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Monetary Policy Instruments and the Growth of Manufacturing Sub-Sector in Nigeria: (1981-2021)

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ABSTRACT

The study examined the nexus between monetary policy instruments and the growth of manufacturing sub-sector in Nigeria. It examined both the short and the long-run relationship between monetary policies and manufacturing sector in Nigeria. The study employed the time series data between 1981 and 2021. In order to achieve the objectives of the study, multiple regression model were formulated. Stationarity tests were conducted on all the series before the estimations to ensure the absence of stochastic processes. The ARDL result showed that the variables under investigation have significant impact on manufacturing sector in Nigeria in the long run as confirmed by the F-Statistics. The Durbin-Watson statistics value is 1.6 which means no autocorrelation. The findings revealed that exchange rate has a negative impact on the growth of manufacturing sub-sector in Nigeria in the long-run, Inflation in Nigeria has significant positive impact on manufacturing sector in the long run, Interest rate is positively related to the growth of manufacturing sub-sector in Nigeria in the long run and all the independent variables are simultaneously significant. Based on the findings, the study recommended among others that: monetary authority should avoid policy inconsistencies to enable long term business planning and investment by manufacturers in Nigeria, Central Bank of Nigeria should maintain a lower interest rate on loans so that manufacturers and other investors who make up the deficit unit of the economy are encouraged to borrow more when the interest rate is low thus leading to increased investment and growth of the manufacturing sector in Nigeria.

Keywords: Broad Money Supply, Interest Rate, Exchange Rate, Manufacturing Output

INTRODUCTION

Over the years, the use monetary policies has been inextricable in the pursuit for achieving macroeconomic stability and economic growth in Nigeria. Although, monetary policy appeared to be more flexible in terms of formulation and implementation; it is relatively easy to alter and apply its policy tools. Hence it has become fashionable tool (after the introduction of Structural Adjustment Programme (SAP) in 1986) for correcting short term macroeconomic maladjustments in Nigeria. The central Bank of Nigeria (CBN) was established in 1959 with the main objective to regulate the money stock in Nigeria.

Manufacturing in Nigeria has been a major driver of the economy for decades and has gone through a lot of obstacles from stringent policies to calamities to counterfeited products from foreign countries. The growth of Nigeria's manufacturing sector since independence has been notable; its share of GDP noted to have increased from 10% percent in 1964 to 13.6% in 1992 (World Bank, 1993); having seen tremendous expansion with textiles and garments, food, beverages, and tobacco as the leading sectors in the 1960s. The promotion of creativity and innovation, promotion of research and development which are the notable importance of manufacturing. Monetary policy mainly refers to the process by which a country's central bank controls the money supply by targeting a rate of interest that would eventually lead to stability

in prices offered and general confidence in the country's currency. The main tools used by the Central Bank of Nigeria (CBN) to put monetary policy into action are; Open Market Operations, Discount Window Operations and Reserve requirements (Central Bank of Nigeria, 2010).

This regulatory role of the CBN is anchored on the use of monetary policy. The major objective of monetary policy in Nigeria is to ensure price and monetary stability. This is mainly achieved by causing savers to avail investors of surplus funds for investment through appropriate interest rate structures; stemming wide fluctuations in the exchange rate of the naira; proper supervision of banks and related institutions to ensure financial sector soundness; maintenance of efficient payments system; applying deliberate policies to expand the scope of the financial system so that interior economies which are largely informal, are financially included. Financial inclusion is particularly important in the sense that the large it is, the lager is the interest rate sensitivity of production and aggregate demand and so the more effective monetary policy could be.

Before the introduction of the Structural Adjustment Programme (SAP) in 1986, monetary management in Nigeria relied heavily on the use of direct monetary instruments such as credit ceilings, selective credit controls, administered interest and exchange rate, cash reserve requirements and special deposits.

Monetary policy instruments commonly used in recent times include the availability of several growth theories and models, in addition to monetary policies in the arsenal of the authorities, these economies have not been able to achieve sustained growth. They still get hurt by external shocks and internal destabilisations. Massive unemployment, low income, high level of inequality and poverty at a larger scale are the effects of these fluctuations (Stiglitz, 2001).

