EFFECT OF MONETARY POLICY ON MANUFACTURING VALUE-ADDITION IN NIGERIA: 1981 – 2018

Professor J.M. Ibbih	**Department of Economics, Nasarawa State University, Keffi**
Professor E.D. Anzaku	**Department of Economics, Nasarawa State University, Keffi**
Ogwuche, David D.	**Department of Economics, Bingham University Karu, Nasarawa State, Nigeria**

Abstract

Nigerian economy has not demonstrated a genuine match to industrialization, as shown by the experiences of industrializing nations because there is absence of a well articulated and implemented monetary policy framework required to actualize the benefits of savings and capital mobilization to the productive sector. This paper attempts to examine the effect of monetary policy on manufacturing value-addition in Nigeria. Monetary policy rate, prime lending rate, open market operation, broad money supply and manufacturing sector credit are captured as monetary policy variables (independent variables) while value-added manufacturing output is the dependent variable. Time series secondary data, sourced from National Bureau of Statistics and Central Bank of Nigeria statistical bulletins is used. The data are subjected to Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) stationarity tests to determine the appropriate econometric tool for analyses. The results of both tests show that all the variables are stationary at both first difference and at level. This condition satisfies the choice of Autoregressive Distributed Lag (ARDL) model for estimation. The paper reveals that in the short run; only broad money supply majorly drives the growth of manufacturing value-addition in Nigeria. However, the long-run significant driver of manufacturing value-addition in Nigeria is largely from manufacturing sector credit. This is a pointer to the need to facilitate a favourable investment climate through appropriate monetary policy tool like manufacturing sector credit which represents more accurately the role of financial intermediaries in channeling fund to manufacturers and investors to boost output growth in the productive sector. The paper concludes that monetary policy variables generally exert significant effect on value-added manufacturing output at 5% level. The paper recommends policy intervention such as well managed and single-digit benchmark interest rate for manufacturers to attract increased investments, which must be tailored towards enhanced value-addition to the manufacturing sector.

Keywords: Monetary Policy, Manufacturing Value-addition, Manufacturing Sector, ARDL

INTRODUCTION

The Central Bank of Nigeria Act of 1958, which established the Central Bank of Nigeria, gave it the sole mandate to promote and maintain monetary stability and sound financial system in Nigeria. Over the years, the regulatory role of Central Bank of Nigeria has been on effective usage of monetary policy. It is worthy of note that the major regimes in the pursuit of monetary policy in Nigeria have remained two; namely regulated era (before 1986) and deregulated or liberalized era (after 1986). Emphasis was placed on direct monetary controls during the first regime while the second regime relied on indirect controls based on market mechanisms.

The policy thrust of monetary policy during the regulated era was to expand domestic aggregate output and curtail inflationary pressures (Osmond, Egbulonu & Emerenini, 2015). As a result of increased oil earnings during the same period, government finances and foreign exchange reserves improved. The multiplier effect was increase in money stock, which again led to another round of inflationary pressures. This made the task of monetary management more complicated. This prompted the introduction of Structural Adjustment Programme (SAP) in July, 1986, which marked the beginning of second monetary policy regime that relied on indirect controls based on market mechanisms. Indirect monetary policy has the advantage of market deregulation and liberalization, which gave credence to SAP. The purpose of SAP was to ultimately institute a more efficient market system for the allocation of resources, with the implication that excessive controls of the previous two decades would be gradually reduced to levels that would not inhibit economic development. The objectives of SAP included promoting investment, stimulating non-oil exports and providing a base for private sector-led development; promoting the efficiency of Nigeria's industrial sector; privatizing and commercializing state-owned enterprises to promote industrial efficiency; developing and utilizing domestic inputs by encouraging accelerated development and use of local raw materials and intermediate inputs rather than imported ones (Chete, Adeoti, Adeynika & Ogundele, 2013).

It is however important to note that the manufacturing sector is one of the determinants of the nation's economic growth and development. The sector is responsible for about 10% of the total GDP in Nigeria (NBS, 2016). Notice that monetary policy is a growth catalyst that can create anenabling investment friendly environment for manufacturing sector to thrive (Adegoke, Victor & Olatunji, 2015). This, no doubt, encourages innovative entrepreneurs to develop interest in productive sector as projected by SAP. It is also important to note that manufacturing sector is regarded as the engine of economic growth and the financial sector is widely acknowledged as the lubricant of that engine. There is therefore, a synergetic relationship that exists between these two sectors; this synergy is dependent on a sound monetary policy (Udeala, 2002).

Meanwhile, the nation's economy has not demonstrated a genuine match to industrialization, as shown by the experiences of industrializing nations because there is absence of a well articulated and implemented monetary policy framework required to actualize the benefits of savings and capital mobilization to the productive sector (Busari, Omoke, & Adesoye, 2002). Despite various manufacturing policy interventions over the years, there are strong indications that the performance of Nigeria's manufacturing industry has not shown significant improvement. For example, indexes from (Various Issues of CBN Annual Reports) pointed out that the share of manufacturing sector contribution to GDP (manufacturing value - addition), which stood at 20.26% in 1981, fell to 6.55% in 2010 before rising at a snail- speed to 7.77% in 2018. The resultant effect is poor value-addition; as a result of low and declining manufacturing contribution to GDP.

