

Relationship between macroeconomic factors and debt structure: evidence from non-financial firms in NigeriaAhmed Balarabe Musa¹, Mutiu Abdulganiu² & Adamu Yahaya³¹*Department of General Studies, School of Liberal Studies,
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Abstract

This study investigates how macroeconomic variables affect non-financial enterprises in Nigeria's decision-making regarding their debt structures. The research makes use of secondary information from listed non-financial corporations in Nigeria between 2008 and 2020. A Panel OLS was used in the study to examine the data gathered. The results of the panel regression demonstrate how firm characteristics (firm size, profits, fixed assets, non-debt tax shields), and growth rates of the gross domestic product have an impact on the debt structure of non-financial enterprises in Nigeria. The results indicate that while interest rates have a negative link with debt structure, there is a positive relationship between GDP growth rates, inflation rate and private credit. The study encourages company managers in the sector in Nigeria to take these macroeconomic factors' possible impacts on their funding decisions and their bearing on the sector's overall growth into account when making long-term funding decisions.

Keywords: Debt Structure, non-financial companies, macroeconomic factors, Nigeria.

1. Introduction

The correct combination of securities must be used to finance a modern business initiative if the company is to be long-term viable and sustainable. Finding the ideal mix of securities to finance future acquisitions would raise the company's worth, while making poor funding decisions would lead to a decline in firm value (Ullah, et al., 2020). The rate and adjustment of the debt structure are therefore influenced by a variety of internal and external circumstances, so it is important to realize that careful consideration must be given while making financial decisions. Macroeconomic variables are outside the control of the company's management, whereas internal variables are company-specific and subject

to management. The significance of these two types of variables, however, cannot be discounted in terms of their effect on capital structures. Organizations can make better financial decisions by being aware of the extent, nature, and strength of their impact on these factors to ensure long-term sustainability and growth.

The research discovers numerous hypotheses in the academic literature that explain how businesses respond in terms of their choice of funding method. Among these ideas, researchers typically use the trade-off theory, pecking order theory, and market timing theory in their empirical studies. The theory of trade-off resulting from the original Modigliani-Miller irrelevance theorem (1958) assumes that the business is balancing off the cost and profit

of debt and equity funding and seeks an agreeable capital structure when considering the advantages of tax shields, agency costs, and bankruptcy costs. On the other hand, the Pecking order theory put out by Myers and Majluf (1984) contends that businesses adhere to an order when making decisions about financing because of the asymmetry of information between firm management and investors. Companies prefer external funding over internal funding. Retained profits thereby gain an advantage over debt and equity and debt over equity in situations where retained earnings are insufficient to satisfy the company's financial demands. According to Baker and Wurgler's (2002) theory of market timing, issues are precisely equity difficulties in firm time. When the price of the company's stock is too high, the corporation will issue new shares, and when the price is too low, it will repurchase shares. These theories and other capital structure hypotheses are helpful in identifying potential internal and external factors that could influence decisions about the debt financing in addition to helping to explain the fundamentals of corporate capital structure.

Few researches have sought to look at the factors that influence debt structures in both developed and developing nations. This research used some important internal factors as controls to significantly see the influence of external factors on the choice of a company's debt structure. These internal factors are Firm size used in the studies by (Ziagham, et al., 2019; Ullah, et al., 2020; Nguyen, 2020), profitability (Chakrabarti 2019; Nguyen, 2020); fixed asset (Vätavu 2015; Solikhah, et al., 2019); expansion potential (Sakr & Bedeir, 2019; Saif-Alyousfi, 2020); and non-debt (Chakrabarti & Chakrabarti 2019; Saif-Alyousfi, 2020; Shaik, et al., 2022). The relationship between these variables and the debt structure can be either negative or positive, depending on the debt structure and country-specific factors.

In more recent studies, researchers have concentrated on examining the relationship between external influences and their influence on the firm's decisions regarding its debt structure. Researchers generally concur that a company's decision on financing cannot be made in a vacuum because both internal and external factors play a vital role in the process. Using data from empirical research, we discover that there is a connection between external factors often referred to as macroeconomic factors in these studies and debt structure. There is a strong correlation between macroeconomic conditions and debt structure, according to research by Apanisile & Olayiwola (2019), Mahmood et al. (2019), and Ullah et al. (2020) among others.