The Nigerian economy has been classified as one of the most volatile economies in the world due to its high dependence on oil revenue. Economic instability is witnessed yearly through rising inflation, massive unemployment, low output and dwindling foreign reserves that result to unstable exchange rates especially during the period when the price of oil continues to fall. Nigeria's GDP has contracted from 553 billion USD in the year 2014 to 479 billion USD in the year 2015; over 17.7 million people aged 15-65 were either unemployed or underemployed in the first quarter of 2015, inflation rose from 8.0 percent to 9.6 percent (Nigerian National Bureau of Statistics, 2015).

In Nigeria, the major macroeconomic policy tools available to achieve sustained growth are fiscal and monetary policy. Despite the intervention of the monetary authority through the manipulation of money supply and demand through the interest rate, combined with deficit budgets over the past years, the economy is yet to feel its real impact.

Over time, there has been a rapid increase in money supply compared with government expenditure, although government expenditure has been more volatile and real economic growth has been sluggish. Broad money (M2) has grown faster by about 127,929% from the year 1981 to 2015 compared with government expenditure that has only grown by about 38,082 % for the same period, yet the real GDP has only grown by about 262% in same period (Bodunrin, 2016).

Nigeria has witnessed several forms of manufacturing distress and drawbacks such as high rates of inflation, high interest and exchange rates in the last 30 years all of which are determined by monetary policy set to regulate and ensure price stability in the country. In 1991 to 1993 for instance, Nigeria witnessed the worst economic performance with the rate of inflation increasing abnormally to a record of 100% in August 1993 hence abnormally increasing interest and exchange rates. The manufacturing sector has for decades served as an avenue for increasing replacement of imports with domestically manufactured products and expanding the quantity of exports, increasing foreign exchange earning capacity by stabilizing

exchange rates as well as targeting full employment. Anderson (1968) postulated that monetary policy in the USA has greater and faster impact on economic activity thus suggesting that greater reliance be placed on monetary measures than fiscal measures in the conduct of stabilization policy. Uniamikogbo (2001) asserted that monetary variables in the Nigerian economy are more effective and dependable than fiscal variables when it comes to affecting changes in economic activities such as in the manufacturing sector. From the foregoing, there is a need for a closer look at Nigeria's monetary policy and how it particularly affects the manufacturing sector which is the second largest team player when it comes to contribution to the country's GDP. This study is also informed by the fact that most studies done here in Nigeria (Corazon, 2014). Tobias (2012) focused on impact of monetary policy on Nigeria's economic growth as a whole as against a sectoral survey of the impact of monetary policy on the real sector in Nigeria. To this end, the objective of this study is to examine the effectiveness of monetary policy on manufacturing sector in Nigeria. However, the specific objectives include; to determine the effect of monetary policy on manufacturing sector in Nigeria and to ascertain the long-run relationship between monetary policy and manufacturing sector in Nigeria. Based on the issues raised in this study, the critical question is; what is the effect of monetary policy instruments on manufacturing sector in Nigeria?

REVIEW OF EMPIRICAL STUDIES

Many research works have been carried out to examine the relationship between monetary policy instruments and the growth of manufacturing sub- sector in Nigeria and several conclusions were made by the various authors on the relationship. For instance, Anyanwu (2000), with findings similar to that of Adenikinju and Chete, pointed out that the collapse of the world oil market in the early 1980s and the prolonged economic recession resulting from this collapse contributed to the sharp fall in the foreign exchange earnings of Nigeria. This further led to a fall in the performance level of the manufacturing sector of the country. The introduction of the Structural Adjustment Programme (SAP) in 1985 was expected to bring an improvement to the situation, but unfortunately no notable improvement was observed. As a result of the continuing low performance of the manufacturing sector, along with other important reasons, today Nigeria has been classified as the poverty capital of the world.

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.

Uniamikogbo 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. Adenikinju and Chete (2002) conducted an empirical analysis of the performance of the Nigerian manufacturing sector over a 30-year period and observed that the sector was performing with satisfactory growth levels from 1970 to 1980. However, after that phase there was a sharp decline in the growth and profitability of the Nigerian manufacturing sector. Especially after 1983, the negative effects of the oil price collapse in the international oil market can be clearly seen on the sector's performance. Due to that global oil crisis, the revenues of the Nigerian government sharply declined which resulted in reduction in foreign exchange earnings.

