



Foreign Exchange and Interest Rates and Manufacturing Output in Nigeria

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ABSTRACT

This research paper seeks to investigate the impact of Foreign Exchange and Interest Rates variations on the Nigeria's manufacturing Output during the period 1983 to 2014. The study employed the Ordinary Least Square (OLS), stationarity, co-integration, together with Error Correction Modelling, to know the significance and relationship between Foreign Exchange Rate, Interest Rate, Capacity Utilization, Government Expenditure on Manufacturing Sector, Investment in Industrial production and Manufacturing Output in Nigeria within the period under review. All the variables were stationary at first difference and there also exists equilibria relationships between the regressand and the explanatory variables. All the regressors (explanatory variables) appeared in their right signs according to apriori expectation being that Foreign Exchange Rate (FREX) and Interest Rates (INTR) have negative but significant relationship with manufacturing Output (MANO). Our current exchange rate policy should be reviewed to curb the international currency depreciation we are facing. Promulgation and implementation of more realizable monetary and fiscal policies that will be targeted at reducing interest rate on loans to the manufacturing sector.

Keywords: foreign Exchange Rate, Interest Rate, Capacity Utilisation and Manufacturing Output.

1.0 INTRODUCTION

Efficient foreign exchange management, financial intermediation and resources mobilization is key to the economic growth and development of developing countries, Nigeria inclusive and this role is the responsibility of the Central Monetary Authorities and financial sub-sectors of every economy. The sector does this by providing funds investors or producers use as capital input to other sectors of the economy particularly the manufacturing sector. Commercial and Merchant banks, participate actively in financial intermediation. This they do by mobilizing savings from surplus units to investment by the deficit units. These savings that are mobilized by paying interest (savings deposit rate) to economic agents that are willing to deposit part of their income. These deposits, on the other hand are given out to economic agents demanding capital at an interest or lending rate (Uzoma 2015).

No country around the globe can exist in autarky or self production and consumption of goods and services produced within its boundaries. On this note, Exchange rate is defined as the price of one currency in terms of other. In other words it is the rate at which one currency is exchanged for another (Afolabi 1999).

The importance of exchange rate in International Trade and Finance can never be over emphasized. More so exchange rate volatility is one of the greatest challenges being faced by most of the under-developed and developing economies around the globe. This research work seeks to examine the effects of foreign exchange and interest rates variations on the manufacturing of Nigeria.

The structure of an economy refers to the totality of the complex relationship existing between the resources of the very economy and the resultant outputs of the resources. The manufacturing and financial sectors are amongst the indispensable sectors of the Nigerian economy. The manufacturing sector precisely and globally is the engine of economic growth and development as it diversifies the economy and makes it more broad based. This sector consists of industries that convert raw materials into finished consumer goods or intermediate or producer goods (Anyanwu, 1993). It also consists of industries that are involved in the making of goods and articles traditionally or with machinery with wide range of products.

Interest rate here is the cost of borrowing: hence, the linkage that exists between the financial and manufacturing sectors is made possible through the developmental role of interest rate. Lending rates otherwise called interest rate, which are cost of capital, directly affects investment. When lending rates are high, investment borrowings are discouraged and vice versa. On the other hand when savings rate are high, savings are encouraged. It has a negative relationship with investment. The irony however is that high savings rates can lead to high lending rates which will have an adverse effect on investment (Acha *et al*, 2011).

The difference between the interest rate commercial banks pay on deposit by savers and that charged on loans to borrowers is known as interest rate spread or interest rate intermediation. High interest rate generally constrains efficiency of financial intermediation as it discourages potential savers and borrowers and ultimately reduces investment and growth of the economy (Chigbu, 2007).

The central Bank of any country is saddled with the responsibility of ensuring the rate of interest is not too low enough to discourage savings and also give room for inflation but also not high enough to discourage borrowing for investment (Komolafe, 2012). To achieve the desired interest rate, the CBN uses the Monetary Policy Rate (MPR) (which is the interest rate the CBN charges on monies lent to commercial banks). The Central Monetary Authorities can influence the market cost of funds by either increasing or reducing the MPR (Onoh, 2007).

2.0 Theoretical Literature

2.1.1 Purchasing Power Parity Theory

The purchasing power parity theory states that the exchange rate between two countries' currencies equals the ratio of the countries price levels. The domestic purchasing power of a country's currency is reflected in the country's price level, the money price of a reference basket of goods and services.

The purchasing power parity theory predicts that a fall in a currency's domestic purchasing power (as indicated by an increase in the domestic price level) will be associated with a proportional currency depreciation in the foreign exchange market. In other words, purchasing power parity predicts that an increase in the currency's domestic purchasing power will be associated with a proportionate currency appreciation (Krugman 2009).