In Nigeria, the non-financial industry is going through challenging times over the past few years. But between the years 2008 to 2018, the industry has witnessed steady growth (Ikpor, et al., 2019). Moreover, between 2019, 2020 and the subsequent years the effect of the Covid-19 pandemic has distorted the steady growth witnessed before 2018. The effect of the pandemic necessitated for the non-financial firms to seek for more funding to continue their businesses. And the funding within the industry cannot be attained because of the fall in capital by most non-financial firms in Nigeria, hence the need for more external debt necessary (Ogunode, et al., 2022).

This study tries to investigate how macroeconomic factors affect the debt structure of Nigerian listed non-financial enterprises. Changes in the growth of the gross domestic product, interest rates, inflation rates may therefore have both positive and negative effects on businesses depending on the kind and direction of changes in these crucial macroeconomic variables, which are outside the management's control. Nigeria's business environment is extremely difficult because of the economy's slower development because of the energy crisis, high interest

and inflation rates, lax law and order. Therefore, in this difficult environment, it was crucial to understand how macroeconomic variables affect a firm's financial decisions.

2. Literature Review

This section reviewed recent related literatures from different researchers mostly in developing countries like Nigeria in order to give an overview of the impact of macroeconomic factors on debt structures of firms in the countries where the studies are conducted.

Kanapickienė et al. (2023) studies the nexus between Macroeconomic Factors of Consumer Loan Credit Risk in Central and Eastern European Countries. The study uses bivariate and multiple regressions to analyse panel data of Eleven CEE countries in the period from 2008 to 2020. The results show that the general macroeconomic condition factors are negatively related to consumer loan NPLs. Moreover, the economic growth, stock market, foreign exchange market, and institutional environment factors proved to be risk-decreasing, while credit market and bond market factors had a risk-increasing impact. Similarly, Alexeeva-Alexeev (2023) using sample of 1,510 public ICT firms from 23 countries over the period 2004 – 2019 and two-step system generalized method of moments (GMM). The findings macroeconomic determinant show that economic growth and foreign direct investment inflows were found to generate a positive effect on financial decisions of ICT firms. Azolibe (2022) analysed the role of macroeconomic factors on the relationship between external debt accumulation and foreign direct investment inflows in Sub Saharan Africa. The study used both static and dynamic model on a pooling a sample of 25 countries spanning from 1990–2017. The findings revealed a significant negative relationship between external debt accumulation and FDI inflows in SSA region. However, when external debt was interacted with macroeconomic,

and the result shows a positive interaction effect between external debt and infrastructure development on FDI.

Adze (2021) study assesses the relationship between macroeconomic factors and debt financing decisions of listed oil and gas firms at the Nigerian Stock Exchange (NSE) for the period 1999-2018. The study finding show that macroeconomic factors have a significant influence on firms' debt financing.

Sadiq et al. (2020) integrated the qualitative and quantitative aspects of capital structure and firms' performance in 56 stock exchange-listed companies of Jordan by using the time series data from 2012 to 2016. The results confirmed a significant relationship between debt, macro factors and Tobin's Q in mediation with the country's per capita income.

Azofra et al. (2020) investigates whether the influence of macroeconomic variables of monetary policy on corporate leverage is shaped by the nature of borrowing, and more specifically by the presence of bank debt.

The evidence reveals that bank debt modifies the impact which macroeconomic variables of monetary policy have on a firm's leverage.

Machokoto et al. (2020) examine the dynamics and determinants of South African corporate debt using a large sample of 775 listed companies. The findings show an increase in long-term debt rather than short term debt for firms in South Africa. They further find out that supply-side factors to be the main determinants of the upward trend in corporate debt, highlighting their importance to corporate debt policies in emerging economies.

Ater et al. (2020) investigates the relationship between macroeconomic variables and capital structure decisions of nonfinancial firms listed at the Nairobi Securities Exchange, in Kenya. Methodology. The study uses an unbalanced secondary panel data consisting of 36 nonfinancial firms listed at the

Nairobi Securities Exchange (NSE) for the period 2015 to 2019 as at December 31st 2019. The result show that policies aimed at popularising external finance to firms could have significant positive impacts on capital structure, the benefits of such policies would be much better realised if harmonised with efficient capital market for firms to raise debt capital with favourable interest. established utilisation of debt.

Goel (2019) examined the nexus between macroeconomic factors and the capital structure of Indian listed companies has been expounded in the present study using panel data from 2008 to 2017 of 255 non-financing companies. Macro-economic indicators. The findings show that GDP growth rate is found to negatively and statistically significantly related with capital structure measured by long term debt to total assets, whereas in terms of total debt the relationship is again negative though not statistically significant. Moreover, Inflation is positively and statistically significantly associated with capital structure measured in terms of both long-term debt as well as total debt.