In a survey report for the United Nations Industrial Development Organization (UNIDO), Malik, Teal and Baptist (2004) discloses that for many years the Nigerian manufacturing sector has been working with mostly unskilled and unqualified labour. Actually, to date, the qualifications and skill level of the sector's workforce is still very low. This is an important issue as it directly affects the quality of the manufactured products in Nigeria. As it turns out, the reason behind the employment of unskilled labour is the inability of the manufacturers to pay actual skilled labour well. Adebiyi (2006) employed quarterly series and the Vector Error Correction Model to empirically analyse 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.

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 shows 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. 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.

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. 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.

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 a priori expectations.

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.

Uzoma, Bowale and Ogundipe (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.

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. 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.

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.

The financial institutions, especially deposit money banks, have been playing a critical role in the mobilization of funds, especially to the manufacturing sector (Ogundele & Okeya, 2020). The manufacturing sector also tends to perform better through obtaining funds from the financial institutions. However, the manufacturing sector investors have limitations in borrowing funds from the Deposit Money Banks due to the high bank lending rates being charged. This study investigated the effect of bank lending rate on the performance of manufacturing sector from 1986 to 2018. Specifically, the study looked at the extent to which shocks in the lending rates affected the growth rate of the manufacturing sector. The study found a mixture in the stationarity of the variables employed in the study at level and first difference. Therefore, the study employed the Autoregressive Distribution Lag (ARDL) as its method of analysis at lag 1. It was discovered in the study that bank lending rate exerted a negative but insignificant effect on the growth rate of the manufacturing sector such that a percentage change in lending rate will lead to -0.68% change in growth rate of the manufacturing sector in the short-run. Furthermore, it was also discovered that bank lending rate exerted a negative influence on the growth rate of the manufacturing sector such that a percentage change in bank lending rate led to -0.99% change in growth of the manufacturing sector in the long-run. It was also discovered in the study that there is a long run co-integrating

relationship among the variables. On the issue of causality, the study showed that there was no direction of causality between bank lending rate and growth rate of the manufacturing sector. It was concluded in the study that bank lending rate is not a significant factor that influences growth rate in the manufacturing sector.

Obi (2021) examined the effect of monetary policy instruments on manufacturing sector output in Nigeria. The study employed an ex-post factor research design obtained from Central Bank of Nigeria Statistical Bulletin 2020. Results showed that manufacturing sector output is an endogenous variable in the explanation of the effect of monetary policy on manufacturing sector output in Nigeria in the short run. Also, monetary policy rate, money supply have positive and significant effect on manufacturing sector output in the short run while treasury bill rate has no significant effect on manufacturing sector output in the short run.

Several studies have attempted to examine the relationship between monetary policy, exchange rate and manufacturing sector within and outside Nigeria. It was observed from this previous studies that they made use of data period below 2021, hence, a study with data period extended to 2021 is believed to have the capacity to produce a reliable outcome. A research gap has been created by the previous studies by failing to reach a consensus as a result of the divergences in their findings. The methodology adopted by most previous studies were static in nature and hence produced spurious results. The need to adopt more robust and sophisticated technique and an attempt to fill the observed gap necessitated the examination of the relationship among monetary policy instruments and the growth of manufacturing sub-sector in Nigeria.

METHODS AND MATERIALS

Model Specification

Reinforcing the position of classical economists, Melton Friedman demonstrated that inflation is directly proportional to changes in money supply, with real national income (GDP) remaining constant in the long-run, any increase in aggregate demand stimulated by increase in money supply will cause price level to increase (inflation).

While Keynes clearly demonstrated that money supply only influence price level indirectly through its effects on interest rate which affects investment in a negative relationship resulting to change in output and then price level. On the strength of these theoretical prepositions, manufacturing sector is proxied by manufacturing output of the (MANGDP), expressed as a function of money supply (M2), interest rate (INTR), inflation rate (INFRT) and exchange rate (EXCHRT). Following the work Egbulonu and Ukwuoma (2018) with modifications by using manufacturing output of the (MANGDP), expressed as a function of money supply (M2), interest rate (INTR), inflation rate (INFRT) and exchange rate (EXCHRT). Thus, the model is specified as follows:

$$MANGDP = f(M2, INTR, EXCHRT, INFRT) \quad (1)$$

Explicitly;

$$MANGDP = \beta_0 + \beta_1 M2 + \beta_2 INTR + \beta_3 EXCHRT + \beta_4 INFRT + \mu_t \quad (2)$$

Where;

MAN = Manufacturing output,
M_2 = Broad Money Supply,
INTR = Interest Rate,
EXCHRT = Exchange Rate,
INFRT = Inflation Rate.