This situation is worrisome for a country that needs industrialization and calls for an x-ray of the problem.

This paper based its analysis on five key monetary policy variables (monetary policy rate, interest rate, Treasury bills rate, broad money supply and manufacturing sector credit).
Hence, this paper seeks to uncover the effect of monetary policy on manufacturing value-addition in Nigeria. It specifically determines the effect of monetary policy rate, interest rate, open market operation, broad money supply and manufacturing sector credit on the manufacturing contribution to GDP in Nigeria. The null hypothesis is stated thus: monetary policy variables have no significant effect on manufacturing value-addition in Nigeria.

LITERATURE REVIEW

Conceptual Review

Conceptually, two main variables captured in this study are monetary policy (independent variable) and manufacturing value-addition (dependent variable). Generally, monetary policy is viewed as a measure designed to regulate and control the volume, cost, availability and direction of money and credit in an economy to achieve specified macroeconomic policy objectives. It is simply one of the macroeconomic instruments employed by the monetary authority to manage an economy with a view to achieving the desired objectives. It is the process by which the Central Bank of a country controls the supply of money, and cost of money or rate of interest to attain a set of objectives developed towards the growth and stability of the economy. Ajisafe and Folorunso (2002) noted that the objectives of monetary policy include increase in Gross Domestic Product growth rate, reduction in the rates of inflation and unemployment, improvement in the balance of payments, accumulation of financial savings and external reserves as well as stability in Naira exchange rate.

From the foregoing, the researcher defines monetary policy as a programme of action undertaken directly or indirectly by the monetary authorities, to control and regulate money supply as well as the supply of credit with a view to achieving predetermined macroeconomic goals such as steady output growth as well as stability in price, interest and exchange rates.

In ordinary parlance, manufacturing is categorized under the industries belonging to International Standard Industries Classification (ISIC). The Nigerian manufacturing sector is a sub-set of industrial sector, which is categorized into crude petroleum & natural gas, solid minerals and manufacturing sub-sectors. Manufacturing entails the conversion of raw materials into finished consumer goods or intermediate or producer goods. Value-addition is measured as the net output of a sector after adding up all outputs and subtracting intermediate inputs. Manufacturing value-addition is the percentage contribution of manufacturing sector to GDP. More explicitly, it is the total net-output of all manufacturing activities in an economy obtained by adding up outputs, less intermediate inputs. The highest value of manufacturing contribution to GDP in Nigeria over the past 38years was 21.10% in 1983 while its lowest value was 6.55% in 2010 (World Bank national accounts data, 2018).

It is usually said that the industrial sector is regarded as the engine of economic growth and the financial sector is widely acknowledged as the lubricant of such engine. A synergetic relationship

between these two sectors therefore becomes inevitable. For this synergy to take place, a sound monetary policy is a pre-requisite (Udeala, 2002). For Nigeria to begin a genuine march to industrialization, as experiences of industrializing countries have shown, a well-articulated and implemented monetary policy framework needs to be put in place to actualize the benefit of capital in the industrialization process (Busari, Omoke, Adesoye, (2002). The mobilization and utilization of savings requires a sound monetary policy. The policy among other things should include prudent management of fiscal and monetary policies. A sound monetary policy is a pre-requisite for industrial development. The monetary authority directs its policies towards making financial resources available to private sector organizations (Agba, 2004). Thus, there is a link between monetary sector and industrial / manufacturing sector.

Theoretical Framework

There are two extreme cases of theoretical literature regarding the ability of monetary policy to influence output. The Keynesians propose that "money does not matter", hence unable to impact on output growth directly. They propose that the link between the monetary sector and the real sector of the economy is weak, and therefore suggest that there is an indirect link (Khabo, 2002). However, the link between the monetary sector and the real sector is ensued through the transmission mechanism. Two steps are involved in the transmission mechanism. First, an increase in real balances generates portfolio disequilibrium (Dornbusch, 1976). If money supply increases, there will be disequilibrium in the money market caused by excess money supply. To correct this disequilibrium, consumers will purchase other financial assets such as bonds thereby bidding their prices up. Due to the negative relationship between bond prices and interest rates, increases in bond prices will lead to decreases in interest rate. Consequently, the second stage of transmission mechanism will be activated. Lower interest rates will positively affect aggregate demand thereby increasing output. Monetary policy through changes in money supply thus function by stimulating interest-responsive components of aggregate demand, primarily investment spending.

