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An Evaluation of Monetary Policy and Manufacturing Sector Performance in the Nigerian Economy

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Abstract. This study considered monetary policy and manufacturing sector performance in Nigeria using annual time series spanning from 1981-2018, sourced from the Central Bank of Nigeria statistical database and the National Bureau of Statistics (NBS). A natural logarithm was taken for the data to show precision, uniformity and robustness of estimates. The Unit root test indicates that the variables were stationary at first difference. The Johansen test showed that there exist long run equilibrium relationship. The VECM gave a speed of adjustment of 55% which indicates that previous period deviations revert to an equilibrium state. The Causality test proved that changes in money supply precede changes in the performance of the manufacturing sector. On the basis of these findings, the study proposed that monetary authorities should implement feedback policies that will make for more loans to be given to the manufacturing sector. Also, Government should create more intervention policies and a thorough feedback mechanism targeted to the manufacturing sector as this will cause loans to be cheaper for investors. When implemented, these policies will invigorate economic / investment activities that will spur economic performance in the Nigerian economy.

Keywords: Feedback Policies, Manufacturing sector loans, Intervention, VECM, and CBN.

1. Introduction

The issue of monetary policy and manufacturing sector performance has attracted the attention of many scholars and researchers in recent times. Estrella and Fuhrer (2003) view monetary policy as a key responsibility of government through the provision of an adaptable policy for attaining medium term stabilization objectives in response to macroeconomic fundamentals. In this study, we view monetary policy as the effort of government in creating accommodating policies in the face of a volatile macro economy in order to cause a secure business environment. Monetary policies mostly affect the investing public in particular segments of the economy like the manufacturing sector. Libanio and Moro (2006), and Kayode and Usman (1989) describe the manufacturing sector, as very sensitive because it acts as the mechanism for development in the Nigeria economy. Loto (2012) opine that the influence of the manufacturing sector to the expansion of the economy cannot be over-stressed in view of its role in the management of the economy. Sola, Obamuyi, Adekunjo and Ogunleye (2013) argue that for a nation to properly secure significant growth, its manufacturing sector must be functional. An industrial economy ensures continual productive activities that stimulate the demand and supply of services and goods, employment origination as well as income boost. This fact is buttressed by evidence from developed economies who gained advancement by way of industrialization (World Development indicators, 2018). To Imoughele and Ismaila (2014), manufacturing processes cover a wide-range of actions which includes; recycling, agro processing, plastic, ICT and software designing, textile, fashion, footwear, cement, soft and hard metals and construction. These activities make available the means by which disparities in income are at minimal levels, promote economic prosperity, output of goods and services, build up forward and backward connections in the value chain, improve on skilled and semi-skilled labour for prospective industrial growth, offer an exceptional medium for entrepreneurial and professional capacity and serve as an avenue for earning foreign exchange. Mbelede

(2012) hold forth that manufacturing sector is concerned with the practice of value-addition through converting raw materials into consumable products and services. Furthermore these ultimate products can either function as refined goods for sale to end users or as intermediary stocks used in further production procedures. Adebayo (2011) view manufacturing sector as a group of productive activities involving the innovation and or processing of ideas and input materials that tend to add more values for consumers. Aderibigbe (2004) hold forth that aside the solidity it creates for the economy, the manufacturing sector helps to substitute imports and provide ready-made marketplace for transitional commodities, and considerably influence government revenue initiation by way of taxes.

In recent times, Nigeria was faced with the issue of global financial crisis and a slump in the global oil market with its associated sharp regression in foreign exchange incomes; which has negatively affected the functioning of the macro economy. Over and over again, the economy has to deal with the issue of deficit in the balance of payment due to unwarranted dependence on imported capital goods, below-operational socio-economic infrastructures, extraordinary decrease in the rate of capacity utilization and a partial disregard for the agricultural sector which is supposed to create wealth for her citizens. All these have given rise to plunging income levels as well as a debased standard of living (Anyanwu, 2000). In another development, the manufacturing sector is being constantly faced with changing inflation, interest and exchange rates which alters return on investment. Manufacturers find it difficult to borrow to invest due to high rates. Even inflationary pressures force cash to become less valuable while being exchanged for raw materials thereby leading to high cost of production. Thus, in order to achieve a favourble balance of payment, price stability, steady employment, and speedy industrial growth, the right policies must be plugged in by the monetary authorities.