The multiple regression in this case appear more acceptable for exploring and estimating the nexus between monetary policy and the manufacturing sector output in Nigeria**.**

A Priori Expectation

The a priori expectation is determined by the principle of economic theory and refers to the sign and size of the parameters of economic relationship.

$$\frac{\partial \text{MAN}}{\partial \text{M2}_t} > 0, \frac{\partial \text{MAN}}{\partial INTR_t} > 0, \frac{\partial \text{MAN}}{\partial \text{EXCHRT}_t} > 0, \frac{\partial \text{MAN}}{\partial \text{INFRT}_t} > 0, \& \frac{\partial \text{MAN}}{\partial \text{INFL}_t} > 0,$$

Estimation Techniques

The methods of estimation employed for this study are based on Autoregressive Distributed Lag (ARDL) approach to cointegration and Granger causality test. The study analyses time series properties of the research variables using the Augmented Dickey Fuller (ADF). The advantage of the ARDL method is that, it can be applied to the model whether the independent variables are stationary at I (0) or I (1). The dependent variable must stationary in I (1).

Statistical Tools

Testing for Unit Roots

A unit root test is vital in observing the stationary of time series data. It is main to estimate about the variables observed have a tendency to return to the long term trend follow a shock (stationary) or the variables follow a random walk which containing a unit root. If the variables follow a random walk after a temporary or permanent shock, the regression between variables is spurious (Amiruddin, Nor, & Ismail 2007). According to the Grauss-Markov's theorem, in such cases, the series do not have a finite variance. Hence the OLS will not produce consistent parameter estimates.

A stationary series is one whose basic properties, for example it mean and its variance, do not change it over time. In contrast, a non-stationary series has one or more basic properties that do change over time. If the time series variable is stationery,

i) The mean of is constant over time

ii) The variance of is constant over time

iii) The simple correlation coefficient between variable depends on the length of the lag (k) but on no other variable (for all k).

The unit root test can be separated into 2 tests, that is Augmented Dickey Fuller (ADF) test and Phillips Perron (PP) test. This will test for level (original series), first differences and second differences (changes). If stationary at level, then the series are integrated of order zero, I(0) and if stationary at first differences and second differences, the series are integrated of order one and two, I(1) and I(2) respectively. The Augmented Dickey-Fuller test statistic and Phillips-Perron test statistic to estimate the stationary for the variables. For the purpose of this study, the researcher choose to use The Augmented Dickey-Fuller test statistic. The results are and the hypothesis will indicate as below:

Hypothesis:

Ho: No stationary

Ha: Stationary

Hence, if p-value is smaller than 0.05, then rejected Ho, that is stationary, if failure to reject Ho, that means no stationary.

Dickey-Fuller and the Augmented Dickey-Fuller Tests

Dickey and Fuller (1979) consider three different regression equations that can be used to test the presence of a unit root. Basically, the three regressions differ due to the presence of the deterministic elements α_1 and $\alpha_2 t$ and they are given as follows:

$$\Delta Yt = \alpha Yt_{-1} + \mu t \quad (3)$$

$$\Delta Yt = \alpha 1 + \alpha_1 Yt_{-1} + \mu t \quad (4)$$

$$\Delta Yt = \alpha 1 + \alpha_2 t + Yt_{-1} - \mu t \quad (5)$$

Where Y_t is the required time series, Δ is the difference operator, t is the time trend and μ_t is the pure white noise error term which should satisfy the following assumptions: normality, constant variance and independent error terms. Equation (3) is a pure random walk, equation (4) adds an intercept or drift term and equation (5) includes both a drift and linear time trend. The test involves estimating the equations using the OLS in order to obtain the estimated value of α, and the associated standard error and compare the resulting t-statistic with appropriate value reported in the Dickey-Fuller (DF) tables. The weakness of the DF test is that it does not take account of possible autocorrelation in the error process or term (μ_t). To cater for the above mentioned problem associated with DF test, the Augmented Dickey-Fuller (ADF) can be used.

