
MACROECONOMIC FACTORS AND FINANCING DECISIONS OF QUOTED FIRMS IN NIGERIA

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ABSTRACT

This study examined effects of macroeconomic factors on financing decisions of industrial goods manufacturing firms in Nigeria. The study modelled debt to equity ratio as the function of inflation rate, nominal interest rate and real interest rate. Panel data were sourced from central bank of Nigeria statistical bulletin and financial statement and annual reports of the industrial goods firms from 2012-2021. Panel regression models were formulated to analyse the relationship between inflation and capital structure. The result of the fixed effect model shows that 45 per cent variation on debt equity ratio of Nigeria quoted industrial goods manufacturing firms can be explain by variation on macroeconomic factor. The regression coefficient indicated that there is no statistically significant effect of inflation rates on debt equity ratios of the listed companies in Nigeria; there is no statistical evidence that there is an effect of consumer price index on the debt equity ratio, and also no statistical evidence that there is a significant effect on the debt equity ratio from the nominal interest rate. However, debt equity ratio increases with changes in nominal interest rate when industry performance improves. The study concludes that it is advantageous for a company to reduce its debt portfolio and increase its equity holdings to improve its financial condition and its long-term growth when the economy is doing well. However, company's management must recognize that there are risks when it decides to go through equity financing, and therefore it requires them to take a disciplined approach to managing its balance sheet. The study recommends that company with high debt levels should consider reducing its debt in order to reduce its borrowing costs and improve its financial strength. Secondly, it is in the best interest of the firm to increase its level of equity financing in order to take advantage of the higher returns that an adequately funded balance sheet can offer.

Keywords: Capital structure, debt equity ratio, Fisher effect, nominal interest rate and real interest rate

INTRODUCTION

Theories about capital structure determinants been mostly developed have around firm-specific factors. Titman and Wessels (1988) and Harris and Raviv (1991) argue that a firm's choice of financing is related to the firm's asset structure, growth, size, operating income volatility, profitability, industry classification, non-debt tax shields, operating leverage, and uniqueness of firm's business line.

Another firm-specific characteristic that is found to be related to firm's capital structure choice is business risk. There is a disagreement regarding the sign of the effect of this variable on optimal debt level, which may be due to different measures of business risk. Castanias (1983) uses tax shelter bankruptcy cost to measure business risk and finds that ex-ante default costs are large enough to induce firms to hold optimal mix of debt and equity. Meaning, there is roughly positive relationship between bankruptcy costs and optimal debt level, which contradicts static tradeoff theory.

Carleton and Silberman (1977) use variance of return on assets (ROA) as proxy for business risk and find negative effect on debt levels. Conversely, Bradley et al. (1984) find that operating income volatility lowers the use of debt as it increases uncertainty in tax shields. Long and Malitz (1985) use firms'

unlevered beta as a measure of business risk and find an inverse relationship between beta and financial leverage.

Ferri and Jones (1979), Flath and Knoeber (1980), and Titman and Wessels (1988) conclude that no significant relationship exists between business risk and debt levels. Several possible links have been provided between both variables. In all cases the link is provided through the demand or supply of corporate bonds. Corcoran (1977), Zwick (1977), and DeAngelo and Masulis (1980) theoretically explain that inflation leads to more debt: since inflation lowers the real cost of debt, the demand for corporate bonds increases during inflationary periods. On the other hand, if corporate bond return becomes higher relative to stocks return as inflation decreases, the aggregate demand of corporate bonds increases.

However, the study of economic effects of macroeconomic factors has long occupied the economics and finance literature at both the theoretical and the empirical levels. Economists and financial economists agree that inflation is a social ill that imposes welfare costs, the size of which depends upon whether inflation is anticipated or not. Even fully anticipated inflation can cause distortions in the distribution of income and wealth.

Inflation uncertainty increases a firm's business risk, which refers to the volatility of the firm's earnings, caused by volatility of the firm's volume of sales as well as the volatility of the firm's price and cost structures. Therefore, in a highly inflationary environment, a firm with highly uncertain cash flows and high business risk that needs to raise funds for capital investment may choose to issue new equity capital. The greater the inflation uncertainty, the higher the firm's business risk and the lower its debt-to-equity ratio will be. Instead the firm issues debt and the business environment deteriorate, the firm may be forced to issue new stock on unfavorable terms in the future.