Simply put, purchasing power parity (PPP) is the economic theory that price levels between countries should be equivalent to one another after exchange rate adjustment. This theory is based on the law of one price being the cost of identical good or service should be the same around the globe.

2.1.2 The Classical Theory of interest Rate

This theory according to the Classicists says that interest rate is determined by the intersection of investment –demand schedule and the saving – schedule. This schedule shows the relationship of investment and savings to the rate of interest. (The Schedule related investment and savings to interest rate)

As stated by them, interest rate is determined by the interaction of the demand for and supply of capital. The demand for capital represents investment which is influenced by the expected productivity of capital while the supply of capital represents savings which is influence by time preference and thrift (Ajie, 2000). The equilibrium rate of interest is therefore determined by the intersection of the investment – demand schedule and the saving schedule. The classicalists argue that the rate of interest is inversely related to demand for capital is a derived demand (arising from expected productivity of investment) and the supply of capital is determined by the thrift in the economy, the classicalists are of the opinion that the combination of the forces of thrift and productivity invariably determines the rate of interest.

2.1.3 Neo- Classical Loanable Funds Theory of Interest

According to this theory, developed by Dennis H. Robertson, the rate of interest is determined by the intersection of the demand schedule for loanable funds or credit with the supply schedule.

The theory explain that the demand for loanable funds come principally from government; who borrows for public works, from business men-who borrow for the purchase of capital equipments and consumers for hoarding consumption.

These borrowings are interest –elastic with fewer funds borrowed at a higher rate and vice versa. The theory of loanable funds on the other hand comes from saving (voluntary saving in the Robertsonian sense), dishoarding of idle balance and net addition to loanable funds from new money i.e. bank credit

(Anyanwu, 1993). Private individuals and corporate savings are the main source of savings. Although the personal saving depends on the income as given, they are regarded as interest elastic. The higher the rate of interest, the greater will be the inducement to save and vice-versa (Jhingan, 1997). Corporate savings to some extent are also dependent on the rate of interest as it partly represents the purchase of old assets from others out of idle cash balance of one's own funds for net investment. Bank credit is also interest plastic as more funds will be given out as loan at higher rates of interest than at lower rates.

2.1.4 Keynesian Liquidity Preference Theory of Interest Rate

According to (Afolabi 1999) John M. Keynes, viewed the rate of interest as a purely monetary phenomenon that is being determined by the interaction of the demand for and supply of money. He defined the rate of interest as the reward for parting with liquidity for a specified period of time. The supply of money refers to the total quantity of money in the country for all purpose at any time. Though the supply of money is a function of the rate of interest to some extent, it is considered to be fixed by the monetary authorities. Thus the supply curve of money is taken as perfectly inelastic.

For the demand for money, Keynes coined the term "Liquidity Preference" which is the desire to hold cash idle. Since the rate of interest is the premium which has to be offered to induce people to hold the wealth in some form other than hoarded money, it follows that the higher the liquidity preference, the higher will their liquid assets. The lower the liquidity preference, the will be rate of interest that will be paid to cash holders.

Keynes identified three motives for liquidity preference

- The transactionary motive I. e. the need for holding cash for the current transaction of personal and corporate exchanges.
- The precautionary motive, i.e. the desire to provide security for unexpected of unforeseen opportunities.
- The speculation motive i.e. to secure profit from knowing better than the market what the future will bring forth.

The transaction and precautionary motives are relatively interest inelastic but are income elastic and can be expressed thus $M_1=L_1(Y)$. The speculative motive is a function of interest rate and can be expressed as $M_2=L_2(r)$. The total liquidity preference function can thus be expressed as $M=L(Y, r)$.

2.2 EMPIRICAL LITERATURE

Nnanna (2001) wrote on " Bank Lending Behaviour and economic growth " confirmed through his model a significant relationship between output growth of the private sector (proxies by the manufacturing sector) and bank lending to the private sector in Nigeria. Though the coefficient of bank credit did not carry the expected sign, the coefficient of real interest rate was correctly signed and statistically significant in his tests. There was, therefore, evidence that positive real interest rates induced greater bank credit to the private sector, in both the short and medium term.

Philip (2001) in his analysis decomposed the real sector for purpose of an in-depth research into formal lending to the agricultural sub-sector. His model recorded the interest rate variable as negatively related to the agricultural; credit supply during the 1978- 1986 sub-period owing to the regime of interest rate regulation prevailing prior to 1987. However, there was a net positive response of agricultural credit lending rate after interest rate deregulation from 1987.

