

**MODELING POLICY OPTIONS: AN IMPERATIVE FOR MONETARY CREDIBILITY IN NIGERIA**

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**ABSTRACT**

*The work modeled policy options (MPOs) vis-à-vis monetary and fiscal policies (MFPs) against monetary credibility covering 26 years spanning 1990 to 2019. Central Bank of Nigeria (CBN) Statistical Bulletin (2019) was the origin of data. Meanwhile, the sourced data was regressed using Econometric Views version 9.0. The study employed Auto Regressive Distributed Lag (ARDL). Methodology having subjected the work through unit root test, Akaike Information Criteria, ARDL bound test for cointegration) and diagnostic tests (Heteroskedasticity test, Breusch-Godfrey Serial Correlation LM Test, and Normality test). The ARDL Cointegrating and Long run result affirmed model fitness for prediction. Specifically, all economic policies except monetary policy (MP) rates exerted direct effect on monetary credibility. Public expenditure and monetary policy rate passed the test of statistical significant. Hence, it concluded that both public expenditure and monetary policy rate are instrumental to monetary credibility attainment though other economic policies like tax revenue, trade policies should not be undermined. In sustaining monetary credibility, government must ensure that her expenditures are more of developmental projects. Meanwhile, the Nigerian monetary authority must ensure that the current MP rate is reduced. Lastly, the current tax revenue, monetization ratio (broad money supply/GDP) and trade policies must be improved upon for improved monetary credibility.*

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**Introduction**

The high rate of inflation in Nigeria has attracted so much attention within political phase, academy including general public. A leading challenge confronting the economy is inability to establishing low inflation as many other developing countries are enjoying presently (Muhammad, and Sahibzada, (2017). However the disputation

over substantiated and implementable monetary policies is at the public domain.

Adekunle, Alalade, and Okulenu (2016) stressed the ability to comprehend the possibility of institutional reforms for credibility and commitment to price firmness. The work focuses attention on option reforms presently under debate which include creation of monetary union

with nearby countries, thereby by providing maximum strength to control national currency and the independence of CBN. Furthermore, in disparity to most literature body, the work has model that encompasses some hazards from high inflation rates while facilitating output. Hence the aimed is to clarify how particular policies attempts to redress to the problems inherent in monetary credibility, (Gatawa, Akinola, and Muftau, (2017). Although, available options can yield substantiated credibility results, the investigation pinpoints the implication of violating on fiscal discipline.

Precise structural fiscal reforms which enable the enhancement of expenditure efficiency by warding off operations of government finance and monetary policy ushers considerable credible results. Few years past, government deliberate improvement in monetary corporation with nearby countries remains paramount object of model policies maintained by government. While section 1 has the introduction, section 2 houses the literature. Section 3 has methodology and model specifications. Section 4 holds data presentation and analyses. Section 5 concludes the work with policy recommendations.

### **Conceptual Issues, Theoretical Underpinning and Empirical Investigation Modeling Policy Options (MPOs)**

MPOs can be characterized as empirical studies or scholars' researched works generally backed by utilization of several theories which comprise of either qualitative or quantitative techniques and models for analyzing and evaluating both cause and consequence of MPOs on any social group (Cornwall, (2019). According to Michael (2020) MPOs involve problem solving method proposed technically and

instrumentally, or theoretically for societies across the globe in different particular time.

Aguh, Okwor, Ugwuntaa, and Idikeh (2015) classified modeling policy into: "labor, population policy modeling; global trade policy modeling; and negotiation policy modeling; public disbursement, fiscal and sundry policy modeling; energy, economic maturation and sustainable development policy modeling; technological and R&D policy modeling; production and consumption policy modeling; earth and monetary policy modeling; welfare and social policy modeling; etc".

Obiora, and Nkechukwu, (2018) posited that despite the twelve classifications of modeling and vast approval of various modelling measures in output, there still exist various differences concerning the import of functions of different policies. Monetarists' approach in facilitating various macro-economic activities is built upon the unexpected upsurge within pool of cash. Again; there exist some contemplation on fiscal policy as less inefficient arising from crowding out effect.

Omodero, Ihendinihi, Ekwe, and Azubuike, (2016) noted that monetary and the fiscal policies (MFPs) are highest MPOs discussed in Nigeria. However, Keynesian has succeeded in recommending FP as a way out for MP's numerous weaknesses during liquidity trap.

### **Fiscal Policy (FP) in Nigeria**

The concept of FP describes government's ability to manage their economy by influencing of receipts and expenditure power for attainment of targeted economics goals (Abdurrauf, (2015). In a similar way, Mlachila (2018) said FP is a method adopted by national government in managing her economy thorough receipts and expenditure

supervision in other to attain a desired economic result. Nonetheless, the Nigeria's CBN (2011) declares FP as the deliberate control of the economy utilization and management of government expenditure and tax revenues. National FP activities is carried out and supervised by CBN, parastatals, agencies and ministries backup with legislation. Furthermore, FP depended on oil incomes since 70s. Nigeria gained her independence on October 1, 1960 and before this time, colonial governance managed her FP. Following the oil windfall, it became the major revenue spinner for governance promoting to weak tax from other sector of revenue. Since this shift from agricultural receipts to oil, FP has been managed with fluctuations in global market.