In other words, it may be appropriate for a firm, given its highly uncertain cash flows, to maintain some flexibility and preserve some unused debt capacity for the future. Inflation uncertainty also makes the corporate tax shield more uncertain, since it increases the firm's business risk and the probability of losing the tax shield benefit associated with the use of debt.

In such an uncertain environment, as more debt is used, beyond some point, the tax savings associated with the use of debt will become highly uncertain. Inflation uncertainty reduces the debt-to-equity ratio and causes a loss of value to the firm's stockholders due to the loss of the tax advantage associated with the use of more debt. It is in the light of the identified problems above that this paper seek to examine the effect of macroeconomic factors on capital structure of quoted firms in Nigeria.

A good number of previous studies exists on effects of inflation and other macroeconomic variables on financing decisions; and these studies often post conflicting. Camara (2012) examine effects of macroeconomic variables and macroeconomic conditions on capital structure decisions of US based multinational firms relative to domestic firms using an integrated dynamic partial-adjustment model. The empirical results show that consumer price index and other macroeconomic factors have significant impact on financial decisions of the sampled firms.

Tongkong (2012) used multiple linear panel regression and dynamic panel GMM regression to examine whether inflation is a significant factors affecting capital structure decision of 39 quoted real estate firms in Thailand, from 2002 – 2009. The results suggest that inflation and other macroeconomic variables are not significant explanatory factors for firm capital structure. Relatedly, Taddese et al. (2013) examined influence of institutions, macroeconomic factors, industry and firm-specific factors on firm's capital structure decision in 9 African countries using GMM and seemingly unrelated regression. The study sampled 986 firms and spanned 1999-2008. The results show that among the factors that influence capital structure decisions are legal and financial institutions, GDP growth rate and inflation.

Also, Phung and Le (2013) investigated impact of the foreign ownership ratio on financial structure of listed businesses in Vietnam, particularly the capital structure as measured by market value of debt ratio. The results of showed an advantageous linkage between foreign ownership ratio and leverage of Vietnam's listed companies. Similarly, Mishra (2013) examined factors affecting Australian firms' foreign ownership in 2001–2009. The study found that debt ratio positively affects foreign ownership ratio and floating rate of foreign ownership of Australian firms. The study of Sivathaasan (2013) which investigated effect of ownership arrangements (foreign and local ownership) on capital structure of listed manufacturing companies in Sri Lanka, ie was reported that a positive relationship exists between foreign ownership and the leverage of Sri Lankan listed companies.

On other studies, Mokhova and Zinecker (2014) reported that inflation and capital structure have weak insignificant correlation; Li and Zhang (2014) showed that only increasing inflation or decline of corporate income tax rate will increase the company's debt ratio. However, these two factors together will decrease the debt level of the company and cause insecure financial impact.

In addition, Köksal and Orman (2015) showed that inflation is among factors with strong positive influence on capital structure such that a 5% decrease in average firm's debt are due solely to a decrease in inflation; Amjed and Shah (2016) found that the capital structure adjustment speed significantly varies across industrial sectors and over time. However, the empirical results fail to validate effect of inflation and market capitalization on capital structure adjustment speed.

Furthermore, Ain et al. (2017) investigated effect of macroeconomic parameters on capital structure of Pakistani firms and found that macroeconomic variables have varying effects on capital structure include market size, company size, and inflation rate. Suhono et al. (2022) and Belema and Odi (2019) reported that inflation relates to firms' capital structure; Maya et al. (2020) showed that inflation have no significant effect on firm value; Moradi and Abad (2021) indicates that inflation rate risk and firm specific risk have significant effect of on financial leverage of companies.