Cointegration Test

Regression of one non-stationary variable on another is very likely to yield impressive-seemingly results which are wholly spurious (Mukherjee *et al*., 1998). In general, if two time series variables are both non-stationary in levels but stationary in first-differences, they are integrated of order 1, I(1), then there could be a linear relationship between them which is stationary, I(1) and as such all the series of interest should be integrated of the same order, preferably I(1).The two time series variables that satisfy this requirement are considered to be cointegrated. Variables are cointergrated with one another if the residuals from the levels regression are stationary.

RESULTS AND DISCUSSION

Presentation of Results

Unit Root Tests

The Augmented Dickey-Fuller (ADF) unit root test results for the time series variables are presented in Table 1 below.

The use of ARDL models does not impose pre-testing of variables for unit root problems. However, unit root tests was conducted in this study to find out if there are mixtures in the order of integration of our variables. The order of integration of the time series was investigated by applying the Augmented Dickey and Fuller (1979) test.

Table 1. Unit root test results

Variable	ADF Test Statistic	95% Critical ADF Value	Order of Integration	Remark
D(MAN)	5.856**	2.957	I (1)	Stationary
M2	7.416**	2.941	I (0)	Stationary
D(INTR)	2.996**	1.952	I (1)	Stationary
D(INFRT)	2.890**	1.951	I (1)	Stationary
D(EXCHRT)	4.253**	2.943	I (1)	Stationary

Source: Authors' Computations, 2023
Note: ** = 5 percent significance

From Table 1, the results of the stationarity (unit root) ADF test statistic test indicates that each of the variables are greater than the respective critical values. Thus, we accept the hypothesis of unit roots in each of the time series. In the final evaluation, all the variables became stationary at first difference except money supply that was stationary at level. Hence, they are integrated of order *I* (1) and *I* (0). Thus cointegration tests can be applied for all variables.

Johansen Cointegration Results

The main theoretical argument of cointegration analysis is that even if individual variable is nonstationary, the group of variables may drift together. In support of this, Engle and Granger

(1987) pointed out that a linear combination of two or more non-stationary series may be stationary. If such a stationary linear combination exists, the non-stationary time series are said to be *cointegrated*. The stationary linear combination is called the *cointegrating equation* and may be interpreted as a long-run equilibrium relationship among the variables. There is the need to test for cointegration relationships using Johansen approach. This approach is preferred to the Engle and Granger two step procedure because the later conceals information on the coefficients of the explanatory variables in the co-integrating vector, hence makes it in appropriate for this study.

Cointegration Test

Date: 04/23/23 Time: 03:44
Sample (adjusted): 1985 2020
Included observations: 36 after adjustment
Trend assumption: Linear deterministic trend
Series: EXCHRT INFRT INTR M2 MAN
Lags interval (in first differences): 1 to 3
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.649599	93.76883	69.81889	0.0002
At most 1 *	0.505610	57.06509	47.85613	0.0054
At most 2 *	0.377322	32.40999	29.79707	0.0245
At most 3 *	0.347274	15.82957	15.49471	0.0445
At most 4	0.025349	0.898645	3.841466	0.3431

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level

The result of the Johansen cointegration test shows that the trace statistics indicate four (4) co-integrating equation. This indicates that there is a long run relationship among the variables, hence the variables have high tendency to converge to long-run equilibrium level. Since the ADF test value for the residual is greater than the critical value, it is said to be stationary. Thus, the time series are co-integrated, implying that a long-run stable relationship exists among the variables used in this study. This means that any short run deviation in their relationships would return to equilibrium in the long-run.

Table 2. Auto-Regressive Distributed (ARDL) bounds test result

BOUND TEST RESULT ARDL (1, 0, 4, 0, 2, 3)				
Significance	**Lower Class Bound**	**Upper-Class Bound**	**F-statistics**	**Decision**
10%	2.2	3.09	25.59302	Long-run
5%	2.56	3.49	25.59302	Long-run
2.5%	2.88	3.87	25.59302	Long-run
1%	3.29	4.37	25.59302	Long-run

Source: Author's Computation, 2023

Based on the outcome of the unit root test, this study estimated the ARDL to test for the existence of a long-run relationship among the series. Table 2 showed the ARDL bounds test result using manufacturing output (MAN) as the dependent variable, it is depicted that long-run relationship exists since the F-statistics is greater than the upper-class boundary at levels 10, 5, 2.5 and 1 significance level.