On the other hand, the Monetarists believe that "money matters", thereby advocating for the use of monetary policy in influencing output growth. They argue that there is a direct link between the monetary sector and the real sector of the economy. The framework for this study centers on the monetary theory developed by the Monetarists, led by Milton Friedman. The Monetarists support their argument of the effectiveness of monetary policy in impacting on output growth using the equation of exchange proposed by the neoclassical economists led by Irving Fisher. They converted this equation of exchange into quantity theory of money, stated as:

$$MV = PY \quad \text{---------- (2.1)}$$

Where M denotes the supply of money over which the Central Bank has some control through the conduct of monetary policy, V denotes velocity of circulation, P denotes the price level and Y denotes the level of output. The Monetarists assume that velocity is constant, and when V is constant, equation *(2.1)* indicates a one-to-one relationship between changes in money stock and changes in the value of national output. As a result, equation *(2.1)* is transformed into equation *(2.2)* below, where k represents a constant.

$$M = kPY \quad \text{---------- (2.2)}$$

According to equation *(2.2)*, changes in output can only be brought about through changes in money supply. Based on the argument of constant velocity, therefore, there exists a direct link

between the monetary sector and manufacturing sector of the economy. This explains the basis for the monetarists' argument that changes in monetary policy affect manufacturing output.
Also, the monetarists do acknowledge that the economy may not always be operating at full employment level of real output. They therefore believe that in the short-run, expansionary monetary policies may increase the level of real output by increasing aggregate demand. However, in the long-run when the economy is operating at the full employment level, they consented that the modified equation of exchange remained a good approximation of the link between the money supply, the price level, and the real output. Implicitly, this exposition demonstrates a synergetic and systematic link between the financial sector (monetary policy) and industrial sector (manufacturing output).

Empirical Review
The performance of monetary policy on the manufacturing index performance in Nigeria was examined by Charles-Anyaogu (2012). In this study, granger causality was employed to test for impact, while VEC and OLS were used to determine the significance, magnitude, direction and relationship of some macroeconomic variables such as lending rate, income tax rate, money supply, inflation rate, and exchange rate on the manufacturing index in Nigeria. It was revealed that money supply positively affect manufacturing sector performance by 0.5% while others exerted negative impact on the manufacturing sector performance.

Owalabi and Adegbite (2014) examined the impact of monetary policy on industrial growth in Nigerian economy using multiple regression analysis. They analyzed the relationship between manufacturing output, treasury bills, deposit and lending, and rediscount rate and industrial growth, and found that the variables had significant effects on the industrial growth. However, no clear specific policy recommendations were proffered by the authors.

Osmond, Egbulonu and Emerenini (2015) analysed the impact of monetary policy variables on manufacturing sector in Nigeria from 1981 – 2012. In this study, four explanatory variables - money supply, credit to private sector, inflation rate and interest rate were used to establish their influence on the dependent variable, which was the industry contribution to GDP. The Johansen cointegration test was employed in order to establish the long run equilibrium relationship between the dependent and explanatory variables. Also, error correction model (ECM) was employed to estimate the model. The study revealed that money supply and credit to private sector exert tremendous influence on manufacturing output in Nigeria. However, no robust diagnostics checking was offered and the study assumed data stationarity.

Igbinedion and Ogbeide (2016) employed the error-correction approach to examine the relationship between monetary policy and manufacturing capacity utilization in Nigeria within a period of 34 years (1980 - 2014). The explanatory variables were banking sector credit, real exchange rate, lending interest rate, and broad money supply while the dependent variables was manufacturing capacity utilization. The study revealed that monetary policy variables significantly explained about 81% of the variables of manufacturing sector performance. Bank credit, money supply and exchange rate were found to have positive effect on manufacturing sector performance at levels, but interest rate was found to have a negative effect on manufacturing sector performance at one year lag. Based on the results from error term, variance decomposition and impulse response, it was concluded that monetary policy explains relatively significant variations in manufacturing performance in Nigeria.

Omini, Ogbeba and Okoi (2017) used the VAR model and Granger causality test to examine the impact of monetary policy shocks on industrial output in Nigeria for a period of 45years (1970 - 2015). The explanatory variables were monetary policy rate, exchange rate and bank credit to industrial sector while the industrial sector contribution of manufacturing and solid minerals subsectors to GDP was employed as the dependent variable. The study revealed a positive relationship between the manufacturing sub-sector and monetary policy rate, bank credit to industrial sector and exchange rates. Also, the contribution of solid minerals sub-sector to GDP responded positively to shocks in commercial bank credit to the industrial sector and exchange rate after the first year. The test of causality showed a unidirectional relationship from monetary policy rate and exchange rate to the contribution of manufacturing sector to GDP on the one hand, and commercial bank credit to the industrial sector and exchange rate to the contribution of solid mineral sector to GDP on the other.