A research conducted by Nkusu (2003) revealed that changes in rates of interest do not have an effect on investment only through bank loans. Portfolio shifts also affect changes in interest rate. The implication of his model was that because deposit and lending rates can impact investment, both of them could be relevant in investment equation even in the presence of credit constraints. Also, interest rate spread, being indicative of default risk on bank credit, is also likely to be important.

Adebisi and Obasa (2004) having isolated the Manufacturing sub-sector (1970-2002) for their investigation, had several interesting conclusions. First, the interest rate spread (difference between lending rate and savings rate) had negative Impact on the manufacturing sector since it led to high cost of borrowing. Second, the rising index of manufacturing sub-sector since was a reflection of high inflation rate and could not be interpreted to mean sectoral growth.

Thirdly, their study revealed that liberalization of interest rates in the economy had promoted manufacturing growth between 1970 and 2002.

Eke (2005), in his study, revealed that there has been a relative low contribution by the manufacturing sector to the development of the Nigerian economy. He observed empirically, that there has been a marginal contribution of 32 percent growth in the level of GDP as a result of 1 percent increase in the growth of manufacturing. his test of statistic (t-stasitic) shows that the marginal Contribution of manufacturing to the level of the economy development is insignificant. The coefficient of determination (R2) being 0.15 shows that the manufacturing sector cannot be said to have contributed meaningfully to the development of the Nigerian economy.

Acha (2011) giving an analytical perspective of interest rates in Nigeria, observed that savings deposit rates and lending rates did not satisfactorily predict savings and investment. This, he said was because other factors which include low income, preference for each and lack of confidence may have contributed in the case of savings. In the case of investment, he argued that the funds borrowed are not used for productive purposes. In his findings, savings and investment were seen to be highly positively correlated just as lending rate and MPR.

Udo and Udejaja (2011), investigating on ‘‘ten years of industrial policies under democratic governance in Nigeria, 1999-2008’’ discovered that democracy had no significant impact on manufacturing sector’s output. They also discovered that manufacturing output increased alongside exchange rate during the 1999 to 2008 period. This implies that exchange rate depreciation could have had a significant positive impact on manufacturing output.

Horgan (2014) examine the impact of interest rate and Foreign exchange rates on manufacturing sub sector in Nigeria during the period 1980 -2012. The study adopted the OLS and the Co integration techniques. Data on index of manufacturing sector output, rate, and FDI and government capital expenditure. The study revealed that for interest rate in the long run does not impact on manufacturing output government capital expenditure does. This scenario has affected the performed of the manufacturing sub-sector in Nigeria.

3.0 METHODOLOGY

3.1 Data Sources

This very research work employed a time-series secondary data from the Central Bank of Nigeria’s statistical bulletin (various editions annual reports) as well as Federal Bureau of statistics.

The time series Data sourced and used fin this study includes; Manufacturing Output, Interest Rate, Capacity Utilization, Foreign Exchange Rate, Government Expenditure on manufacturing sector, and investment in Industrial Production.

3.2 Model Specification

In this study, the reseacher measures the impact of interest rates on the manufacturing sector in Nigeria using the manufacturing output as a proxy for manufacturing sector performance, thus, adopting Nnanna (2001) approach to measuring manufacturing sectoral growth and performance.

The model for this study is specified thus;

$$MANO=f(INTR, CAPU, FREX, GEMA, INIP)$$

Where;

- MANO = Manufacturing Output
- INTR = Interest Rate (Lending Rate)
- CAPU = Capacity Utilization
- FREX = Foreign Exchange Rate
- GEMA = Government Expenditure on Manufacturing Sector
- INIP = Investment in Industrial Production

Determining the mathematical form of the model, and further restating the equation in a long linear form estimating the variables in the same unit of meauration adding the error term (V)

$$Ln MANO= lo +ln \alpha_1 INTR+\alpha_2 CAPU +\alpha_3 FREX +\alpha_4 GEME+\alpha_5 INIP+ U$$

Where,

Ln = Logarithm

Ro =Functional intercept

$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5$ = weight of a unit change in the explanatory variables (estimation parameters)

U=Error term

The Hypothesis stated us:

$$H_0: \alpha_1 = \alpha_2 = \alpha_3 \dots \alpha_n = 0$$

Against the alternative

$$H_1: \text{not all } \alpha\text{'s are zero}$$

If the null hypothesis is true, there is a significance relationship between variables