Studies conducted by previous research have revealed mixed and inconclusive results; consequently this report is undertaken to fill up the gap in literature. Specifically, the study aims to examine the impact of monetary policy on manufacturing sector performance in Nigeria using an up-to-date series, with more robust analysis that takes into consideration the disturbances in the Nigerian macro economy. The rest of the paper is structured as follows: section two offers a review of previous works, section three deals with analysis, section four discusses the empirical findings, and section five concludes with apt recommendations.

2. Literature Review

2.1 Lending Rate:

Lending Rate is the charge at which banks can loan money to the investing public. The lending rate is therefore, the rate of interest that a borrower needs to repay a loan borrowed from a bank.

2.2 Money Supply

Money supply can simply be described as the total amount of money in transmission in an economy .Money supply simply refers to the quantity of domestic currency flow in an economy for a specified period of time .Money supply therefore include cash, coins and money held in savings and current accounts by banks.

2.3 Keynesian Viewpoint of Monetary Policy

This study is based on the Keynesian theory of monetary policy. The theory states that monetary policy performs a substantial role in affecting economic activities in an economy and that an adjustment in money supply can cause alterations in key variables such as interest rate, employment levels, aggregate demand, as well as revenue and productivity. Keynesians believe that money supply can ultimately generate increase in the level of output and income; and that expansionary monetary policy intensify the allocation of loans obtainable via the banking institutions, instigating a fall in interest rate. Thus, with a decreasing interest rate, interest-sensitive consumption goods and aggregate investment expenditures will be increased, initiating a rise in real gross domestic product (Keynes, 1923; 1936).

2.4 Classical Viewpoint of Monetary Policy

The Classical economists view monetary policy as simply a medium of exchange. To them, the employment of an expansionary policy will trigger full employment by way of a rise in price levels that will reduce real wages. Hence, monetary policy help to determine the general level of prices by which services and goods will be exchanged.

2.5 Monetary Policy and the Performance of the Manufacturing Sector in Nigeria

Monetary policies in the Nigerian environment are implemented by the Central Bank with coordinated collaboration with the Federal Ministry of Finance, to ensure policies are in line with objectives of government. Various studies on manufacturing sector performance in the face of monetary policies have resulted to conflicting results. This may sometimes be due to the short time frame adopted in such studies or the statistical tools employed in analyzing the data. Below are the views of previous researches:

Osakwe, Ibenta, and Ezeabasili (2019) studied monetary policy performance in Nigeria's manufacturing sector. The variables employed include monetary policy rate, cash reserve rate, treasury bill rate and the rate of money supply. Data from 1986-2017 was gotten from the statistical database of the CBN. The Autoregressive Distributed Lag model was adopted to identify the short run effect of monetary policy on output. From the analysis, 81% of variations in manufacturing output is due to variations in monetary policy. Thus, they recommended that in order to maintain macroeconomic stability, the CBN should use money supply and treasury bills as short term instruments. In addition, an expansionary policy will help boost the performance of the manufacturing sector; alongside single digit interest rate.

Egbulonu and Ukwuoma (2018) examined the impact of monetary policy on manufacturing sector growth in Nigeria from 1981-2016. The variables for the analysis include exchange rate, interest rate, money supply and manufacturing output. From the analysis, no significant growth exist due to monetary policy. The research recommended that the Central Bank should avoid inconsistencies in monetary policy so that long term planning and forecasting will be attained.

Ezeaku, Ibe, Ugwuanyi, Modebe and Agbaeze (2018) examined a 1981-2014 industry effects of monetary policy transmission in the Nigerian economy. Variables employed include private sector credit, exchange rate and interest rate. From the analysis, they found that the transmission channel of monetary policy, have a long run relationship with output growth of the industrial sector in Nigeria. Furthermore, there was a 72.2 per cent speed of adjustment to an equilibrium status. They recommend that credit should be made available to the industrial sector but with adequate monitoring to ensure targets are achieved.

Goshit, Dabuor and Kromtit (2018) empirically investigated the relationship between manufacturing sector output and monetary policy. Broad money supply, cash reserve requirement and the monetary policy rate was adopted. From the Two Stage Least Square regression, it was concluded that monetary policy do not impact significantly on manufacturing sector output in Nigeria. Thus, it was recommended that the government should redirect more of its intervention to manufacturing to enable manufacturers drive the economy.

Okonkwo, Godslove and Mmaduabuchi (2015) investigate on the interplay between monetary policy and the manufacturing sector in Nigeria. Annual series from 1981-2012 was secured from the fact books of the Central Bank of Nigeria. The Unit Root test, Cointegration, and Parsimonious Error Correction Model was adopted to analyze the specific variables such as Broad Money Supply, Interest Rate, Inflation, Private Sector Credits and Industry Contribution to Economic Growth. From the analysis, the variables are found to be stationary at the 5 percent level after first differencing; there were 2 cointegrating equations that supports long run equilibrium relationship among the variables; the parsimonious error correction model gave evidence of the significance of money supply and private sector credits as having a link with the manufacturing sector. They recommend that policy inconsistencies should be looked into vigorously by the Central Bank to enable long term planning and growth in investments.