Ezeaku, Ibe, Ugwuanyi, Modebe and Agbaeze (2018) employed error correction model and Johansen cointegration technique to examine the monetary policy transmission channels on industry performance in Nigeria from 1981 to 2014. Three explanatory variables were used as channels of monetary policy transmission, being bank channel (private sector credit), interest rate channel (real lending rate) and exchange rate channel, while the dependent variable was the real output; measured as the contribution of the industrial sector to GDP. A long run relationship was found by the study between monetary policy and industrial output with about 72% annual speed of adjustment. However, an insignificant negative effect exists between all the monetary policy transmission channels and industry performance with about 61% significant explanatory power.
Osakwe, Ibenta and Ezeabasili (2019) used Autoregressive Distributive Lag (ARDL) to examine the effect of monetary policy on the performance of the Manufacturing sector in Nigeria within a period of 32 years (1986 to 2017). The independent variables employed were monetary policy rate, cash reserve requirement treasury bills rate, and money supply, while the dependent variable was the manufacturing sector output. The results showed that monetary policy tools have significant effect on the manufacturing sector output in Nigeria in the short run only. The study concluded that monetary policy tools might not be a long run policy instrument for manufacturing output growth in Nigeria. It was recommended that in the Nigerian manufacturing sector, money supply and treasury bills can be used as policy instruments to maintain macroeconomic stability in the short run.

The existing literatures reviewed such as Busari, Omoke, & Adesoye, (2002); Chete, Adeoti, Adeynika & Ogundele, (2013); Osmond, Egbulonu & Emerenini, (2015); Osakwe, Ibenta & Ezeabasili (2019); among others failed to incorporate both direct and indirect monetary policy instruments. This gap is covered by this research. Even though it was in the early 80s that the manufacturing value-addition recorded significant output growth, the direct monetary policy regime operated then was traditionally regulated, and failed to liberalize the market. This rendered the policy inadequate in stimulating the manufacturing sector, which is expected to thrive in a market-based economy. However, the combination of both direct and indirect monetary policy is a new development that is likely to produce more reliable results, which can engender economic stability and enhance manufacturing contribution to GDP in Nigeria.

METHODOLOGY

This paper adopts ex-post facto research design, which is suitable for times series data. It involves impact analysis and periodic measurement of variables on a group before and after treatment.

Monetary policy variables such as Monetary Policy Rate (MPR), Prime Lending Rate (PLR), Open market Operation (OMO), measured by Treasury Bills Rate (TBR), Manufacturing Sector Credit (MSC) and Broad Money Supply (M2) are used as independent variables, while the dependent variable is Value-added manufacturing output (VAMO) in Nigeria. The authors subjected the time-series data used to Augmented Dicker Fuller and Phillips-Perrons stationarity tests to determine the best suitable econometric tool of analyses. It was realized that the Autoregressive Distributed Lag (ARDL) cointegration approach developed by Pesaran and Shin (1999) and Pesaran, Shin and Smith (2001) was the appropriate estimation model to use due to its advantage over the traditional cointegration approach. The advantage of ARDL approach is that while other cointegration techniques require all of the regressors to be of the same order, the ARDL approach can be applied whether the variables in the regression are purely of I(1) and/or purely I(0) or a mixture of both. This implies that the ARDL approach avoids the pre-testing problem associated with standard cointegration, which requires that the variables be already classified into I(1) (Pesaran et al, 2001). Also, in the ARDL approach, variables could have different lag length, whereas this is not permissible in other cointegration techniques like the Johansen method.

Model Specification

Based on the earlier theoretical premise, the model adapted for this research is predicated on the theoretical exposition of the Monetarists regarding the ability of monetary policy to influence output. This paper, therefore adapts the augmented Milton Freidman's model by including both direct and indirect monetary policy variables that can influence the output of manufacturing sector other than money supply. This was supported by the work of Osakwe, Ibenta, & Ezeabasili (2019), using value-added manufacturing output as dependent variable, while the explanatory variables were monetary policy rate, Treasury bills rate and broad money supply. However, in this paper, the authors introduced prime lending rate and manufacturing sector credit to augment Osakwe etal (2019) model. Hence, the modified value-added manufacturing output model and the monetary policy variables can be stated thus;

$$VAMO = f(MPR, PLR, TBR, M2, MSC)$$

Setting up the model in linear stochastic equation form or econometric form; gives:

$$VAMO = \alpha_o + \alpha_1 MPR + \alpha_2 PLR + \alpha_3 TBR + \alpha_4 M2 + \alpha_5 MSC + \mu_{t1}$$

Where:

VAMO = Value added manufacturing output (measured by manufacturing contribution to GDP).
MPR = Monetary policy rate
PLR = Prime lending rate
TBR = Treasury bills rate (proxy for open market operation)
M2 = Broad money supply
MSC = Manufacturing sector credit

α_0 = Intercept or autonomous parameter estimates for monetary policy

$\alpha_1 - \alpha_5$ = Coefficients of monetary policy (monetary policy rate, interest rate, open market operation (proxy by treasury bills rate), broad money supply and manufacturing sector credit respectively)

$\mu_{t1}, \mu_{t2}, \mu_{t3}, \mu_{t4}$ and μ_{t5} = The Error terms

The above *a priori* expected relationship (theoretical prediction) between manufacturing output and monetary policy rate is negative because a lower benchmark interest rate induces investors to invest more, which in turn increases output (MNFO<MPR). The expected relationship between manufacturing output and interest rate is negative (MNFO<PLR).Open Market Operation is expected to relate positively or negatively with manufacturing output (MNFO>/<TBR/OMO). The expected relationship between manufacturing output level and money supply is positive because expansionary monetary policies boost output growth in the long-run (MNFO>M2). The expected relationship between manufacturing output and manufacturing sector credit is positive because the endogenous growth theory predicts a positive relationship between real income/output and credit, as a key measure of financial depth (MNFO>MSC).