4.0 INTERPRETATION OF RESULTS AND DICUSSION OF FINDINGS

4.1 Unit Root test of Stationarity

Variables	ADF Test Statistic at 1 st differencing	5% critical values	Prob.	Order of integration
MANO	-2.973594	-2.9627	0.006404	I(1)
CAPU	-8.008531	-2.9627	0.000000	I(1)
GEMA	-5.124533	-2.9627	0.000000	I(1)
INTR	-5.512162	-2.9627	0.000000	I(1)
FREX	-3.581820	-2.9627	0.000097	I(1)
INIP	-5.008522	-2.9627	0.000013	I(1)

Source: E-views 3.1– Econometric output of the study

The result in the table above presents the summary of unit root tests results gotten at levels, and first difference. The Augmented Dickey Fuller test were conducted on all the variables and the result gotten, showed that all variables achieved stationarity at first order of differencing as their ADF Test Statistics values at first differencing is greater than the critical value at 5%.

4.2 Cointegration Test

Date: 11/14/16 Time: 09:20				
Sample: 1981 2013				
Included observations: 31				
Test assumption: Quadratic deterministic trend in the data				
Series: MANO CAPU INTR FREX GEMA INIP				
Lags interval: 1 to 1				
Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.884381	107.7023	77.74	85.78	None **
0.522111	60.82118	54.64	61.24	At most 1*
0.282890	17.93153	34.55	40.49	At most 2
0.168284	7.623200	18.17	23.46	At most 3
0.059784	1.911016	3.74	6.40	At most 4
0.208799	8.455318	15.41	20.04	At most 5
*(**) denotes rejection of the hypothesis at 5%(1%) significance level				
L.R. test indicates 2 cointegrating equation(s) at 5% significance level				

The Johansen co-integration analysis was used to determine if there exists a long-run equilibrium relationship among variables under study. It revealed that 2 variables are co-integrated at 5% critical value. The likelihood ratio of 107.7023 & 60.82118 are greater than the critical value of 77.74 & 54.64. We therefore reject the null hypothesis and conclude that there exist at least one co-integrating relationship and as such, long run equilibrium relationship exists among the variables.

4.3 The Long Run Estimates

Dependent Variable: AGDP				
Method: Least Squares				
Date: 11/14/16 Time: 09:24				
Sample: 1981 2013				
Included observations: 33				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.312339	0.010989	4.554017	0.0001
CAPU	0.023023	0.093879	3.245239	0.0281
GEMA	0.028321	0.087421	2.999123	0.0482
INTR	-1.319645	1.213151	-0.136534	0.8924
FREX	-1.221964	0.215382	-5.787867	0.0000
INIP	0.007710	0.116552	2.966152	0.0477
R-squared	0.846895	Mean dependent var	181216.3	
Adjusted R-squared	0.825023	S.D. dependent var	83094.51	
S.E. of regression	34758.68	Akaike info criterion	23.88897	
Sum squared resid	3.38E+10	Schwarz criterion	24.11572	
Log likelihood	-389.1681	F-statistic	38.72020	
Durbin-Watson stat	1.566290	Prob(F-statistic)	0.000000	

The above discloses the relationship between MANO as dependent variable and CAPU, GEMA, INTR, FREX, INIP as the independent variables.

It is expected that there will be a positive signs between all variables and MANO except interest rate and foreign exchange rate where a negative relationship is expected. This simply tells that Manufacturing output (MANO) has a negative relationship with interest rate (INTR) and Foreign Exchange Rate (FREX).

From our result, the signs of all variables are in line with apriori expectation.

The coefficient of CAPU (0.023023) shows that a 1% increase in CAPU, will lead to an increase in MANO by 0.23. Also, the coefficient of GEMA (0.028321) shows that a 1% increase in GEMA increases MANO by 0.028, while that of INTR shows that a 1% increase in INTR decreases Manufacturing Output by 1.32 and a 1% increase in FOREX decreases Manufacturing Output by 0.007. Coefficient of multiple determination (R^2) of 0.846 indicates that about 85% of total variation in the dependent variable can be explained by the explanatory variables, other variables not included in the model explains the remaining 15%.

The test of significance from our result showed that all variables except INTR were statistically significant for the period under review at 5% level of significance. This is seen from their T probability values which are all less than 0.05 (5% level of significance). Interest rate was not significant with a value of 0.8924

The F-Stat test, which shows the significance of the entire regression model from our result, was significant as the Prob(F-statistic) value of 0.000 is less than 0.05 (5% level of significance) which further confirms the value of the R^2 . Since the F stat test is significant, we reject the null hypothesis and accept the alternative that there exist a significant relationship between Manufacturing Output and variables tested in the model. Hence when taken jointly, the explanatory variables significantly influences the performance of MANO in Nigeria.