Yahaya & Sarwe (2019) attempts to study how macroeconomics factor give an impact to the household debt. The study applied Secondary data and used multiple regression analysis to analyse collected the period of 10 years spanning from 2008 to 2017. Five variables are determined to be included in this study such as gross domestic product (GDP), interest rate (IR), house price index (HPI), Unemployment Rate (UNEM), and consumer price index (CPI).

It is evident that the reviewed literature shows the usage of different micro and macroeconomic variable to analyse debt, and the results show mixed (positive and negative) result on their impacts. Therefore. This study is in line with what is obtainable in the literature using recent data and in Nigerian context.

In conclusion, there are very few empirical studies, especially in Nigeria, that have

used the financial market development as a variable influencing financing decision. Instead, most empirical studies in developing countries have generally on country and firm specific characteristics. This study will therefore contribute to the already little body of knowledge, notably in the area of financial market expansion by offering useful insights into its impact on firm's debt financing decisions.

The table below show the expected (apriori) sign between the macroeconomic factors and debt structure.

Table 1 Expected signs between specific macro factors and debt structure

Variables	Expected Connection
Growth rate of GDP	Positive
Inflation rate	Positive
Interest rate	Positive
Financial Market Development	Positive

3. Methodology

For this report, information was acquired from secondary sources. Data on macroeconomic variables and firm-level variables were acquired through the World Bank Database and the Nigeria Central Bank Statistical Bulletin. Data for the last thirteen years, from 2008 to 2020, were used in this analysis. 50 Nigerian non-financial firms were chosen as the sample. Throughout the data gathering procedure, it was found that some firm-level variables had missing data. The study identifies a few literary techniques for handling missing data, including full case analysis, case analysis that is available, single imputation, multiple imputations, etc. Missing data were handled using several imputations, with the benefits and drawbacks of each method explained. This method generates potential estimates for the missing value, which are then averaged to get the estimated value for the missing data. Thus, approximations for the missing values were found using five different data sets. After analysing these datasets, the expected estimation of each missing value was added up to obtain the average value from these

forecasts. Schafer (1997) contended that five data sets were adequate to obtain an impartial estimate for missing values.

Specific macro factors used in this study are GDP growth rate (GDPG), Inflation rate (INF), interest rates (INT), and financial market development proxied by private credit to GDP (PCGDP). The dependent variable debt structure choice (debt ratio) was measured as Total debt to total assets (LEV). The control variables for the capital structure will be sales (SL), profitability (PRFTS), fixed assets (FA), and non-debt tax shield (NDTS).

3.1 Estimated Model

The effect of macroeconomic variables on the selection of capital structure in Nigeria's listed non-financial firms was determined using regression of the panel data. In comparison to other estimating techniques, panel data offers more illuminating details, consistency, efficiency, degrees of freedom, and reduced collinearity among the independent variables. Financial studies employing annual data benefit greatly from panel data because it provides the researcher with a high number of data points (Hiaso, 1986). Also, the usage of panel data is more beneficial for identifying and measuring impacts that cannot be identified in pure time series or pure cross-section data (Baltagi, 1995). Below is a description of the empirical model that was used to determine the relationship between specific macro factors and debt structure.

$$LEV_{ij,t} = \beta_0 + \beta_1 GDPG_{j,t} + \beta_2 INF_{j,t} + \beta_3 INT_{j,t} + \beta_4 PCGDP_{j,t} + \beta_5 SL_{ij,t} + \beta_6 FA_{ij,t} + \beta_7 PRFTS_{ij,t} + \beta_8 NDTS_{ij,t} + \mu_{it}$$

Where:

LEV = Ratio of Total Debt to Total Assets

GDPG = Gross Domestic Product Growth

INF = Inflation Rate

INT = Interest rate

PCGDP = Ratio of Private Credit to GDP

SL = Log of Size

FA = Ratio of Property, Plant, and Equipment to Total Assets

NDTS = Ratio of Non-Debt Tax Shield to Total Assets

PRFTS = Ratio of Earnings before Interest and Tax to Total Assets

NDTS = Ratio of Non-Debt Tax Shield to Total Assets

ϕ_i = Firm Fixed Effects

α_t = Year Fixed Effects

λ = Adjustment Parameter

μ = Error Term

The literature that researchers use contains two typical panel data models. Both a fixed-effects model and a random-effects model are available. In contrast to fixed effects, which assume that each company's intercept term fluctuates, random effects presume that each company's intercept is drawn at random from a much larger population with a constant mean value. In circumstances where the panel is balanced, the fixed-effects approach is more appropriate. On the other hand, the random-effects model might be adequate when the sample only contains a few observations of recognized cross-sectional units [Gujarati (2004)].