Theoretical Framework

This study is underpinned by the Modigliani and Miller theory (MMT) of capital structure and the Fisher effect hypothesis. MMT argue that in perfect capital markets without taxes and transaction costs, a firm's market value and cost of capital remain invariant to capital structure changes. The value of the firm depends on the earnings and risk of its assets (business risk) rather than the way in which assets have been financed. MMT is best explained in terms of its two propositions. The first is that for firms in the same risk class, total market value is independent of debt-equity mix and is given by capitalizing expected net operating income by capitalization rate (i.e, the opportunity cost of capital) appropriate to that risk class.

Value of levered firm = Value of unlevered firm

$$V_l = V_u$$

$$\text{Value of the firm} = \frac{\text{Net operating income}}{\text{Firm's opportunity cost of capital}}$$

$$V = V_l = V_u = \frac{NOI}{K_d}$$

Where

V is the market value of the firm and it is sum of the value of equity, E and value of debt D

NOI = EBIT = X, the expected net operating income, and

K_d = the firms opportunity cost of capital.

The Fisher effect, also known as the Fisher Hypothesis states that real interest rate is independent of monetary measures, specifically nominal interest rate and expected inflation rate. It describes the underlying relationship between inflation and both real and nominal interest rates. The theory proposes

that the difference between nominal interest rate and expected inflation rate is equal to real interest rate. Consequently, a rise in inflation leads to a fall in real interest rates, unless the same rate of increment occurs in nominal rates as with inflation. Mathematically,

$$Real\ Interest\ Rate = Nominal\ Interest\ Rate - Inflation\ Rate.$$

The most common form of this relationship expresses the expected nominal rates of return of assets as a summation of the expected rate of inflation and the expected rate of real return. The Fisher effect implies that the expected nominal returns on assets should provide a complete hedge against inflation; if this is the case, a positive relationship is expected between stock returns and inflation, which implies that investors are compensated for the loss in purchasing power due to inflation.

METHODOLOGY

This study adopted panel econometric methodology. The ordinary least square method (OLS) was employed for estimation of relationships between predictor and criterion variables. Unit root test was conducted using the Augmented Dickey Fuller to ascertain the stationary property of the time series. This is done to avoid spurious regression. To further verify the relevance of the model, co-integration test was performed to determine whether there exists long run equilibrium relationship among the variables; while OLS was estimated to capture short-run relationships. The population of the study comprise 15 industrial goods manufacturing firms quoted on the Nigeria Exchange Group for a period of 10 years (2012 to 2021). Due to the small nature of the population, the study adopted census sampling method.

Table 1: Sample Size

S/N	Name Manufacturing Firms	S/N	Name of Manufacturing Firms
1.	African Paints Nigeria Plc	8.	Cement Company of Northern Nigeria Plc
2.	Ashaks Cem Plc	9.	Cutix Plc
3.	Austin Laz and Company Plc	10.	Dangote Cement Plc
4.	Avon Crown Caps and Containers	11.	First Aluminum Nigeria Plc
5.	Berger Paints Plc	12.	Lafarage Africa Plc
6.	Beta Glass Company Plc	13.	Meyer plc
7.	Cap Plc	14.	Paints and Coatings Manufacturing Plc
		15.	Port Land Paints and Products Nig. Plc.

Source: Nigeria Exchange Group Report, 2021

The data for the study is panel in nature. The secondary data were extracted from annual financial reports of the listed industrial goods manufacturing firms for the period of 2012 to 2021. The financial reports will be obtained from the Nigeria Exchange Group factsheet.

Model Specification

The regression models are presented as follows;

Pooled Regression Model Specification

$$DER = \beta_0 + \beta_1NIR_{it} + \beta_2CPI_{it} + \beta_3RIR_{it} + \mu_{it} \tag{1}$$

Fixed Effect Model Specification

$$DER = \alpha_0 + \alpha_1NIR + \alpha_2CPI + \alpha_3RIR + \sum_i^9 = 1\alpha_i idum\epsilon_{1it} \tag{2}$$

Random Effect Model Specification

$$DER = \alpha_0 + \alpha_1NIR + \alpha_2CPI + \alpha_3RIR + \mu_i + \epsilon_{1it} \tag{3}$$