DATA ANALYSES

Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) Unit Root Tests

Table 1: ADF and PP Unit Root Results (Trend and Intercept)

Variables	ADF			PP		
	ADF Values	Critical Values	Order of Integration	PP Values	Critical Values	Order of Integration
VAMO	-8.166822*	-3.626784	I(1)	-7.964450*	-3.626784	I(1)
MPR	-3.212879**	-2.943427	I(0)	-3.169741**	-2.943427	I(0)
PLR	-5.859045*	-3.632900	I(1)	-3.441089**	-2.943427	I(0)
TBR	-2.996907**	-2.943427	I(0)	-3.004442**	-2.943427	I(0)
M2	4.394237*	-3.621023	I(0)	3.661638*	-3.621023	I(0)
MSC	4.473773*	-3.689194	I(0)	-4.923906*	-3.626784	I(1)

Note:*, **, *** are 1, 5 and 10% respectively
Source: Researcher's Computation using Eviews-10.0 (2020)

Both the traditional ADF and PP tests in Table 1 above showed that all the variables tended to be stationary at both first difference and at level. This scenario satisfied the assumption of ARDL-bound testing since there exists no presence of I(2) variable. Therefore, all the variables satisfied the requirements for ARDL-bound testing approach to cointegration, as proposed by Pesaran et al (2001) which states that all the variables in the model should be stationary either at level or at first difference or mixed to adopt the ARDL model.The ADF and PP unit root tests are used to test for consistency and where conflicts exist, decision on the most appropriate option is taken (Hamilton, 1994).

ARDL (Bounds) Test for Long runs Cointegration

Since the paper adopts the use of annual data, which have limited number of observations, it imposed a maximum of four lags during the sample period on each first differenced variable and relied on Adjusted R-square Criterion and Akaike Information Criterion (AIC) using the restricted ARDL equation in Eviews-10. Thereafter, in determination of whether a long-run co-integration relationship exists between monetary policy variables and manufacturing value - addition, the ARDL-bounds testing approach is used. This is aimed at examining the presence of cointegration among monetary policy variables (MPR, PLR, TBR, M2 and MSC) and value-added manufacturing output (VAMO). If the F-statistic of ARDL bound test is higher than the lower and upper bound critical value at 5% level of significance, the null hypothesis of no long run relationship is rejected, otherwise, it is accepted. Table 1 below shows the results of ARDL co-integration tests.

Table 2: ARDL Bounds Test for Co-integration: Monetary Policy and Value-added manufacturing output

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.997314	10%	2.26	3.35
K	5	5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68

Source: Researcher's Computation using Eviews-10.0 (2020)

As depicted in table 2, the F-statistic value of 5.997314 is greater than both the lower and upper bounds critical values at 1%, 2.5%, 5%, and 10% during the period under review. Hence, the null hypothesis of no co-integration relationship is rejected. This implies that a long-run co-integrating relationship is established between value added manufacturing output and monetary policy variables.

Table 3: ARDL – ECM Result for Short-run effect of Monetary Policy on Value-added manufacturing output

Variable	Coefficient	T-Statistic	Prob.
C	2.585472	7.235344	0.0000
DLOG(VAMO(-1))	0.023496	0.194061	0.8497
DLOG(VAMO(-2))	0.317126	2.683545	0.0213
DLOG(VAMO(-3))	0.478941	2.869258	0.0153
D(PLR)	-0.004655	-1.057048	0.3132
D(PLR(-1))	-0.012283	-3.059381	0.0109
D(PLR(-2))	-0.018186	-3.514278	0.0048
D(PLR(-3))	-0.008257	-2.217740	0.0486
D(OMO)	-0.019971	-4.624040	0.0007
DLOG(M2)	0.030761	0.235473	0.8182
DLOG(M2(-1))	0.750802	3.899606	0.0025
DLOG(M2(-2))	0.290761	1.639719	0.1293
DLOG(M2(-3))	0.664217	3.974751	0.0022
DLOG(MSC)	-0.084917	-0.798249	0.4416
DLOG(MSC(-1))	-0.574929	-4.077888	0.0018
DLOG(MSC(-2))	-0.272157	-2.497281	0.0296
DLOG(MSC(-3))	-0.209638	-2.114023	0.0582
CointEq(-1)*	-0.681817	-7.234653	0.0000
R-squared	0.852036		
Adjusted R-squared	0.694824		
Durbin-Watson stat	1.882310		

Source: Researcher's Computation using Eviews-10.0 (2020)

The one period ECT (-1) value of -0.681817 in Table 3 was found to be highly significant at 1%. This showed that once there is disequilibrium in the value-added manufacturing output model as a result of monetary policy shock, it takes an average speed of 68% to restore or adjust the system back to equilibrium from short-run to the long-run.

