector regulation) also had a confirmatory correlation with the expanded (growth) rate of entrepreneurs/SMEs. The researcher recommended effective enhancement of the distribution and apportionment policies to keep guard against bad debts and untoward wastage of funds. According to the study, there is also the necessity to initiate a proper and workable policy to make certain that the loans advanced to clients are equitably dispersed across the SMEs country wide to make sure that the rewards of economic and financial development are secured by a much wider population among other notable recommendations. The study further recommended the realignment of the interest rates in tandem with the existing parliamentary laws to prevent the exploitation of entrepreneurs/SMEs by the financial lending institutions. The researcher suggested that a study be carried out to give a model to guide the establishment of the appropriate lending rate that can ensure a steady positive entrepreneurial growth in the country.

Chang, Chen & Dasgupta (2019) examine how time-varying macroeconomic conditions affect firms' financing decisions. Their principal components decomposition of several macroeconomic variables characterizes three phases of the business cycle relative to recessions: early recovery, robust recovery, and economic crest; a fourth phase dubbed windows of opportunity in capital markets that are unrelated to recessions. This characterization yields interesting novel results. Debt issuance exhibits a non-monotonic pattern during the upward phase of the business cycle: it declines in robust recovery relative to recessions but peaks at the economic crest. Financially constrained firms issue more equity during windows of high stock market valuation, whereas unconstrained firms time debt issuance in response to debt market spreads. However, in the Mclean & Zhao (2014) paper, share issuance plays a bigger role than debt issuance in causing these effects. Mclean & Zhao (2014) document similar results as Chang, Chen & Dasgupta (2019) for US firms in the context of time-varying external finance costs whereby both investment and employment are less sensitive to Tobin's  $q$  and more sensitive to cash flow during recessions and low investment sentiment periods.

Nwanna and Chinwudu (2016) examined financial deepening and economic growth in Nigeria from 1985 to 2014. The paper focused on the impact of stock market and bank deepening variables such as money supply, market capitalization, private sector credit and financial savings have on economic growth of Nigeria. The study used annual time series data from 1985 to 2014 obtained from the Central Bank of Nigeria statistical bulletin. Ordinary least square (OLS) econometric technique was employed in the study. The result of the analysis revealed that both bank based and stock market financial deepening proxies have significant and positive effect on economic growth. The study recommended that there should be improvement by encouraging more participation in the stock market, easing restrictions on international capital and entry into stock market to ensure more companies are listed.

Obafemi, Oburota and Amoke (2016) assessed the relationship between financial deepening and investment in Nigeria. Secondary data spanning from 1970 to 2013 was used for the empirical analysis. It adopted the Gregor-Hansen Endogenous structural break methodology and the supply-leading hypothesis in building the model. The study also employed the Unit Root Test, Co Integration Test and Granger Causality Test. It discovered a unidirectional causality, running from financial deepening to investment. It also found that the financial deepening has a statistically significant impact on domestic investment. Based on these empirical findings, the study recommended increased integration of the credit and thrift societies, cooperatives, rural saving organization into the mainstream formal financial sector in order to shore up the mobilization of savings for investment. It also recommended subsidizing the operational cost of financial intermediation so as to narrow the gap in interest rate spread. According to the studies, these steps when judiciously executed will ultimately promote financial deepening by easing the rigidities involved in mobilizing and accessing of credit for investment purpose.

### METHODOLOGY

This study combined the theoretical expectations and empirical observations that enable to extract the expected controlled variable that influences domestic private investment. Statistical and econometric analyses of the given data were applied and e-view software was used to examine the statistical findings. Data were sourced from Nigerian Exchange Group and annual reports of the 32 quoted manufacturing firms within 2014-2023.