Table 3. ARDL long-run relationship results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
MAN(-1)	1.738198	0.304279	5.712520	0.0001
MAN(-2)	-1.324928	0.344995	-3.840429	0.0018
EXCHRT	-2.812783	6.038279	-0.465825	0.6485
EXCHRT(-1)	6.506869	7.207596	0.902779	0.3819
EXCHRT(-2)	12.11899	6.432114	1.884138	0.0805
EXCHRT(-3)	-8.600383	4.758394	-1.807413	0.0922
INFRT	5.682939	5.942186	0.956372	0.3551
INFRT(-1)	-2.465187	7.176832	-0.343492	0.7363
INFRT(-2)	10.00118	9.044331	1.105795	0.2875
INFRT(-3)	-1.407687	8.058327	-0.174687	0.8638
INFRT(-4)	11.41787	6.548603	1.743558	0.1031
INTR	25.38739	22.90448	1.108403	0.2864
INTR(-1)	-5.134384	21.69707	-0.236639	0.8164
INTR(-2)	-12.52107	20.07839	-0.623609	0.5429
INTR(-3)	-35.68989	22.04411	-1.619022	0.1277
M2	0.164565	0.080418	2.046383	0.0600
M2(-1)	-0.172640	0.106312	-1.623892	0.1267
M2(-2)	0.018676	0.163333	0.114342	0.9106
M2(-3)	0.086533	0.185615	0.466196	0.6482
M2(-4)	0.124366	0.122781	1.012913	0.3283
C	-245.6374	369.6757	-0.664467	0.5172
R-squared	0.997638	Mean dependent var		3105.185
Adjusted R-squared	0.994264	S.D. dependent var		4172.580
S.E. of regression	316.0035	Akaike info criterion		14.63309
Sum squared resid	1398015.	Schwarz criterion		15.56630
Log likelihood	-235.0791	Hannan-Quinn criter.		14.95524
F-statistic	295.6975	Durbin-Watson stat		1.698233
Prob(F-statistic)	0.000000			
*Note: p-values and any subsequent tests do not account for model selection.				

Source: Author's Computation, 2023

The ARDL result in Table 3 showed that the variables under investigation have significant impact on the growth of manufacturing sub-sector in Nigeria in the long run. The Durbin-Watson statistics value is 1.6 which means no autocorrelation. The F-statistics measure the joint significance of the variables. The F-statistics value is 295.6975 with the probability of 0.000000; this indicates that the independent variables jointly explained the dependent variable at a 5% significance level. The R-squared measures the determination of coefficient, measuring the fit of the model. The value of the R-squared is 0.997638, this shows that about 99% variation in the dependent variable is been explained by the variations in the independent variables. Hence, there is a good fit in the model. Likewise, the adjusted R squared measure the goodness of fit with putting the degree of freedom into consideration. The value is 0.994264, showing that the model has a good fit at 99%.

The long run estimation coefficient of (EXCHRT) carries negative sign (-2.812783) and its t-value (0.465825) with the p-value of 0.6485 is statistically not significant at 5% level. This implies that exchange rate affect the growth of manufacturing sub-sector in Nigeria in the long-run. The t-value for the regression coefficient of (EXCHRT) is not significant as confirmed by the p-value (0.6485). It is estimated from the result that 1% decrease in (EXCHRT), on the

average, will lead to 281% increase in (MAN) in the long run. It was theoretically expected that positive relationship exist between exchange rate and the growth of manufacturing sub-sector in Nigeria.

The ARDL statistical findings show that inflation in Nigeria have significant impact on manufacturing sector. The long run regression coefficient of (INFRT) though carries positive sign of 5.682939 and its p-value 0.3551 which is greater than 0.05% level of significance meaning that the coefficient is not significant, and this implies statistically that, the inflation rate is not significant to productivity in Nigeria statistically, but theoretically, positive value of inflation rate indicated that as inflation increases the output capacity of the manufacturing sub-sector in Nigeria reduces.