In furtherance to the above, the 0.694824 Adjusted R-squared result revealed that monetary policy variables accounted for about 69.5% changes in value-added manufacturing output, while the remaining 30.5% was as a result of other factors affecting the dependent variable that were not captured in the model. This also showed that the model has a good fit.

Also, it is interesting to note that only broad money supply (M2), among the monetary policy variables significantly impacts on value-added manufacturing output positively in the short run.

Table 4: ARDL Result for Long-run effect of Monetary Policy on Value-added manufacturing output

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MPR	0.038838	0.011205	3.466046	0.0053
PLR	-0.010755	0.016547	-0.649992	0.5290
OMO	-0.011573	0.012889	-0.897926	0.3885
LOG(M2)	-1.000781	0.384649	-2.601802	0.0246
LOG(MSC)	0.810215	0.363375	2.229697	0.0476

Source: Researcher's Computation using Eviews-10.0 (2020)

From Table 4, the relationship between monetary policy rate and value-added manufacturing output was found to be positive and statistically significant in the long-run. This was captured by the positive coefficient value of 0.038838 and associated p-value of 0.0053. The monetary policy rate coefficient value of 0.038838 thus revealed that a 1% change in MPR, on the average, increased the manufacturing processing by about 0.04% during the study period. This did not conform to the theoretical prediction.

Meanwhile, the result showed that there was a negative relationship between prime lending rate and value-added manufacturing output, but it was found to be statistically insignificant in the long-run within the sample period. The evidence was shown by the negative interest rate coefficient value of -0.037820 and associated higher p-value of 0.5290. In conformity to the theoretical prediction, the above coefficient value of interest rate thus showed that a 1% increase in interest rate, on the average reduced value-added manufacturing output by 0.04% during the study period.

In furtherance, the coefficient of treasury bills rate operation was found to be negative and statistically insignificant in the long-run, as seen by the negative coefficient value of -0.011573 and associated higher p-value of 0.3885. This showed that a 1% change in contractionary open market operation, on the average, reduced the processing of manufacturing output by 0.012% within the period under investigation. Likewise, a 1% change in expansionary open market operation, on the average, increased the processing of manufacturing output by 0.012% within the period under review. These conformed to the theoretical prediction.

Meanwhile, for broad money supply, the result showed a negative relationship with value-added manufacturing output. Although the negative M2 coefficient value of -1.000781 was contrary to the theoretical predictions, the result was found to be statistically significant with a lower p-value of 0.003. The coefficient value showed that a 1% change in M2 on the average reduced the value-added manufacturing output by 1.0% on the long run.

The coefficient of manufacturing sector credit was found to be positive and statistically significant in the long-run, as seen by the positive coefficient value of 0.810215 and associated lower p-value of 0.0476. This showed that a 1% change in manufacturing sector credit, on the average, increased the manufacturing value-added by 0.81% within the period under investigation. This was in conformity with our earlier a priori expectation.

Hypothesis Testing

Table 5: Wald Test Result for Null hypothesis: Monetary policy variables have no significant effect on Value-added manufacturing output in Nigeria.

Test Statistic	Value	Df	Probability
F-statistic	3.019462	(13, 11)	0.0373
Chi-square	39.25301	13	0.0002

Source: Researcher's Computation using Eviews-10.0 (2020)

The Wald test result in Table 5 above the F-statistic coefficient value of 3.02 and p-value of 0.0373 (less than 0.05).This implies the rejection of null hypothesis; meaning thatmonetary policy has a significant impact on value-added manufacturing output in Nigeria.

Post Estimation Tests

The value-added manufacturing output model was subjected to thorough diagnostic tests to ascertain the appropriateness and stability of the model as well as the robustness of the results. According to Davidson & Mackinnon (1999), the specification of every econometric model should be subjected to thorough tests before we even accept its results. The model was tested for normality, serial correlation and heteroscedasticity. Diagnostic checks are performed in order to validate the estimated parameters and appropriateness of model selection. The model is made inefficient and the estimated parameters biased, if any problem is recorded in the residuals. This post estimated test is based on these null hypotheses: there is normality for the Jarque-Bera test; there exists no serial correlation in the model and there is no heteroscedasticity for the Breusch-Pagan-Godfrey heteroscedasticity test. The post estimated test results presented in Table 6 assists in checking for normality, serial correlation, and heteroscedasticity.

