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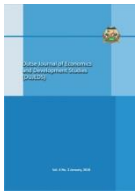

MULTIVARIATE CAUSALITY BETWEEN MONETARY POLICY, EXCHANGE RATE AND MANUFACTURING SECTOR IN NIGERIA

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Abstract
The paper examines multivariate causality between monetary policy, exchange rate and manufacturing sector in Nigeria for the period 1980 to 2017. By employing Johansen cointegration, the results suggest the existence of a stable long-run relationship between the monetary policy (proxied by money supply), exchange rate, interest rate and manufacturing sector. In the long run, the finding also suggests whereas money supply has a significant but positive influence on the manufacturing sector, both the exchange rate and interest rate have a negative long-run relationship with the manufacturing sector. The empirical results also suggest the existence of a unidirectional causality running from monetary policy to the manufacturing sector, and interest rate to the manufacturing sector. The finding in this paper also indicates a unidirectional causality running from exchange rate to monetary policy, and interest rate to monetary policy. It also suggests bidirectional causality is running between the manufacturing sector and money supply, exchange rate and manufacturing sector, and the interest rate and the manufacturing sector. In the long run causality, Granger causality is also observed in the manufacturing equation and money supply equation. Based on the finding of the study, the paper recommends the need to diversify the economy of Nigeria, and in the process makes the manufacturing sector the engine for sustainable economic growth. There is also the need for monetary authorities to adopt the appropriate monetary policy measures that will ensure effective management of the money supply and interest rate. Finally, if the appreciation of the exchange rate can affect the manufacturing sector in the long run, there is also the need to implement effective exchange rate management policy that will boost the manufacturing sector.

Keywords: Exchange Rate, Manufacturing Sector, Monetary Policy, Interest Rate, Nigeria
JEL Classification: E52, E43, L60, F31

Introduction

One of the major instruments used by the monetary authority to attain the macroeconomic objective of an economy is monetary policy. The policy interest is particularly influenced by both theoretical and empirical evidence that suggests monetary policy can be used to attain a set of objectives oriented towards the growth and stability of the economy (Abdussalam & Kabuga, 2017). In both theory and empirical fronts, the consensus is that monetary policy should be formulated with the objective of achieving macroeconomic stability either through the control of money supply by targeting desirable interest rate or a rate of inflation.

Theoretically, the nature of the influence of the monetary transmission mechanism of the monetary policy on the real output and the entire sectors of the economy is a subject of debate. In the classical theory, there is an argument that the monetary policy especially changes in the money stock is only effective on the price level, and not on real output and rate of employment in the economy. However, the Keynesian theory was also relatively cautious on the influence of monetary policy on the economy. Their argument is that money supply can be quite ineffective in stimulating aggregate demand in the economy. This is because an increase in money supply may not necessary have significant effect on spending. It was also observed

in the Keynesian argument that unlike unrestricted changes in money stock, a tight monetary policy can affect both output and price level, and hence aggregate demand especially in the presence of resistance from monopolistic firms and trade unions against reduction in both price and wage. In the monetarists' theory, the argument is that monetary expansion is more effective on output and employment in the short run, and more effective on interest rate and price level in the long run.

Given these theoretical arguments, the underlying motive of monetary policy in a country like Nigeria is to build expectations of attaining macroeconomic stability in terms of internal and external balances on different monetary policy instruments. In this context, the Central Bank of Nigeria (CBN) is the main monetary authority. Their major objective is to use monetary transmission mechanism of the monetary policy to achieve full employment of productive resources, ensure price stability, influence real sectors of the economy to achieve accelerated growth and bring about external balance in the economy (Kabuga & Ismail, 2015).

The monetary policy can either be expansionary or contractionary. The expansionary monetary policy is described as a situation whereby monetary authority may decide to increase the level of money supply in the national economy with the goal of reducing the cost of borrowing and stimulating national output. The contractionary monetary policy describes a given situation whereby the monetary authority decided to reduce money supply in the economy which has the effect of increasing the cost of borrowing and probably affect national output.

Similarly, there is also another debate in the literature concerning whether exchange rate changes can be expansionary or contractionary. The proponents of the argument that exchange rate changes are expansionary believed that exchange rate depreciation could increase the competitiveness of the national output by making its export dearer and attractive in the global market. in contrast, there is a strong argument that exchange rate changes can be contractionary through the strong impact of exchange rate depreciation on the cost of production, income distribution and trade balances.