The results indicate that the coefficient of Interest rate (INTR) is positive, that is 25.38739. The implication of this result is that one percent increase in interest rate reduces the capacity of the growth of manufacturing sub-sector in Nigeria by about 253% within the period under review. The coefficient of interest rate do conform to a priori in line with economic theory and is statistically insignificant at 0.05% with manufacturing output in Nigeria.

The ARDL results indicates that the coefficient of Money supply (M2) is positive, that is 0.164565. The implication of this result is that one percent increase in money supply increase the capacity of the growth of manufacturing sub-sector in Nigeria by about 164% within the period under review. The coefficient of money supply do conform to a priori in line with economic theory and is statistically significant at 0.05% with manufacturing output in Nigeria. This symbolizes that the higher the money in circulation the higher the production capacity of the manufacturing sub-sector in Nigeria. Money supply will increase the purchasing power of the consumer in demanding for more output of the manufacturing sector in Nigeria.

Table 4. ARDL short-run relationship results

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(MAN(-1))	1.324928	0.221669	5.977051	0.0000
D(EXCHRT)	-2.812783	3.965752	-0.709268	0.4898
D(EXCHRT(-1))	-3.518611	3.684306	-0.955027	0.3558
D(EXCHRT(-2))	8.600383	3.326815	2.585170	0.0216
D(INFRT)	5.682939	4.062982	1.398711	0.1837
D(INFRT(-1))	-20.01136	5.620239	-3.560589	0.0031
D(INFRT(-2))	-10.01018	4.461378	-2.243742	0.0415
D(INFRT(-3))	-11.41787	4.615632	-2.473739	0.0268
D(INTR)	25.38739	16.19883	1.567236	0.1394
D(INTR(-1))	48.21096	17.93275	2.688431	0.0177
D(INTR(-2))	35.68989	15.65865	2.279244	0.0388
D(M2)	0.164565	0.054328	3.029126	0.0090
D(M2(-1))	-0.229575	0.076597	-2.997166	0.0096
D(M2(-2))	-0.210899	0.106055	-1.988577	0.0667
D(M2(-3))	-0.124366	0.088778	-1.400866	0.1830
CointEq(-1)*	-0.586730	0.128525	-4.565089	0.0004
R-squared	0.945490	Mean dependent var		478.6840
Adjusted R-squared	0.902456	S.D. dependent var		868.5179
S.E. of regression	271.2559	Akaike info criterion		14.34738
Sum squared resid	1398015.	Schwarz criterion		15.05839
Log likelihood	-235.0791	Hannan-Quinn criter.		14.59282
Durbin-Watson stat	1.698233			

Source: Author's Computation, 2023.

Table 4 shows the result of the short-run relationship between monetary policy instruments and the growth of manufacturing sub-sector in Nigeria. To investigate the existence of a short run relationship among the variables of interest, restricted error correction model regressions was estimated. The most important thing in ECM (CointEq(-1)*) model is the sign and significance status of the error term. It measures the speed by which the short term deviations in the model can converge back to, or diverge from its long run equilibrium. In this case, it is negative and highly significant implying that any short term distortions in the model could be corrected; and the short term deviations could converge towards the long run equilibrium at the annual speed rate of -0.586730. The equilibrium adjustment level reported that about 58.6% of disequilibrium will be adjusted periodically. It revealed that the model will revert to its equilibrium path whenever shocks occurs.

The coefficient of error term is 58.6% indicating that the growth of manufacturing sector corrects its disequilibrium at a speed of 58.6% yearly. The error correction term is significant at 0.05% level since the p-value is less than 0.05%. It thus means that our short run is given validity that monetary policy instrument have long run relationship with the manufacturing sub-sector in Nigeria. We can accept this model because the value of adjusted R^2 is smaller (0.90) and the value of Durbin-Watson statistic (1.6) which means that the model is not a spurious model hence can be accepted.

Discussion of Findings

The study examines the short and long-run nexus between monetary policy instruments and the growth of manufacturing sub-sector in Nigeria. The ARDL result showed that the variables under investigation have significant impact on manufacturing sector in Nigeria in the long run as confirmed by the F-Statistics. The Durbin-Watson statistics value is 1.6 which means no autocorrelation. The F-statistics measure the joint significance of the variables.