Table 6: Residual Test Result of Monetary Policy and Value-added Manufacturing Output in Nigeria

Tests		Outcomes	
		Coefficient	**Probability**
Normality Test	Jarque-Bera	0.216269	0.5949
Breusch-Godfrey-Serial-Correlation Test	F-stat.	0.550544	0.2433
	OR^2	3.706235	0.1567
Heteroscedasticity-Breusch-Pagan-Godfrey Test	F-stat.	0.783325	0.7000
	OR^2	20.75317	0.5360

Source: Researcher's Computation, 2020 (Eviews-10)

The diagnostic test result of monetary policy and value-added manufacturing output model presented in Table 6 showed that there were no evidences of serial correlation and heteroskedasticity in the estimated ARDL-ECM model as the p-values of both 0.2433 and 0.7000 were found to be greater than 0.05 or 5%. The Jarque-bera test for normal distribution also revealed that the result attained a normal distribution with a bell-shaped symmetrical distribution at 5% level of significance. The evidence of this was shown by the probability value of 0.5949, which is found to be greater than 0.05.

Discussion of Findings

In Table 3, the one period ECT (-1) value of -0.681817, which was found to be correctly signed and highly significant at 1 % showed that, once there is disequilibrium in the value-added manufacturing as a result of monetary policy shock, it takes an average speed of 68% to adjust itself back to equilibrium from short-run to the long-run. Nevertheless, the value of 0.694824 Adjusted R-squared was a sign of goodness of fit of the model. It showed that 69% variation in the value-added manufacturing output was explained by monetary policy variables, while 31 % was captured by the error term. Interestingly, in the short run, all other monetary policy variables, except broad money supply depict negative impact on manufacturing value addition in Nigeria within the period under investigation. This implies that in the short run, broad money supply impacts positively on value-added manufacturing output in Nigeria. It was observed that prime lending rate maintains a negative relationship with value-added manufacturing output. Implicitly, a lower level of interest rate paid on loans to manufacturing sector increased value-added manufacturing output significantly and vice versa.

Added to the above, as depicted in Table 3, the long-run effects of all the monetary policy variables captured, except for prime lending rate and open market operation on value-added manufacturing output were significant during the sample period. Prime lending rate exerted a negative effect on value-added manufacturing, but the result was found with a higher p-value of 0.53 and thus, insignificant. The coefficient of open market operation was found to be negative and statistically insignificant in the long-run, as seen by the negative coefficient value of -0.011573 and associated higher p-value of 0.3885. This showed that a 1% change in contractionary or expansionary open market operation, on the average, reduced or increased the processing of manufacturing output by 0.012% respectively within the period under investigation. This conformed to the theoretical prediction. Although the negative M2 coefficient value of -1.000781 was contrary to the theoretical predictions, it was found to be statistically significant with a lower p-value of 0.003. This was a reflection that a 1% change in M2 on the average reduced the value-added manufacturing output by 1.0% in the long run within the sample period. Meanwhile, the

long-run effects of MPR and MSC on value-added manufacturing output were positive and significant with coefficient values of 0.039 and 0.810 during the sample period. This implicitly revealed that a 1% increase in MPR, on the average, increased value-added manufacturing by 0.04%. This failed to conform to the theoretical prediction during the study period. However, that of MSC showed that a 1% change in this variable increased manufacturing value addition by 0.81%, conforming to the theoretical prediction. This is a reflection of poor manufacturing value addition witnessed in the Nigerian economy over three decades, averaging only about 10%. Ezeaku et al, (2018) also corroborated this view, when they opined that the impact of manufacturing subsector on the economy fell consistently, without meaningful recovery, as a result of overdependence on crude oil and natural gas.

CONCLUSION AND POLICY RECOMMENDATIONS

Although finding revealed that monetary policy has a significant effect on value-added manufacturing output in Nigeria, the performance was generally low.The evidence was a reflection of poor manufacturing value-addition, over the last three decades, which was averagely 10.44% all time highest in 1983, with attending lowest value of 2.41% in 2008.

It can also be concluded from the empirical results, so far that open market operation (OMO), measured by Treasury bills rate (TBR) is not a significant driver of manufacturing output in Nigeria. Also, the negative long run sign of broad money supply (M2) is a reflection of excess money supply, which leads to inflation, reducing productivity in the manufacturing sector. This is a confirmation that the amount of money supply during the period under review was over and above the level of total output in the economy. Interestingly, in the short run, only broad money supply (M2), among the monetary policy variables significantly impacts on value-added manufacturing output positively. There is the need for steady adoption of well-structured and manageable flow of money supply that could boost manufacturing output both in the short-run and long-run. Also, there is need to regulate the supply of money that allows a stable relationship between the quantity of money supply and economic activity and that its supply be limited to what is required for productive activities in the manufacturing sector. However, manufacturing sector credit (MSC) exerts superiority over other monetary policy instruments, with a higher and significant positive coefficient value. By implications, there is a pointer to the need to facilitate a favourable investment climate through appropriate monetary policy tool like manufacturing sector credit which represents more accurately the role of financial intermediaries in channeling fund to manufacturers and investors in productive sector.