#### Methods of Specification

The main variables under consideration are taken from theoretically setups and empirical evidences in different countries. The study and econometric output depend upon the data from the aforementioned sources.

$$CL = \beta_0 + \beta_1 PLR + \beta_2 MLR + \beta_3 MMR + \beta_4 SR + \beta_5 MPR + \mu \quad (1)$$

Where

CL = Corporate leverage measured by the percentage of total debt to total capital

SR = savings rate

MKR = money market rate

MPR = monetary policy rate

PLR = prime lending rate

MLR = maximum lending rate

$\phi_0 \alpha_0 =$  Constant

$\beta_1 - \beta_5 =$  Coefficients of independent variables

$\mu_i =$  Error Term

#### A-Priori Expectation

The mathematical implication is stated as follows:  $\beta_0, \beta_1, \beta_2, \beta_3 > 0$  (2)

### Data Analysis Methods

This investigation considers panel data where by cross sectional with time variation natures of the data and different methods can be applied to get the estimated variable of interest when looking variation of corporate leverage of the quoted manufacturing firms. It is affected by different observable and unobservable; time varying and invariant factors across in the investigation period. Thus, empirical estimation using fixed effect and random effect model estimation can be applied depending on the assumption of the nature of unobserved factors relation with predictor variables; and policy intervention using this kind of estimation is becoming common for controlling unobserved regional variations (Wooldridge 2012). In light of this, applying the FE model is common to get rid of 'time invariant' factors. Hence, this 'time invariant' interest rate that affects corporate leverage captured by the unobserved effect  $\alpha_i$  (Wooldridge 2012). FE and RE model specifications are discussed in detail below and pooled OLS methods for baseline comparison were employed.

$$y_{it} = \beta_0 + \beta[X_{it}] + \alpha_i + \mu_{it} \quad (3)$$

Where;

$\beta_0$  and  $\beta$  are parameters to be estimated,

$X_i$  = Vector of explanatory variables,  $i$  stands for country and  $t$  denotes time period. The variable  $\alpha_i$  captures all unobserved, 'time-invariant' factors that affect the dependent variable ( $y_{it}$ ), it is generally known as unobserved effect  $\alpha_i$  captures unobserved heterogeneity or individual country heterogeneity, heterogeneity across different places, and related issues (Wooldridge 2012).

$\mu_{it}$  stands for idiosyncratic error or time-varying error and stands for unobserved factors that affect private investments and changes over time with constant variance. Equation one can be rewritten in different ways and capture OLS model estimation as comparison purpose: Equation one can be rewritten in different ways and capture OLS model estimation as comparison purpose

$$y_{it} = \beta_0 + \beta X_{it} + V_{it} \quad (4)$$

Where  $V_{it} = \alpha_i + \mu_{it}$  composite error and when OLS is applied, assuming  $V_{it}$  is uncorrelated with  $x_{it}$  and the dependent variable is domestic private investment. Nevertheless, we assume that  $cov(u_{it}, X_{it}) = 0$ , pooled OLS outcome become biased and inconsistent when  $cov(\alpha_i, X_{it}) \neq 0$ . This leads to heterogeneity bias in pooled OLS and it is originated from omitting a 'time-invariant' variable (Wooldridge, 2012).

$\beta_i$  = coefficient of explanatory variables

$X_i$  = vector of explanatory variables

**Note:** for the purpose of precision, the right model is now based on the cross sectional effects of the nature of  $u_i$  relation with explanatory variables under consideration.

**Assumption 1:** if  $Cov (X_{it}, u_{it}) \neq 0$ , when the variation across the region is correlated with the explanatory variable: FE model gives consistent and efficient result.

**Assumption 2:** if  $Cov (u_{it} X_{it}) = 0$  which is variation across region is assumed to be random and uncorrelated with the predictor or independent variables: RE model gives consistent and unbiased estimators.

### Hausman Specification Test

Following Hausman (1978) test specification either FE or random effect model is appropriate based on the given data and helps to find out the parameters to be estimated in the model. It can be employed based on the following tests.

**Null hypothesis H0:**  $Cov [ X_{it}, u_{it} ] = 0$  which states explanatory variables are uncorrelated with variation across the region. When Ho is true RE is more efficient than FE model, because both  $\beta_{RE}$  and  $\beta_{FE}$  are consistent but looking at the standard error of both estimator,  $SE [ \beta_{RE} ] < SE [ \beta_{FE} ]$ , so using RE is

**Alternative Hypothesis H1:**  $Cov [ X_{it}, u_{it} ] \neq 0$  when explanatory variables are correlated with variation across the region, then  $\beta_{FE}$  is solely consistent and only FE model is appropriate. Hence, when Ho is rejected the difference is systematically justified and FE model uses to interpret the estimated coefficients.