Consequently, considering the impact of both monetary and exchange rate policies on attaining internal and external balances in the economy, it is possible to conclude macroeconomic policies can affect manufacturing sector and its optimal production or output through the effect of the exchange rate, money supply and interest rate. In this paper, the objective of the research study is to evaluate the causal relationship between monetary policy, exchange rate, and the manufacturing sector while controlling for interest in Nigeria. The paper is designed to provide answer to the question of how effective monetary policy instruments such as money supply and the interest rate are on the performance of the manufacturing sector while taking the influence of exchange rate into account.

Currently, there is increasing concern that Nigeria is still a mono-cultural economy that heavily relied on oil revenue as the primary sources engineering economic growth of the country. There is also the anxiety on whether the monetary and macroeconomic policies formulated and implemented have a causal effect on the manufacturing sector. The motivation for this paper is further strengthened by both theoretical and empirical evidence suggesting some macroeconomic policy variables such as money supply, exchange rate, and interest rate have a significant impact on the manufacturing sector. In the courses of achieving the objective of this study, the paper employs Granger causality test in a multivariate vector error correction model (VECM) to examine the causal relationship between monetary policy, exchange rate and manufacturing sector after controlling for interest rate in Nigeria.

The remaining section of this paper after the introduction s organised into four sections. Section two review the literature of the study. Section three describes the methodology. Section four discusses the empirical results and findings while section five provide the summary and recommendations of the paper.

Literature Review

There are several empirical studies carried out on the relationship between monetary policy, exchange rate and manufacturing sector in the literature. However, the available literature can be divided into two strands. A first strand is a group of studies on the impact of monetary policy on the manufacturing sector. A second strand is a group of studies on the effect of exchange rate policy on the manufacturing sector.

Starting with the first strand, Omni et al. (2017) investigated the impact of monetary policy shocks on industrial output in Nigeria for the period 1970 to 2015. Results show that manufacturing subsector to GDP responded positively to shocks in monetary policy, commercial bank credit to the industrial sector and exchange rates, while the contribution of solid minerals subsector to GDP responded positively to shocks in commercial bank credit, to the industrial sector and exchange rate after the first year. On the causality test, the authors find a unidirectional causality running from

monetary policy rate and exchange rate to the manufacturing sector to GDP on the one hand, and commercial bank credit to the industrial sector and exchange rate to the contribution of the solid mineral sector to GDP on the other.

Uzoma et al. (2017) also examined the effect of monetary policy on the manufacturing sector output in Nigeria with a quarterly time series data from 1981 to 2015. The authors employ the structural vector autoregressive framework to show that in the short-run only monetary policy rate and money supply conformed to theory. They also observed from the impulse response functions that all monetary variables, as well as other variables except for government expenditure, confirmed to economic theory. It is also observed in the study that the lending interest rate accounted for the most significant variance in the manufacturing contribution to the gross domestic product as evidence in the forecast error variance decomposition.

Omolade and Ngalawa (2016) explored the relationship between monetary policy and growth of the manufacturing sector in Algeria using quarterly time series data for the period 1980Q1 to 2010Q4. The result suggests that money supply responds to fluctuations in manufacturing sector growth. The study also reveals that changes in interest rates largely explain money supply variations. The authors also find evidence to suggest the interest rates play an important role in determining variations in manufacturing sector growth. Also, the interest rates significantly affect exchange rates, which are observed to respond to changes in overall GDP growth. At the same, overall GDP growth is also shown to have the most significant influence on manufacturing sector performance, probably due to strong forward and backward linkages between the manufacturing sector and other sectors of the economy.

Igbinedion and Ogbeide (2016) investigated the nexus between monetary policy and manufacturing capacity utilisation in Nigeria for the period 1980-2014 using an error-correction modelling approach. The findings reveal that both current and past values of lending rate adversely affect manufacturing performance, but manufacturing responds positively to the current period's banking credit, which is evidence that policy to enhance access to investment funds can stimulate investment in manufacturing sub-sector in Nigeria. The result of the variance decomposition shows shock in monetary policy phenomena, explains relatively significant variations in manufacturing performance. Okonkwo et al. (2015) examined the impact of monetary policy variables on manufacturing in Nigeria covering the period 1981 to 2012. The study revealed that money supply and credit to private sector exert tremendous influence on manufacturing in Nigeria.