Where

DER= Debt to equity ratio

NIR = Nominal interest rate

CPI = Consumer Price Index

RIR = Real Interest rate

 α_0 = Constant or intercept α_1 - α_3 Parameters ε_1 = Stochastic or disturbance/error term

t = Time dimension of the variables

RESULTS AND INTERPRETATIONS

Table 1: Pre-Test of the Data

Series: DER					
Method	Handri Z test	Statistic	Prob.**	Cross-sections	Obs
Pre-Test of the Data at Level					
RIR		25.187	0.000	15	10
NIR		25.191	0.0000	15	10
CPI		25.192	0.000	15	10
DER		13.544	0.000	15	10
Pre-Test of the Data at First Difference					
RIR		26.3401	0.0000	15	10
NIR		26.3247	0.0000	15	10
CPI		26.3427	0.0000	15	10
DER		17.4614	0.0000	15	10

Source: Extract from E-view

According to Table 1, a panel unit root test reveals that all variables are stationary at first difference and at level. This indicates that all variables are stationary at difference, suggesting a possibility of a long-term relationship and necessitating a co-integration test for further verification. Pesaran (2012) and Chakravarty and Mandal (2020), who carried out a panel unit root test, discovered that there is a significant correlation between time and an unequal cross sectional error term. Therefore, the cross sectional error term is not equal to the equation's sum of the variances, as demonstrated by the panel data unit root test. According to Peseran (2012), the panel unit root test revealed that the variables are stationary at difference and that the null hypothesis of no unit root cannot be refuted.

Table 2: Presentation of Pooled Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.728941	0.147479	4.942687	0.0000
NIR	-0.005957	0.017325	-0.343825	0.7315
CPI	-0.003889	0.008929	-0.435568	0.6638
RIR	-0.006954	0.007617	-0.912963	0.3628
R-squared	0.006209	Mean dependent var		0.611467
Adjusted R-squared	-0.014211	S.D. dependent var		0.200199
S.E. of regression	0.201617	Akaike info criterion		-0.338592
Sum squared resid	5.934796	Schwarz criterion		-0.258309
Log likelihood	29.39442	Hannan-Quinn criter.		-0.305976
F-statistic	0.304079	Durbin-Watson stat		2.098340
Prob(F-statistic)	0.822410			

Source: Extract from E-view

The pooled panel data regression analysis indicates that the independent variables were not statistically significant but have negative coefficients; this implies that there are negative relationships between debt to equity ratio and the independent variables which are nominal interest rate, consumer price index, and

real exchange rate. This result implies a negative relationship between debt to equity ratio and nominal interest rate. Similarly, the relationship between debt to equity ratio and consumer price index is negative. Further, this relationship was found to be statistically insignificant. Finally, the relationship between debt to equity ratio and inflation was negative, but it was statistically insignificant. These results are consistent with the findings of previous studies that showed that lower debt to equity ratios are associated with lower interest rates and higher inflation (Egbunike et al., 2018). These results indicate that firms can borrow funds from banks at a lower cost by raising debt capital if they maintain lower debt to equity ratios. However, these results should be interpreted with caution because of the limitations of the regression method used.

Table 3: Presentation of Fixed Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.757003	0.193799	3.906118	0.0001
NIR	0.003415	0.059039	0.057845	0.9540
CPI	-0.008397	0.026345	-0.318733	0.7504
RIR	-0.007514	0.008863	-0.847791	0.3981
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.088423	Mean dependent var	0.611467	
Adjusted R-squared	-0.028977	S.D. dependent var	0.200199	
S.E. of regression	0.203079	Akaike info criterion	-0.238277	
Sum squared resid	5.443823	Schwarz criterion	0.123000	
Log likelihood	35.87074	Hannan-Quinn criter.	-0.091502	
F-statistic	0.753181	Durbin-Watson stat	2.286847	
Prob(F-statistic)	0.742747			

Source: Extract from E-view

The fixed effect model was not statistically significant based on the value of the F-statistics and the R-squared value of 8% indicates that the variation in the model were accounted for by the independent variables included in the model. In the fixed effect model (see Table 3) the independent variables were not significant.