Ajudua-Emmanuel, Davis-Ojima and Osmond (2015) conducted a review of monetary policy and the performance of the agricultural sector from 1986-2013. The data for the study were obtained from the statistical databank of the Central Bank of Nigeria. The variables for the study include monetary policy rate, inflation, interest rate, money supply and agricultural growth rate in the Nigerian economy; and were expressed in logarithm. The statistical tools employed are the Unit Root test which gave Stationarity of the variables at first and second difference. From the Johansen test for cointegration, there exist two cointegrating equations meaning that the variables have a long rum relationship. The Granger Pairwise test for causality prove that, at the 5 percent level of significance, there exist three unidirectional causality. Finally, the multiple regression model indicate that money supply and monetary policy rate are consistent with apriori expectations. Building on the outcomes, the study recommends that the government should increase budgetary allocations towards the agricultural sector and also implement strict feedback systems to ensure total compliance. In addition, they should put in place

a concessionary interest rate structure targeted to farmers to help improve overall growth both in the agricultural sector and the economy.

Imoughele and Ismaila (2014) empirically examined how the Nigerian manufacturing sector has performed due to its monetary policy from 1986-2012. Time series employed were sourced from the annual reports of the Central Bank; and the statistical tests used were Unit root test, Vector Autoregressive model and the Granger Causality test. From the findings, the variables are stationary both at levels and first-order differencing. From the VAR results, only Broad Money Supply and Inflation are significant in predicting performance in the manufacturing sector. The Granger causality test also showed unidirectional causality from real exchange rate and external reserves to manufacturing sector performance. The study hence recommended that monetary authorities should implement favourable market-based policies on exchange rate and interest rate that will help attract domestic and foreign investments on industrialization. This will, in the long run, improve performance in the manufacturing sector.

Sola, Obamuiyi, Adekunjo and Ogunleye (2013) examined the relationship between manufacturing sector performance and sustainable development in the Nigerian economy. The study employed panel time series covering 1980-2008, gotten from the publications of the Central Bank of Nigeria. The result of the fixed-effect model shows that export is negatively linked with manufacturing performance. The study thus recommended for an active involvement of domestic firms in the export business. This can be achieved when local manufacturers secure favourable exchange rate to import innovative technologies to boost the manufacturing of local products.

Chigbu and Njoku (2013) researched on monetary and fiscal policy impact on the economic growth of Nigeria; from 1990-2010. Statistical techniques used were the Unit Root test, Cointegration test and the Vector Autoregressive model. From the analysis, all monetary policy indicators are very significant to the growth of the Nigerian economy.

Odior (2013) investigate macroeconomic impact on productivity in the manufacturing sector from 1975-2011. The empirical evidence from the Unit Root test prove Stationarity of the variables. The cointegration test also show that a long run equilibrium relationship exist among them. From the error correction mode, manufacturing sector loans and advances as well as foreign direct investment are significant in improving productivity and industrialization. Hence, it recommends for an expansionary monetary policy to be adopted to help increase the output of the economy.

Nneka (2012) researched on the performance of monetary policy and its effect on the manufacturing sector in Nigeria for the period 1986-2009. The variables used in the analysis were external stability, output stimulation, domestic growth and employment. The Vector Error Correction model and Ordinary Least Square regression model were used to analyze the data. From the empirical analysis, the study showed that inflation rate and exchange rate exert a negative impact while the supply of money exerts a positive impact on manufacturing output index. Consequently the study recommends that the monetary agencies of government should engage more of expansionary policies which are fundamental to an all-inclusive growth in the Nigerian economy.

Nwosa and Saibu (2012) expressed monetary policy shocks and its impact on the growth of sectoral output in Nigeria; from 1986-2009. Quarterly series alongside the Vector AutoRegressive and Granger Causality test adopted for the study. From the analysis, particularly, interest rate shocks significantly affect both manufacturing and agricultural sectors. Thus, for the government to stimulate growth, interest rate issues should be addressed properly.