The second group of studies focused on the effect of exchange rate policy on the manufacturing sector. Otokini et al. (2018) evaluated the effect of exchange rate deregulation on manufacturing output performance in Nigeria covering the period from 1980 and 2016. The authors reveal that the exchange rate has a non-significant positive long-run effect on manufacturing industry output. They also indicate a unidirectional causal impact of exchange rate on manufacturing output was established using the pairwise Granger causality test. Abdul-Mumuni (2016) examined the effect of exchange rate variability on manufacturing sector performance in Ghana over the period 1986 to 2013. The results show that as the exchange rate appreciates, the manufacturing sector performance improves and as it depreciates, the sector is adversely affected.

Dhasmana (2013) explored the impact of real exchange rate changes on the performance of manufacturing firms over the period 2000-2012 in India. The finding suggests that real exchange rate movements have a significant impact on the performance of Indian firms via the cost and the revenue channel. However, the studies suggest the impact depends on the share of imports and exports coupled with a degree of market power as reflected in the time-varying firm level mark up. Innocent et al. (2013) examined the effects of exchange rate fluctuations on the manufacturing sector in Nigeria throughout 1985 to 2010 and indicated that manufacturing foreign private investment and exchange rate have a positive effect on manufacturing the gross domestic product.

Ehinomen and Oladipo (2012) examined the impact of exchange rate management on the growth of the manufacturing sector in Nigeria. The result shows that exchange rate depreciation has no significant relationship with the manufacturing's sector productivity. The authors also reported that exchange rate appreciation has a significant relationship with domestic output, meaning exchange rate appreciation can promote growth in the manufacturing sector. The study also reveals that there is a positive relationship between the manufacturing gross domestic product and inflation.

Rahman and Hossain (2003) analysed the existence of a long-run relationship between the real exchange rate and private manufacturing investment in Bangladesh. The authors show that appreciation of the real exchange rate has been found to have a negative impact on the level of

private manufacturing investment both in the long and in the short run but to the contrary in the case of depreciation in both short-run and long-run level of analysis. The authors also show that gross domestic product has a significant effect on investment.

The reviewed literature has highlighted the effort of previous studies to examine the relationship between monetary policy, exchange rate and manufacturing sector. However, as it was evident from the previous studies reviewed, with the exception of Omni et al. (2017), there is relatively limited studies that simultaneously examine the causal relationship between monetary policy, exchange rate policy and the manufacturing sector in the reviewed studies. The contributions of this paper are three-fold. First, the research paper used more recent data to explore the causal relationship between monetary policy, exchange rate policy and the manufacturing sector in Nigeria. The paper uses annual time series data covering the period of 19780 to 2017. Second, the paper control for the interest rate to examine long-run co-movement between the variables of interest. Third, a dynamic Granger causality in the framework of the vector error correction model (VECM) is employed to examine the causal relationship between variables of interest. In view of its contribution to knowledge, the research paper extend on the existing body of literature by examining the causal relationship between monetary policy, exchange rate policy and the manufacturing sector in Nigeria.

Methodology

This study uses annual time series data covering the period of 19780 to 2017. The availability of data influenced the choice of the period of study. The time series data used was obtained from World Bank Development Indicators database. With the exception of interest rate which is in percentages, all the data series have been log-transformed.

The functional model for this paper can be written as follows:

$$MNS_t = f(MSS_t, EXR_t, INT_t) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

where MNO represent the manufacturing sector, MSS refers money supply (proxy to monetary policy), EXR represents the exchange rate, and INT is the interest rate. However, when the variables are transformed into logarithmic form, we have yield:

$$lmns_t = \beta_1 + \beta_2 lmss_t + \beta_3 lexr_t + \beta_4 Int_t + \varepsilon_t \quad \ldots\ldots\ldots(2)$$

A priori expectation $\beta_2>0$, $\beta_3<0$, $\beta_4<0$.

where $lmns_t$ is the log of manufacturing output to GDP, $lmss_t$ is the log of the money supply, $lexr_t$ is the log of an exchange rate, and lnt_t is the interest rate. The ε_t is the residual error term, and t implies they are trend variables.