Although fixed effects appear to be more appropriate for this research, the ultimate choice was made based on the Hausman test of the estimate model. A specification test called the Hausman test (1978) enables one to determine if a model is better suited for dealing with random or fixed effects. The test essentially examines the accuracy of an estimator in comparison to a less accurate estimator that has already been shown to be trustworthy.

Table 2, is the Hausman test results that shows the model of fixed effects is more appropriate for this study's analysis.

Table 2 Hausman Test: Correlated Random Effect

Test summary	Chi-sq. stat.	Chi-sq. d.f	Prob.
Random test: cross-section	95.457	6	0.001

Source: Author computation using Stata 14.

Panel regression is used in the analysis, although regression testing must consider a few variables, including multicollinearity

and heteroscedasticity. Table 3 shows the correlational matrix of the variables, and Table 4 shows the variance inflation factors for the variables employed in this analysis. Results from Table 3 show that multicollinearity is not a problem in this study. When two additional independent variables in a regression equation exhibit a weak or strong association with one another, this is known as multicollinearity. Multicollinearity is a result of strong R², unfavourable t-values, big variances, and covariances, which makes precise estimate challenging.

Table 3, below is the correlation result, the result showed the bivariate connection between the variables and detects the presence of a multicollinearity problem.

Table 3 Correlation Estimation

	LEV	GDPG	INF	INT	PCGDP	SL	FA	PRFTS	NDTS
LEV	1.000								
GDPG	0.063 ^a	1.000							
INF	0.078 ^a	-0.293 ^a	1.000						
INT	0.112 ^a	-0.075 ^a	0.05 ^a	1.000					
PCGDP	0.093 ^a	-0.053 ^a	0.256	-0.038 ^a	1.000				
SL	-0.007	0.028 ^a	-0.056	-0.004	-0.012 ^a	1.000			
FA	0.203	-0.624 ^a	0.021	0.074	0.017	0.123	1.000		
PRFTS	0.091 ^a	-0.477 ^a	0.057	0.006	-0.005	0.056	0.238	1.000	
NDTS	-0.065 ^a	-0.308 ^a	0.074	-0.009	0.010	-0.004	0.242 ^a	-0.342	1.000

Note: ^a and ^b indicate correlation coefficient is significant at 1 and 5 percent levels, respectively. Source: Researcher's computation using Stata 14.

Multicollinearity is not a problem if the VIF value is less than 10 [Gujarati (2004)]. All data must have identical variances or error terms, which is one of the major premises of the regression analysis. Our significance tests based on the presumption that the error term in the regression model is uncorrelated and constant may be invalidated by heteroscedasticity, which occurs when the variance of the error term is not equal across all data. To overcome the difficulties of heteroscedasticity and uneven variances, white cross-sectional test was employed, and the model was derived by applying estimated Generalized Least Squares (GLS) weights of the balanced panel, where one observation for each firm represented a cross-section.

Table 4, below show the result multicollinearity among the independent variables.

Table 4 Variance Inflation Factors

GDPG	5.42
INF	3.67
INT	3.90
PCGDP	4.71

Source: Researcher's computation using Stata 14.

3.2 Descriptive Statistics

Table 5 depicts the descriptive statistics of the variables. The mean value of LEV is 2.423 whereas the standard deviation which shows the dispersion from the mean is 3.147. The mean value of GDPG is 6.273 whereas the standard deviation is 2.223. The Mean value of INF is 5.365 whereas the standard deviation is 3.421. The Mean value of INT is 7.108 whereas the standard deviation is 5.234. The mean value of PCGDP is 7.809 whereas the standard deviation is 6.239. The mean value of SL is 3.189 whereas the standard deviation is 2.615. Moreover, the mean value of FA is 0.629 whereas the standard deviation is 1.165. The mean value of PRFTS is 1.238 whereas the standard deviation is 1.105. The mean value of NDTS is 5.236 whereas the standard deviation is 2.347. The skewness values of all variables are within the range of a normal distribution.

Table 5, below show the summary of dependent and independent variables used in the research.