The long run estimation coefficient of (EXCHRT) carries negative sign (-2.812783) and its t-value (0.465825) with the p-value of 0.6485 is statistically not significant at 5% level. This implies that exchange rate affect the growth of manufacturing sub-sector in Nigeria in the long-run. This findings negate the work of Rahman and Hossain (2003) who analysed the existence of a long-run relationship between the real exchange rate and private manufacturing investment in Bangladesh.

The ARDL statistical findings revealed that inflation in Nigeria has significant impact on manufacturing sector. The long run regression coefficient of (INFRT) though carries positive sign of 5.682939 and its p-value 0.3551 which is greater than 0.05% level of significance implies that the coefficient is not significant, and this means that, inflation rate is significant to productivity in Nigeria in practice, but theoretically, positive value of inflation rate indicated that as inflation increases the output capacity of the manufacturing sub-sector in Nigeria reduces. This outcome corroborates the work of Adebiyi (2006) who employed quarterly series and the Vector Error Correction Model to empirically analyse the relationship between the manufacturing sector, interest rate policy and financial sector reforms in Nigeria.

Supporting this finding is the work of Omolade and Ngalawa (2016) where the relationship between monetary policy and growth of the manufacturing sector in Algeria was explored using quarterly time series data for the period 1980Q1 to 2010Q4. The result suggests that 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.

The ARDL results indicates that the coefficient of Money supply (M2) is positive, that is 0.164565. The implication of this result is that one percent increase in money supply increase the capacity of the growth of manufacturing sub-sector in Nigeria by about 164% within the period under review. Also corroborating this work is the work of Okonkwo *et al.* (2015) who

examined the impact of monetary policy variables on manufacturing in Nigeria covering the period 1981 to 2012 and revealed that money supply exert tremendous influence on manufacturing in Nigeria. Nneka (2012) also found out that the supply of money showed a positive impact on manufacturing output index. The coefficient of money supply do conform to a priori in line with economic theory and is statistically significant at 0.05% with manufacturing output in Nigeria. This symbolizes that the higher the money in circulation the higher the production capacity of the manufacturing sub-sector in Nigeria. Money supply will increase the purchasing power of the consumer in demanding for more output of the manufacturing sector in Nigeria.

CONCLUSION AND POLICY RECOMMENDATION

The role of the Central Bank in regulating the liquidity of the economy which affects some macroeconomic variables such as output of the manufacturing sector cannot be over emphasized. This study applied the Auto regressive distributive lag method to determine the impact of monetary policy on manufacturing output in Nigeria for the period 1981 – 2020.

It is evident from the result that monetary policy indices (especially Exchange rate and interest rate) did not impact significantly on the growth of the manufacturing sector in Nigeria for the period under review. Money supply however showed a positive and significant impact on the manufacturing sector meaning that CBNs' supply of money has a direct effect on manufacturers who easily access funds for production purposes. In the long run, money supply remained a positive and significant determinant of manufacturing output in Nigeria.

Exchange rate decreased manufacturing output showing an inverse relationship as well as high interest rate decreased manufacturing output. We can conclude from this finding that exchange rate as expected, decreased the manufacturing output owing to the high cost of obtaining foreign currencies due to the high exchange rate, this makes manufacturers to source for alternative means of production since most of their raw materials are imported.

This ultimately has an adverse effect on output of the sector. Manufacturers are forced to borrow from banks despite the increasing Interest rate as seen from the long run estimates but this did not directly have a significant impact on the sector. This study concludes therefore that the inability of monetary policy to effectively maximize its policy objectives most times is as a result of the shortcomings of the policy instruments used in Nigeria and as such, limits its contribution to growth of key sectors.

Based on the findings and conclusion, the study recommended the following;

The monetary authority should avoid policy inconsistencies to enable long term business planning and investment by manufacturers in Nigeria.

The Central Bank of Nigeria should maintain a lower interest rate on loans so that manufacturers and other investors who make up the deficit unit of the economy are encouraged to borrow more when the interest rate is low thus leading to increased investment and growth of the manufacturing sector. Stability in money supply is essential to the growth of the manufacturing sector, government through monetary authorities should ensure a steady money supply in the economy in order to foster investments. Commercial banks and other financial intermediaries must be forced to ensure compliance with the stipulated prudential guidelines. Any deviations from the set regulations should be punished to serve as a deterrent to others.

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