Charles-Anyaogu (2012) studies monetary policy and its performance in the manufacturing sector in Nigeria. The variables employed include money supply, exchange rate, inflation rate, income tax rate and company lending rate. From the multiple regression model money supply exhibit positive relationship with manufacturing sector performance index while income tax rate, company lending rate, exchange rate inflation rate exhibit negative relationship with manufacturing sector performance index. This is an indication that monetary policy is imperative in manufacturing sector growth in Nigeria.

Obamuyi, Edun and Kayode (2012) employed the Cointegration test and Vector Error Correction Model in their study of the manufacturing sector growth in Nigeria. From the empirical analysis, bank lending rate and manufacturing capacity utilization are key in determining the growth of manufacturing output and general economic activities.

Amassoma and Nwosa (2011) conducted a 1986-2009 analysis to determine monetary policies and macroeconomic fundamentals in the Nigerian

economy. The Unit Root analysis prove Stationarity of the variables at first difference. The cointegration test show the existence of a long run equilibrium relationship; while the Ordinary Least Square regression model show that although there has been various initiatives and expansions of monetary policies, only exchange rate and money supply significantly impact on the economy. However, stability of prices has no significant relationship with monetary policy.

Adebiyi (2006) employed quarterly series and the Vector Error Correction Model to empirically analyze the relationship between the manufacturing sector, interest rate policy and financial sector reforms in Nigeria, from 1986Q1 to 2002Q4. The findings reveal that deposit rate and inflation rate impact on the performance of the manufacturing sector. In addition, shocks to the manufacturing index are due to its own variations.

Ajisafe and Folorunso (2002) used the dynamic error correction model on a 1970-1998 sample to prove that both monetary and fiscal policies of government greatly influence the growth of the economy.

Unaimikogbo and Enoma (2001) assesses monetary and fiscal policy impact on manufacturing activities in Nigeria. Time series ranging from 1986-1997 was obtained from the database of the Central Bank of Nigeria; and the multiple linear regression model was employed. From the study's findings, both fiscal and monetary policies promote considerably to the growth of the manufacturing sector. However, monetary policies have greater impact on economic activities in the period under review.

3. Data and Methods

The objective of this study is to empirically investigate the impact monetary policies of government has on the performance of the Nigerian manufacturing sector. Annual series were obtained from the statistical database of the CBN for the period 1981-2018 depicting 38 observations. A natural logarithm was taken for the data to show precision, uniformity in the variables and give better estimates. The eviews10 statistics software was adopted to run the analysis which comprises of Descriptive statistics, Unit Root test, Cointegration test, Vector Error Correction Model and the Granger Causality test. In line with the aim of this study, the model in its functional form is:

$MSGDP = F(MS, LR)$

Transforming the model to an econometric log-linear model:

$$LogMSGDP_t = \alpha_0 + \beta_1 LogMS + \beta_2 LogLR + \mu \quad (1)$$

MSGDP = Manufacturing Sector performance GDP
MS = Money Supply
LR = Lending Rate
Log = natural logarithm
α_0 = constant
β_1, β_2 =coefficients
μ = error term which captures other variables outside of the model.

The study therefore expects apriori that the variables will follow thus: $\beta_1>0$ means a positive and significant relationship; while $\beta_2<0$. This means an inverse relationship.

4. Results and Discussions

Table 4.1 Descriptive Statistics of the variables

	MSGDP	MS	LR
Mean	5555.150	5153.387	17.56951
Median	1639.590	753.7047	17.54281
Maximum	26129.91	25079.72	29.80000
Minimum	37.02000	14.47117	7.750000
Std. Dev.	7291.427	7536.495	4.630821
Skewness	1.235431	1.337830	0.208017
Kurtosis	3.296714	3.431295	3.661326
Jarque-Bera	9.805896	11.62986	0.966524
Probability	0.007425	0.002983	0.616768
Sum	211095.7	195828.7	667.6415
Sum Sq. Dev.	1.97E+09	2.10E+09	793.4466

Observations	38	38	38

Source: E-views10 computation

Positive skewness explains that upper tail distributions are thicker than the lower tail; and portrays effectiveness of the monetary policy of government towards the manufacturing sector. Kurtosis is greater than the required standard of 3 which portrays leptokurtic distribution. Also, the high standard deviations signals high level of riskiness associated with the industrial sector. The probability values of the Jarque-Bera statistic which is less than the 0.05 level of significance show that the variables are not normally distributed.

Table 4.2 ADF Presentation of Results of Unit Root Test of Stationarity

Variables	ADF statistic @5%	Test critical value @ 5%	Prob.	Order of integration
MSGDP	-6.449701	-3.557759	0.0000	I(1)
MS	-4.757827	-3.540328	0.0026	I(1)
LR	-6.208818	-3.544284	0.0001	I(1)

Source: Author's extraction from E-views10 computation

From the analysis, all the variables are stationary after being first difference. This means that no unit root exist as the variables are proved to be stationary.