Using this model, the paper started by testing for the statistical properties of the series. In this context, two traditional unit tests used are the Augmented Dickey-Fuller (ADF) test as proposed by Dickey & Fuller (1979; 1981), and Philips-Perron (PP, 1988) test. The ADF test is known to be a parametric test characterised with higher order correlation by assuming autoregressive (k) process with deterministic terms, and the basic autoregressive unit root test can also accommodate general ARMA (p, q) models with unknown orders (Said and Dickey, 1984). The ADF test can be computed in the following model:

$$\Delta y_t = \theta' D_t + \vartheta y_{t-1} + \sum_{j=1}^{k} \varphi \Delta y_{t-j} + \omega_t \quad \ldots\ldots\ldots\ldots\ldots\ldots..(3)$$

An alternative formulation in the presence of autocorrelation in the residuals and Δy_t for the ADF computation can be given as

$$\Delta y_t = \theta' D_t + \varpi y_{t-1} + \sum_{j=1}^{k} \varphi_j \Delta y_{t-j} + \omega_t \quad \ldots\ldots\ldots\ldots\ldots\ldots(4)$$

ADF test the null hypothesis test that a time series y_t is I(1) against the alternative that is I(0) assuming the data generating process has an ARMA structure.

The second unit root test to be used is the PP test. The test is a non-parametric test that ignores any serial correlation in the unit root test. The test corrects for any serial correlation and heteroskedasticity problem in the stochastic term

ω_t of the test regression by adjusting the test statistics $t_\tau = 0$ and $t_{\hat{\tau}}$.

$$\Delta y_t = \theta' D_t + \varpi y_{t-1} + \omega_t \quad \text{.....(5)}$$

where it is assumed ω_t is I(0), and it can be heteroskedastic.

Before testing for causality, the paper proceeds to establish the existence of long-run cointegration using Johansen (1988) maximum likelihood cointegration approach. The Johansen procedure assumed a vector autoregressive (VAR) model of order p given as:

$$y_t = A_1 y_{t-1} + ... + A_p y_{p-1} + BX_t + \omega_t \quad \text{.....(6)}$$

Where y_t is a vector of variables considered as non-stationary I(1) variables and the A represents the autoregressive matrices. X_t is the deterministic vector and B represent the parameter matrices, ω_t is a vector of innovation and p is the lag length. The VAR can be re-written as:

$$\Delta y_t = \Pi_{y_{t-1}} + \sum_{j=1}^{p} D_j \Delta y_{t-j} + \mathrm{B}X_t + \omega_t \quad \text{.....(7)}$$

Where

$$\prod = + \sum_{i=1}^{p} \mathrm{A}_{i-1} \quad and \quad \Gamma_i = - \sum_{j=i+1}^{p} \mathrm{A}_j \quad \text{.....(8)}$$

In order to show the number of cointegration rank in the Johansen test, two likelihood ratio test statistics; the trace and maximum eigenvalue tests are employed (Johansen, 1988). The tests are given below:

$$\lambda_{trace} = -\mathrm{T} \sum_{i=r+1}^{k} \log(1-\lambda_i) \quad \text{.....(9)}$$

$$\lambda_{\max} = -\mathrm{T} \log(1-\lambda_{i+1}) \quad \text{.....(10)}$$

Granger causality is also used in this paper to test the causal relationship between monetary policy, exchange rate, interest rate and the manufacturing sector. In the literature, the VAR model is mostly used to test for the existence of causality. However, in a situation where the set of variables being used are cointegrated the use of standard difference VAR will be misleading. Following Kabuga et al. (2018), the only solution, in this case, is that the Granger causality must be computed within the VECM framework as given in equation (11):

$$(1-L)\begin{bmatrix} LMNS_t \\ LMSS_t \\ LEXR_t \\ INT_t \end{bmatrix} = \begin{bmatrix} \pi_1 \\ \pi_2 \\ \pi_3 \\ \pi_4 \end{bmatrix} + \sum_{i=1}^{g} (1-L) \begin{bmatrix} \vartheta_{11i} & \vartheta_{12i} & \vartheta_{13i} & \vartheta_{14i} \\ \vartheta_{21i} & \vartheta_{22i} & \vartheta_{23i} & \vartheta_{24i} \\ \vartheta_{31i} & \vartheta_{32i} & \vartheta_{33i} & \vartheta_{34i} \\ \vartheta_{41i} & \vartheta_{42i} & \vartheta_{43i} & \vartheta_{44i} \end{bmatrix} \begin{bmatrix} LMNS_{t-1} \\ LMSS_{t-1} \\ LEXR_{t-1} \\ INT_{t-1} \end{bmatrix} + \begin{bmatrix} \Gamma_1 \\ \Gamma_2 \\ \Gamma_3 \\ \Gamma_4 \end{bmatrix} ECT_{t-1} + \begin{bmatrix} \varpi_{1t} \\ \varpi_{2t} \\ \varpi_{3t} \\ \varpi_{4t} \end{bmatrix} \quad \text{.... (11)}$$