## ANALYSIS AND DISCUSSION OF FINDINGS

Table 1: Analysis of Interest Rates and Corporate Leverage of Quoted Firms in Nigeria

Variable	Coefficient	Std. Error	t-Statistic	Prob.
<b>Pooled Regression Model</b>				
D(MKR(-1))	0.104122	0.832504	0.125071	0.9011
D(MLR(-1))	1.207395	1.045965	1.154336	0.2550
D(MPR(-1))	-2.596094	1.044839	-2.484683	0.0171
D(PLR(-1))	1.744723	0.966284	1.805602	0.0783
D(SR(-1))	-2.472863	4.224103	-0.585417	0.5615
C	0.022332	1.702061	0.013120	0.9896
R-squared	0.496870	Mean dependent var		-0.535625
Adjusted R-squared	0.423241	S.D. dependent var		11.81929
S.E. of regression	8.976112	Akaike info criterion		7.361048
Sum squared resid	3303.394	Schwarz criterion		7.633932
Log likelihood	-169.6652	Hannan-Quinn criter.		7.464171
F-statistic	6.748316	Durbin-Watson stat		1.632213
Prob(F-statistic)	0.000050			
<b>Fixed Regression Model</b>				
D(MKR(-1))	-0.596820	1.202069	-0.496494	0.6225
D(MLR(-1))	-0.084406	0.612665	-0.137768	0.8912
D(MPR(-1))	0.949972	0.865888	1.097107	0.2797
D(PLR(-1))	-2.730602	0.796422	-3.428587	0.0015

D(SR(-1))	1.242517	0.779122	1.594766	0.1193
C	-1.138362	0.150794	-7.549109	0.0000
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.681128	Mean dependent var		-0.535625
Adjusted R-squared	0.594946	S.D. dependent var		11.81929
S.E. of regression	7.522248	Akaike info criterion		7.071657
Sum squared resid	2093.616	Schwarz criterion		7.500474
Log likelihood	-158.7198	Hannan-Quinn criter.		7.233708
F-statistic	7.903394	Durbin-Watson stat		1.878234
Prob(F-statistic)	0.000001			
<b>Random Regression Model</b>				
D(MKR(-1))	0.322990	0.686000	0.470831	0.6407
D(MLR(-1))	1.211072	0.858105	1.411332	0.1670
D(MPR(-1))	-3.077300	0.905767	-3.397452	0.0017
D(PLR(-1))	1.209157	0.797237	1.516685	0.1383
D(SR(-1))	-2.434707	3.444794	-0.706779	0.4844
C	-0.323441	1.393173	-0.232162	0.8178
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.714477	Mean dependent var		-0.535625
Adjusted R-squared	0.616583	S.D. dependent var		11.81929
S.E. of regression	7.318580	Akaike info criterion		7.044523
Sum squared resid	1874.656	Schwarz criterion		7.551307
Log likelihood	-156.0686	Hannan-Quinn criter.		7.236038
F-statistic	7.298499	Durbin-Watson stat		1.947549
Prob(F-statistic)	0.000002			
Correlated Random Effects - Hausman Test				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		48.770579	5	0.0000

Source: An extract from E-view 12.0

## Analysis and Discussion of Findings

The result of the dynamic panel regression that explained the dynamics of the relationship between interest rate and corporate financial leverage the quoted manufacturing firms in Nigeria is presented in table 1. First a choice between fixed and random effects regression has to be made. This is determined by the probability of the Chi-sq. statistics from the Hausman test. The Hausman test shows a probability of the Chi-Sq. as 0.0000 which is less than 0.05; therefore, the study adopts the fixed effect model. The value of the adjusted R-squared from the fixed effect model is ( $R^2$ ) of 0.594946 implies that interest rates explained about 59.4 percent systematic variations of corporate leverage of the quoted firms over the observed years in the Nigeria economy while the remaining 40.1% variation is explained by other determining variables outside the model. The

estimated model found that money interest rate, maximum lending rate and prime lending rate have negative effect on corporate leverage within the time scope of the study. The findings indicated that the variables reduced corporate leverage by 0.59, 0.08 and 2.7 percent over the periods. The findings are contrary to expectations and the theories of monetary policy.