The major findings from this work necessitate the provisions of a set of policy recommendations that are impactful, implementable and applicable to the Nigerian economy.

The paper recommends policy interventions such as well managed and single-digit benchmark interest rate for manufacturers to attract increased investments in the sector and deliver greater output to manufacturing sector.

The paper further recommends the sustainability of unconventional monetary policy interventions such as entrepreneurship development activities (EDA), small and medium enterprises credit guarantee scheme (SMECGS) and SME restructuring/refinancing fund (RRF). Essentially, all these should be tailored towards enhanced value-addition to the manufacturing sector.

REFERENCES

Adegoke, I.A., Victor, U.O. & Olatunji, A.S. (2015). Monetary policy towards inclusive growth in Nigeria. *The Nigerian Journal of Economic and Social Studies 57(2),* 313-337.

Agba, A. V. (2004): Long term funding options for manufacturing industries in Nigeria. Being a paper presented at 45th Annual conference of the Nigerian Economic Society (NES),Abuja.

Ajisafe, R.A. and B. Folorunso, (2002). The relative effectiveness of fiscal and monetary policy in macroeconomic management in Nigeria. *The African Economic and Business Review, 3(1):23-40.*

Busari,D., Omoke, P. & Adesoye, B. (2002). Monetary policy and macroeconomic stabilization under Alternative exchange rate regime: evidence from Nigeria.*Nigerian Economic Society, Ibadan, 521-551*

Central Bank of Nigeria (2015). *Monetary policy department, statistical bulletin*: 26, December 2015.

Central Bank of Nigeria (2017). *Accessed on November 22, 2017 on stefanie.moya@tradingeconomics.com.*

Charles-Anyaogu, N. B. (2012). Investigating the performance of monetary policy on manufacturing sector in Nigeria. *Arabian Journal of Business and Management Review, 2(1)*, 12-25.

Chete, L.N., Adeoti, J.O., Adeynika, F.M. & Ogundele, O. (2013). Industrial development and growth in Nigeria: Lessons and Challenges. *A Brookings Institution: L2C Working Paper 8.*

Davidson, R., & MacKinnon J. G. (1999). The size distortion of bootstrap tests. New York: McGraw-Hill Companies.

Dornbusch, R. (1976). Expectations and exchange rate dynamics. *Journal of Political Economy*, 84, 1161- 1176.

Ezeaku, H. C., Ibe, I. G., Ugwuanyi, U. B., Modebe, N. J. & Agbaeze, E. K. (2018). Monetary policy transmission and industrial sector growth: Empirical evidence from Nigeria. *SAGE Open, April-June,* 1–12.

Hamilton, J.D. (1994). *Time series analysis*. New Jersey: Princeton University Press.

Igbinedion, S. O. & Ogbeide, F. (2016). Monetary policy and manufacturing capacity utilization: Further evidence from Nigeria. *South-Eastern Europe Journal of Economics*, *2*, 159–174.

Khabo, V. S. (2002). The impact of monetary policy of the economic growth of a small and open economy: The case of South Africa, Department of Economics, University of Pretoria.

National Bureau of Statistics (2016). Nigeria manufacturing summary report: 2014-2016, 14th October

Omini, E. E, Ogbeba, E.P, & Okoi, O. (2017). Monetary policy shocks and industrial output in Nigeria. *British Journal of Economics, Management & Trade Article no. BJT.30459*, *16* (2), 1–13.

Osakwe, A. ., Ibenta, S. N. ., & Ezeabasili, V. N. (2019). Monetary policy and the performance of the manufacturing sector in Nigeria (1986-2017). *International Journal of Academic Research in Business and Socal Sciences*, *9*(2), 399–413.

Osmond N.O., Egbulonu K.G. & Emerenini F.M. (2015). Monetary policy and the manufacturing sector in Nigeria. *SSRG International Journal of Economics and Management Studies (SSRG-IJEMS) – 2 (1),* 17-25.

Owolabi, A.U. & Adegbite, T.A. (2014) Impact of monetary policy on industrial growth in Nigeria. *International Journal of Academic Research in Business and Social Sciences,4(1),* 18-31.

Pesaran, M.H., & Shin, Y. (1999). An autoregressive distributed-lag modelling approach to cointegration analysis. In econometrics and economic theory in the 20th century. The ragnarfrish centennial symposium, ed. strom. Cambridge: Cambridge University Press.

Pesaran, M.H., Shin, Y., & Smith, R. J. (2001). Bounds testing approach to the analysis of level relationships. *Journal of Applied Econometrics,* 16(2001), 289-326.

Udeala, S. (2002). Manufacturers and the new interest rate regime. *www.economicconfidential.com Browsed and retrieved on 20th June, 2017.*

World Bank National Accounts Data, (2018). Https://data.worldbank.org/indicator/NV.IND.MANF.ZS.