Table 4.3 Johansen Test of Cointegration

Hypothesized No.of CE	**Trace Statistic**	**0.05 Critical Value**	**Prob. ****
MSGDP*	47.24725	35.19275	0.0016
MS*	21.01499	20.26184	0.0393
LR	7.417345	9.164546	0.1061

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

** denotes rejection of the hypothesis at the 0.05 level*

***MacKinnon-Haug-Michelis (1999) p-values*

Source: Author's extraction from E-views10 computation

From the test of cointegration, all the variables have long run equilibrium relationship which means that they are cointegrated. This is because their trace test statistics are significantly more that their critical values at the 5 per cent level.

Table 4.4 Vector Error Correction Model

Vector Error Correction Estimates
Date: 10/29/19 Time: 15:20
Sample (adjusted): 1984 2018
Included observations: 35 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1		
MSGDP(-1)	1.000000		
MS(-1)	-0.725332		
	(0.09515)		
	[-7.62271]		
LR(-1)	-8.983614		
	(74.1886)		
	[-0.12109]		
C	-1582.039		
Error Correction:	**D(MSGDP)**	**D(MS)**	**D(LR)**
CointEq1	-0.556009	0.178214	-0.000359
	(0.15111)	(0.08795)	(0.00063)
	[-3.67943]	[2.02624]	[-0.57127]

Source: E-views10 computation

The vector error correction model is to ascertain the proportion of the disequilibrium errors built up in the previous periods which can be corrected in the current period; and indicates the time lag for the correction to be completed. Our result gave a speed of adjustment of 55% with its expected negative sign which shows that the ECM (-1) is statistically significant at the 5% level (t= -3.67). Individually, a 1 percent increase in money supply will lead to a 7.25 percent fall in manufacturing sector GDP. Also, a 1 percent increase in lending rate will to an 8.98 percent fall in manufacturing sector GDP. This is however in line with apriori expectation that there exist an inverse relationship between lending rate and manufacturing sector GDP. Adjusted R^2 show that 68 percent variations in the MSGDP is caused by money supply and lending rate. F-statistic of 10, which is greater than the benchmark of 2 indicate that the model is fit for use in decision making and forecasting.

From the causality test below, money supply and lending rate have predictive substance. This means that changes in money supply and lending rate lead changes in manufacturing sector GDP. This is because the probability values are less than the 5 percent level of significance

Table 4.5 **Granger Causality Test**

VEC Granger Causality/Block Exogeneity Wald Tests
Date: 10/29/19 Time: 15:39
Sample: 1981 2018
Included observations: 35

Dependent variable: D(MSGDP)

Excluded	Chi-sq	df	Prob.
D(MS)	47.75537	2	0.0000
D(LR)	0.044927	2	0.9778
All	48.76143	4	0.0000

Source: *E-views10 computation*

5. Conclusion and Recommendations

The study focuses on the relationship between monetary policy and performance of the manufacturing sector in Nigeria. The study used the Vector Error Correction Model and the Granger causality test on annual time series of 1981 to 2018 giving 38 periods. The Unit root test conducted prove that the variables are stationary. The Johansen test for cointegration found a long run cointegration relationship among the variables. The VECM gave a speed of adjustment of 55% indicating that disequilibrium errors built up in the previous periods was corrected in the current period. Also from the model, 68 percent variations in the MSGDP is caused by money supply and lending rate. Money supply has a negative but significant relationship with manufacturing sector GDP while lending rate has an inverse and significant relationship with manufacturing sector GDP. This is however consistent with most of the current findings by Osakwe, Ibenta, and Ezeabasili (2019); Ezeaku, Ibe, Ugwuanyi, Modebe and Agbaeze (2018); Goshit, Dabuor and Kromtit (2018) that support the existence of a significant relationship between monetary policy and output of the manufacturing sector; and advised for government intervention into the sector to boost the economy. Based on the findings, the following recommendations are offered: That monetary authorities should implement policies that will make for more loans to be given to the manufacturing section. Also, government should create intervention policies like the single-digit interest rate targeted to the manufacturing sector as this will cause loans to be cheaper for investors. This is also supported by Osakwe, Ibenta, and Ezeabasili (2019); Ajudua-Emmanuel, Davis-Ojima and Osmond (2015) and Imoughele and Ismaila (2014). When implemented, these policies will invigorate economic / investment activities that will spur economic performance in the Nigerian economy.

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