The findings thus imply that the variables cannot be used to influence both the corporate performance of the firms and the growth of the sector. From all indications, our findings support the position expressed by Sundararajan (2007); Siddiqui (2007); Tsangyaae (2009) and Singh and Hamid (2011) examined the linkages among interest rates, bonds, preferred shares of firms, the overall cost of capital, rights issues, ordinary shares and retained earnings. According to them, a change in the administered interest rate positively affects bonds, preferred shares of 201 firms, the overall cost of capital, rights issues, ordinary shares and retained earnings of firms. However, monetary policy rate and savings rate have positive and significant effect on corporate leverage which is in line with expectations. The variables added 0.95 and 1.2 percent to corporate leverage for a unit increase. This result supports the empirical findings of Jonah and Dagash (2010) who noted that the very high cost of capital had made firms to depend and rely more on their unshared profits which is subsequently reinvested. Saeedi and Mohamodi (2011), Schwert (2011) and Jonah & Dagash (2010) noted that the very high cost of capital had made firms to rely more on their unshared profits which is subsequently reinvested. This they explained that firms would prefer to plough back their profits for reinvestment since the cost of capital is prohibitive. However, this finding disagrees with the observations of Chipeta, Wolmarans and Veermaak (2012), Hegwood (2011), Njoseh (2011), Ngugi (2011) and Okafor (2012) which noted that retained earnings of the firms declined with interest rate deregulation in Nigeria and were also not significant determinants of investment of the listed manufacturing companies in Nigeria. According to them, business environment in Nigeria has infrastructural deficiency. Theoretically, this finding supports the Pecking Order Theory as propounded by Samuel and Bryshaw (2012) and Donaldson (2011). The theory opines that firms rely for finances as much as they can on internally generated funds. If this source is not enough, then debt financing, but in the event that debt financing is not a viable option, then, the firms will head for new equity.

## **CONCLUSION AND RECOMMENDATIONS**

The main aim of this work was to empirically examine the effect of interest rate on corporate financial leverage on quoted manufacturing firms in Nigeria using panel data of 32 quoted manufacturing firms from 2014-2023 based on data collected from the publications of Central Bank of Nigeria statistical bulletin annual report and annual reports of the quoted manufacturing firms. Findings of the study showed that interest varies within the periods covered in this study and that money interest rate; maximum lending rate and prime lending rate have negative effect on corporate leverage while monetary policy rate and savings rate have positive and significant effect on corporate leverage. From the findings, the study makes the following recommendations:

- i. The capital market regulatory authorities should ensure that Nigeria stock market operate with international best practice, all barriers to inflow of foreign portfolio investment should be discouraged as this will enhance market mechanism to determine interest rate.

- ii. Policies should be directed toward increasing the openness of the financial market Nigeria should, as a matter of urgency, deploy resources towards gathering reliable and accurate information which would facilitate development of comprehensive strategies to manage variations in interest rates.
- iii. Orderly market rules should be made and enforced in the money market; this is because orderly markets rules help maintain stability in the interest rate such as money market rates.
- iv. There should be a frantic effort to increase the expansionary policy mechanism as a tool to checkmate lending decision in the economy. Monetary and credit regulatory procedure should be maintain in line with real economic growth and financial market needs this will enhance competitive interest rate in the market.
- v. Based on observed consistent high interest rate and its effect on market interest rate for manufacturing firms the management and policy makers of manufacturing firms in Nigeria should come up with better strategies of countering inflation effect to allow sustained increase on value and attract investors and prevent them from being liquidated.
- vi. The findings of this study should help the Central Bank of Nigeria devise better policies to stabilize the interest rates to a minimum value that does not highly impact on the value of Nigeria quoted manufacturing firms.

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