Whereas (1-L) is the lag operator, $i(i = 1, ...g)$ is described as optimal lag length determined by Akaike Information Criteria (AIC), the ECT_{t-1} denotes the lagged error correction term, $\tau_j (j = 1, 2, 3, 4)$ are the adjustment parameters, and $\varpi_{jt} (j = 1, 2, 3, 4)$ are the homoscedastic error terms assumed to be uncorrelated with zero means. Finally, the short run causality in this analysis is usually established when the first-differenced variables are confirmed to be statistically significant using F-statistics of the Wald test. The long-run causality is also established when the lagged ECT is negative and statistically significant using t-statistics.

Results and Discussion

It is common in time series studies to check for the underlying properties of the data especially the unit root; otherwise one may produce spurious regression. In doing so, the paper used both Augmented Dickey-Fuller (ADF), and Philips and Perron (PP) unit root tests. Table 1 reports the results of both ADF and PP unit root tests. The result suggests all the series are found non-stationary at level. However, after first differencing log of the manufacturing sector (LMNS), log of money supply (LMSS), log of the exchange rate (LEXR) and interest are stationary in both ADF and PP unit root tests.

Table 1: Unit-root test

	ADF test.			PP test.		
Variables	level	1st Diff	Inference	level	1st Diff	Inference
LMNS	-1.122	-7.493***	I(1)	-0.919	-6.450***	I(1)
LMSS	-2.283	-5.040***	I(1)	-2.225	-7.140***	I(1)
LEXR	-2.129	-4.505**	I(1)	-2.318	-4.910***	I(1)
INTR	1.912	-3.588***	I(1)	-1.893	-7.569***	I(1)

Source: Extraction from estimation output using E-views 9.0. Note:* **and ** denotes show how at 1% and 5% level of significance respectively the null hypothesis is rejected.

Having affirmed the stationarity of the series employed at first differences, it is also critical to establish whether there exists a stable long-run relationship between the variable of interest. In this case, the cointegration test developed by Johansen (1988) and Johansen and Juselius (1990). This method is known to produce asymptotically optimal estimates in its approach as it combines a parametric correction for serial correlation, and the method does not require normalisation procedure. The method also determines its lags from the Akaike Information Criteria (AIC). Table 2 reports the Johansen cointegration results.

Table 2: Cointegration test results

Null hypothesis	Alternative	J_{trace}	J_{max}
r=0	r<1	51.640**	30.82**
		(0.021)	(0.019)
r=1	r<2	29.797	13.867
		(0.369)	(0.376)
r=2	r<3	6.956	4.383
		(0.582)	(0.820)
r=3	r<4	2.573	2.573
		(0.109)	(0.120)

Note: P-values in parenthesis (). ** means 5% significance level.

Table 2 shows the cointegration test results developed from two likelihood ratio test statistics; the maximum eigen statistic test and trace statistic test. The result suggests in both the test suggests the existence of at least one cointegrating equation among the variable of interest. This means both the maximum-eigen and trace statistics reject the null hypothesis of no cointegration at 5% level. This result implies that a linear combination of the four-series used in this paper is stationary and cointegrated. This means, the manufacturing sector, monetary policy proxy by money supply, exchange rate and interest rate are linked together by a long run equilibrium relationship, and therefore co-move together in the long run.

The paper also reports the normalised co-integrated vectors in Table 3, where the signed are interpreted in reverse form.