Table 4: Presentation of Random Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.729176	0.148952	4.895369	0.0000
NIR	-0.005934	0.017563	-0.337899	0.7359
CPI	-0.003904	0.009044	-0.431686	0.6666
RIR	-0.006970	0.007685	-0.907005	0.3659
Effects Specification				
			S.D.	Rho
Cross-section random			0.009170	0.0020
Idiosyncratic random			0.203079	0.9980
Weighted Statistics				
R-squared	0.006207	Mean dependent var	0.605326	
Adjusted R-squared	-0.014214	S.D. dependent var	0.200034	
S.E. of regression	0.201451	Sum squared resid	5.925017	
F-statistic	0.303941	Durbin-Watson stat	2.101783	
Prob(F-statistic)	0.822510			
Unweighted Statistics				
R-squared	0.006209	Mean dependent var	0.611467	
Sum squared resid	5.934796	Durbin-Watson stat	2.098320	

Source: Extract from E-view

The random effect model is presented in Table 4 the model is not statistically significant, and the R^2 value of 0.006 implies that this model explains only about 6% of the variability in the market value of the companies. This can be explained by the presence of other unobserved factors that may affect the debt to equity ratio, hence explaining the low variance explained by the model. Thus, we can conclude that the "random effects model" has lower power than "fixed effect model" because of the lack of information on the source of variation.

Table 5: Presentation of Panel Co-integration Test Regression Results

ADF	t-Statistic	Prob.
	-1.616846	0.0530
Residual variance	0.083539	
HAC variance	0.023040	

Source: Extract from E-view

The Panel co-integration result shows that all the value are integrated and that long run relationship exists between the debt-equity ratio, nominal interest rate, real interest rate and inflation. Thus, it can be concluded that the debt-equity ratio of the firms are influenced by several other factors besides nominal interest rate, real interest rate and inflation. The Panel co integration result also shows that the market values of the firms are influenced by other unobserved factors besides cost of equity and weighted average cost of capital.

Table 6: Presentation of Causality Test Regression Results

Null Hypothesis:	Obs	F-Statistic	Prob.
CPI does not Granger Cause DER	120	0.08635	0.9173
DER does not Granger Cause CPI		-29.4512	1.0000
NIR does not Granger Cause DER	120	0.14954	0.8613
DER does not Granger Cause NIR		-52.3245	1.0000
RIR does not Granger Cause DER	120	0.04826	0.9529
DER does not Granger Cause RIR		0.24013	0.7869
NIR does not Granger Cause CPI	120	0.00000	1.0000
CPI does not Granger Cause NIR		-57.0272	1.0000
RIR does not Granger Cause CPI	120	0.00000	1.0000
CPI does not Granger Cause RIR		1.58554	0.2093
RIR does not Granger Cause NIR	120	0.00000	1.0000
NIR does not Granger Cause RIR		0.99835	0.3717

Source: Extract from E-view

From Table 6 which presents the granger causality results, shows that there is no causation between debt-equity ratio, nominal interest rate, real interest rate and inflation.

CONCLUSION

In conclusion, we have established that there is no statistically significant relationship between inflation rates and debt equity ratios of the listed companies in Nigeria; there is no statistical evidence that there is an effect of the consumer price index on the debt equity ratio, and also no statistical evidence that there is a significant effect on the debt equity ratio from the nominal interest rate. However, the debt equity ratio increases with the changes in the nominal interest rate when the industry performance improves. Thus, we

can conclude that it is advantageous for a company to reduce its debt portfolio and increase its equity holdings to improve its financial condition and its long-term growth when the economy is doing well. However, the company's management must recognize that there are risks when it decides to go the equity route, and therefore it requires them to take a disciplined approach to managing its balance sheet. Based on the findings and conclusion the following recommendations are made

- a) Any company that has high debt levels should consider reducing its debt in order to reduce its borrowing costs and improve its financial strength.
- b) It is in the best interest of a company to increase its level of equity financing in order to take advantage of the higher returns that an adequately funded balance sheet can offer.
- c) The management of a listed company should monitor the financial conditions of all of its major suppliers in order to ensure that it has adequate cash flow to meet its expenses and provide working capital for its operations.

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