4.4 Error Correction Mechanism

SHORT RUN ESTIMATES

Dependent Variable: D(AGDP)				
Method: Least Squares				
Date: 01/24/16 Time: 18:47				
Sample (adjusted): 1983 2013				
Included observations: 31 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.018185	0.013983	1.300517	0.2063
D(MANO(-1))	0.626980	0.231688	2.706143	0.0126
D(CAPU(-1))	0.021837	0.032976	3.662231	0.0444
D(GEMA(-1))	0.028232	0.017156	3.645606	0.0234
D(INTR(-1))	-0.044379	0.110458	-4.401774	0.0366
D(FREX(-1))	-0.041409	0.039546	-3.047112	0.0259
D(INIP(-1))	0.028232	0.017156	3.645606	0.0234
ECM(-1)	-0.154786	0.184883	-4.783123	0.0415
R-squared	0.773212	Mean dependent var		0.050317
Adjusted R-squared	0.692310	S.D. dependent var		0.048633
S.E. of regression	0.042726	Akaike info criterion		-3.250381
Sum squared resid	0.041987	Schwarz criterion		-2.880320
Log likelihood	58.38091	Hannan-Quinn criter.		-3.129751
F-statistic	6.312400	Durbin-Watson stat		1.990127
Prob(F-statistic)	0.047385			

The result from the parsimonious model in table above revealed that the coefficients of the variables are all rightly signed. Further, the coefficient of the error correction term bears the required sign (-0.154786) and is significant with at prob value of 0.0415. Its magnitude of -0.154786 implies that approximately 15% of the previous year disequilibrium caused by previous year's shock is adjusted for in the following year.

The determinant of correlation (R^2) revealed that 77 percent variation in MANO in Nigeria is explained by the explanatory variables in the model. The probability value of the f statistics (0.047385) also shows that the entire regression model is of good fit. The Durbin-Waston stat of 1.990127 tends towards 2 indicating no serial autocorrelation.

5.1 SUMMARY OF MAJOR FINDINGS

The major findings of study are:

- The short run analysis shows that interest rate which is the most determining parameter as well as foreign exchange rate, appeared with the right sign (negative) as stipulated by its apriori expectation and statistically not significant. This indicates that interest rate did not impact on manufacturing production output during the period under review.
- The analysis also shows that the coefficient of capacity utilization rate, government expenditure on on manufacturing sector and investment in industrial production appeared with their correct signs (positive) and were also statistically significant. This indicates that increase in the mentioned variables will lead to increase in manufacturing production output.

- The long run dynamic shows that all the independent variables (interest rate, foreign exchange rate capacity utilization rate, government exp. On manufacturing sector and investment in industrial production) appeared with the right signs
- The long run dynamic results show that there exists a long-run relationship or equilibrium among the variables. This is because the coefficient of ECM is rightly signed (that is negative) and statistically significant.

5.2 CONCLUSION

It was discovered in the literature reviewed that most government foreign exchange administrations and budgetary expenditures did not substantially aide manufacturing output and economic growth. This is evident in the variations in exchange and interest rates in Nigeria which have not led to the significant improvement of manufacturing sector productivity in particular and economic growth at large. This implies that high exchange and interest rates raise adverse effects on the Nigerian economy. Owing to our findings above, I conclude that the Nigerian manufacturing sector is still faced with the problem of poor funding as a result of high interest rates and this have forced manufacturers to resort to informal and even illegal forms of borrowing or acquiring funds.

To this end, the period (1983 and 2014 had witnessed diverse structural changes like structural adjustment programmed with no strong positive growth.

Finally, the results conforms to the Keynesian liquidity preference theory in the literature, but did not really conform well with the Purchasing Power Parity principle, thus there is need to redirect fiscal policy measures towards making Nigeria a producer nation through the manufacturing sector which invariably would lead to economic growth and development.

5.3 RECOMMENDATIONS

Based on the results and major findings of this research work, I make the following recommendations:

- Our current exchange rate policy and administration should be reviewed to curb the international currency depreciation we are facing. Promulgation and implementation of more realizable monetary and fiscal policies that will be targeted at reducing interest rate on loans to the manufacturing sector.
- Government' fiscal policy actions should also be used in areas of budgetary spending on capital projects such as electricity and accessible roads; this will enhance the productive capacity of Nigeria.
- Manufacturing Sector remains the key to economic growth and development, Government should enact new economic laws or repeal existing ones where necessary to have a proper diversified economy which will give more room for expansion and enhancement in the productive sector thereby solving the problem of National growth and Economic Development.
- Finally this will also create a very enabling environment for both the public and private sectors who engage in productive activities to function effectively.

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