Table 5 Summary of Descriptive Statistics

Index	LEV	GDPG	INF	INT	PCGDP	SL	FA	PRFTS	NDTS
Mean	2.423	6.273	5.365	6.458	7.809	3.189	0.629	1.238	5.236
Median	2.390	3.063	6.270	4.908	5.159	2.867	0.738	0.092	4.467
Max	7.490	13.470	15.441	49.102	119.031	24.302	42.289	19.619	14.124
Min	0.005	3.659	1.906	3.042	13.151	0.025	0.501	-6.527	0.501
Std. Dev.	3.147	2.230	3.421	4.424	5.284	3.416	1.165	1.105	2.347
Skewnes	0.372	0.540	0.625	2.458	0.392	0.641	25.122	33.312	0.354

Source: Researcher's computation using Stata 14.

4. Empirical Results

According to the study's findings, the debt ratio in Nigeria's non-financial sector is statistically significantly correlated with interest rates, GDP growth rates, private

credit, and inflation rates. The debt ratio is positively correlated with inflation rates, GDP growth rates, private credit, and market capitalization, however the debt ratio is adversely correlated with interest rates. The use of debt offers tax shield benefits to the business; as debt levels rise, the business will save more taxes. As a result, the company's amount of debt keeps rising to maximize the debt tax shield (Bukhair, 2018).

The expansion of financial markets is crucial in supplying the firm's capital requirements. In addition to lowering borrowing costs, they also have access to money. Financial markets also assist in improving the company's information quality, tracking, and control, which facilitates the company's ability to borrow from outside sources and encourages lenders to lend to creditworthy businesses. Companies' debt levels start to rise when the financial market expands in the case of financial market growth (Dakua, 2018). Although though Nigeria's economy and financial system are still in their infancy, businesses are more likely to employ private credit than public credit to acquire money from outside investors.

Table 6, below show the result of the panel regression model for all variables.

Table 6 Panel GLS Estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.152	0.137	3.540	0.008
GDPG	0.041	0.015	3.272	0.004
INF	0.004	0.032	4.204	0.000
INT	-0.030	0.003	-0.701	0.352
PCGDP	0.042	0.132	2.461	0.005
SL	0.005	0.185	2.009	0.001
FA	-0.214	0.073	-2.404	0.721
PRFTS	-0.053	0.439	-5.514	0.394
NDTS	-0.302	0.238	-3.508	0.000
Effect specification: Cross-section fixed (dummy variables)				
R-Sq.	0.968		F-statistics	20.254
Regression S.E	0.652		Prob. (F-statistic)	0.001

Source: Researcher's computation using Stata 14.

The fact that private credit, GDP growth rate, and leverage (debt ratio) are all positively correlated suggests that non-financial businesses' debt ratios tend to increase as the economy expands. Sales rates and profits for businesses increase

during economic expansions, which results in an increase in the firm's debt ratio and drops during recessions (Guru & Yadav, 2019). Many businesses, especially small and medium-sized ones, may lack the internal resources necessary to take advantage of these lucrative prospects, so they turn to borrowing from outside sources.

The fact that the inflation rate and leverage are positively correlated suggests that non-financial businesses' debt ratios tend to increase in response to favourable economic conditions. Businesses typically increase their debt-to-income ratios during periods of low inflation and decrease them during periods of high inflation. Also, the debt ratio of the company rises as the market price of the firm's shares rises as economic conditions improve and remain steady (Munoz Mendoza, et al., 2022).

Moreover, the positive relationship between sales and debt ratio demonstrates that as sales rise, the firm's debt ratio will rise, but as sales fall, debt ratio likewise declines. Research like (Bukhair, 2018; Dakua, 2018) discovered a favourable association between these variable and other variables. The Leverage (debt ratio), on the other hand, decreases as fixed asset values fall and increases as they increase, according to the negative correlation between profit, fixed asset, and non-debt tax shield. In their investigations, researchers like (Oztekin & Flannery, 2012; Guney et al., 2011) demonstrate a negative link between these variables.

5. Conclusions

In conclusion, the focus of the study was to explore the effect of macroeconomic factors on the capital structure decisions of non-financial firms in Nigeria, the findings of the study revealed that macroeconomic variables do influence the capital structure decisions of the firm. GDP growth rate, inflation rate, private credit, and market capitalization are positively related to debt ratio whereas interest rate is negatively related to debt ratio. The relationship

between GDP growth rates, private credit, and debt ratio supports the trade-off theory. Furthermore, the relationship of sales, profit, and growth opportunity is statistically significant and positively related to debt ratio whereas fixed assets and non-debt tax shield have a negative relationship with debt ratio.

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