Table 3: Long Run Vector Estimates result

LMNS	C	LMSS	LEXR	INTR
1.000000	-6.344			
		-0.796	0.347	0.025
		(0.159)	(0.017)	(0.008)
		[5.013]	[20.762]	[3.040]

Source: Computed by the author using E-views. Version 10 (2018)

Table 3 shows the outcome of the long run vector of the estimated system given by the matrix after normalising by the coefficient of the manufacturing sector. In the long run, the results in table 3 when interpreted in reverse form indicates a log of money supply (LMSS) in the economy exercise a significant positive influence on the manufacturing sector in the long run. This means as at least one appropriate and effective monetary policy is introduced into the economy, it may likely have a positive impact on the manufacturing sector by 0.8%. This result is a call to monetary authorities to adequately monitor money supply in the economy in line with economic fundamentals and the economic structure of the country. The result also shows that the log of the exchange rate has a negative and significant influence on the manufacturing sector in the long run. This means exchange rate appreciation can adversely affect the manufacturing sector especially its competitiveness of exportable product and increased the inflow of importable product as the imported product become cheaper in the long run. This finding indicates that when the exchange rate appreciates by 1%, it may likely affect the performance of the manufacturing sector by 0.3%. The interest rate series also exercise a negative and significant impact on the manufacturing sector in the long run. This means there is an inverse relationship between interest rate and manufacturing sector in Nigeria. This result implies if the interest rate in the economy increases by at least 1%, the performance of the manufacturing sector is negatively affected by a decrease of about 0.03%.

Since the variables used are stationary and cointegrated, the paper employed the Granger causality analysis in the VECM framework with the view to determine the direction of causality between the variables of interest. The results of Granger causality are presented in Table 4.

Table 4: Granger VECM Causality Result

Dependent variables	Independent Variables: x^2 statistics of lagged 1st differenced term [P-value]				ECTt-1 Coefficient (t-ratio)
	ΔLMNS	ΔLMSS	ΔLEXR	ΔINTR	
ΔLMNS		12.141***	13.025***	5.820***	-0.773**
		[0.002]	[0.002]	[0.055]	(5.566)
ΔLMSS	20.503***		5.678*	0.400*	-0.712***
	[0.000]		[0.059]	[0.819]	(4.658)
ΔLEXR	1.622**	0.704		1.087	-0.344
	[0.445]	[0.703]		[0.581]	(1.024)
ΔINTR	3.568*	1.770	2.239		-1.990
	[0.088]	[0.434]	[0.327]		(0.600)

Note: ***, **, * Statistical significance at the 1%, 5% & 10% levels, Source: computed by the author using E-views 10.0

Table 4 in this paper presented the result of Granger VECM causality tests. Starting with short-run causality analysis of manufacturing sector equation, the result suggests unidirectional causality running from a log of monetary policy proxy by money supply (LMSS), a log of the exchange rate (LEXR), and interest rate (INTR) to manufacturing sector (MNS). For monetary policy equation, causality runs from the manufacturing sector (MNS), EXCR, INTR to money supply or monetary policy. In the case of exchange rate equation, causality runs from the manufacturing sector to exchange rate. For interest rate equation, the result indicates causality is running from the manufacturing sector to interest rate.

On the bidirectional causality between variables of interest, the result indicates bidirectional causality is running between the manufacturing sector and money supply, exchange rate and manufacturing sector, and the interest rate and the manufacturing sector. On the long run causality displayed in Table 4, the result suggests only manufacturing equation and money supply equation have the coefficient their one period lagged error correction terms negative and statistically significant, meaning there

a long run causal effect in the variables incorporated in these equations.

Summary and Recommendations

The paper examined multivariate causality between monetary policy, exchange rate and manufacturing sector in. The results suggest the existence of a stable long-run relationship between the monetary policy which is proxied by money supply, exchange rate, interest rate and manufacturing sector. In the long run, the finding also suggests whereas money supply has a significant but positive influence on the manufacturing sector, both the exchange rate and interest rate have a negative long-run relationship with the manufacturing sector. The empirical results also suggest the existence of a unidirectional causality running from monetary policy to the manufacturing sector, and interest rate to the manufacturing sector.

The finding in this paper also indicates a unidirectional causality running from exchange rate to monetary policy, and interest rate to monetary policy. It also suggests bidirectional causality is running between the manufacturing sector and money supply, exchange rate and manufacturing sector, and the interest rate and the manufacturing sector. In the long run causality, Granger causality is also observed in the manufacturing equation and money supply equation

Based on the finding of the study, the paper recommends the need to diversify the economy of Nigeria, and in the process makes the manufacturing sector the engine for sustainable economic growth. There is also the need for monetary authorities to adopt the appropriate monetary policy measures that will ensure effective management of the money supply and interest rate. Finally, if the appreciation of the exchange rate can affect the manufacturing sector in the long run, there is also the need to implement effective exchange rate management policy that will boost the manufacturing sector.

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