### **Monetary policy (MP) in Nigeria**

MP modulates money supply (MS) via merchandising government securities, adjustment of banks reserve interest rate, foreign exchange, etc; (Osakwee Ibentah and Ezeabasili (2019). Accommodative MP in promoting economic activities and engineer economic growth, tends to reduce cost of capital in other to attain its goals of high output; however we termed MP as being neutral when it does not target high output or deflating inflation.

According to Ebikila, Agada, Lucky, and Matthew (2018) contractionary MP exists when MS is deliberately reduced with or without increased cost of capital via MP instruments. Expansionary MP guarantees increased MS.

### **Monetary Policy Credibility (MPC)**

Furthermore the term MPC is a vital tool for MP cogency as CBN sets out its activities in its vital policy objectives at reducing inflation and maintaining high output. However MPC we can deduced from a standpoint of its non-visual in practice.

Scholars and professional forecasters noted that measure best suit for MPC is the discrepancy rate (Osakwee , Ibentah and Ezeabasili, 2019).

Sensed CBN independence rate, MP transparency and accurate economic predictability influences inflation. For money to be credible there must be less anxiety encircling both MP tools and their objectives. Measures considered to dictate the increase of MPC are: cost of capital, observing inflation at target range, exchange rates, and high output.

### **Theoretical Underpinning.**

Here, we anchor on FP as propounded by Savers-Spenders Theory (SST) and the endogenous growth theory. Mankiw (2000) formulated the SST of FP but employed by Matsen, Sveen and Torvik in 2008. The Barro-Ramsey's 1974 infinitely-lived families and Diamond Samuelson's 1965 overlapping generation had some inconsistencies birthing SST developed to justify the behaviour of FP. Firstly, SST offers transitory tax alterations with sizeable consequence on demand for tangible products and services. Thus, spenders' lifetime aids are for keeps spent while extra take-home pay is expected to meet the upwardly tax liability.

Furthermore, Odimgbe and Ezeabalisi, (2018) states possibility of output growth only if economic policies are targeted towards the practical application of resources, technological advancement. Hence, for output to attain high monetary credibility, the need is for government agencies' guarantee for economic policies were not regressive instead proactive.

### **Empirical Review**

Ogugua (2021) investigated MP instruments on manufacturing sector output. Analyzed outcome shows shows MP

rate as positively significant to manufacturing sector. Osakwee, Ibentah and Ezeabasili (2019) probed MP of the Manufacturing sector performance. Cash reserve requirement, MP rate, TBs rate and MS acted as “causal variables” while Manufacturing sector output was the “effect variable”. Findings shows MP devices have evidential effect on the manufacturing sector output in the short run.

Egbulonu and Ukwuoma, (2018) inquired MP effect on manufacturing sector output (1980-2016). Variables considered include Manufacturing sector’s output against capital cost, MS, and Exchange rate as “causal variables”. ADLM was employed. Findings show MS has an affirmative and evidential effect on manufacturing output in the short and long run.

Ebikila, Agada, Lucky, and Matthew (2018) studied the effect of MS on macroeconomic variables in Nigeria (1985 to 2016). Results showed narrow MS had an affirmative and evidential effect on savings and PCI. Conversely, broad MS has no evidential effect on savings and real gross domestic per capita income.

Lawrence, Odimgbe and Ezeabalisi, (2018) looked into the effect of MP on output in Nigeria. Proxies employed were investments, MS, MP rate, lending rate and exchange rate. Results showed long run link among variables.

Mlachill (2018) analyzed MPC and exchange rate in South Africa. Standard deviation of individual inflation forecast was used as a proxy of MPC. Results unveiled were negatively affected by inflation rate and its volatility and MP uncertainty.

Khaysy and Gang, (2017) investigated the impact of MP on economic development: Evidence from Lao PDR: The

study employs the Ex-post-facto research approach through quantitative panel methodology. The findings of the study disclose that optimizing firms’ earnings necessitate striking the best liquidity-profitability trade-offs, otherwise firms protecting inadequate liquid assets may be compelled to obtain from superficial references at excessive costs. Omodero, Ihendinihi, Ekwe and Azubuike (2016) examined the impact of FP on the economy of Nigeria between 1994 and 2014. Findings shows no evidential relationship among recurrent expenditure, capital expenditure, tax revenue and the real GDP.

## **Research Methodology**

### **Research Design and Data Sources**

Based on the nature of the study, we adopted the ex post facto research design. This is justified on the ground that this form of research design is most amenable for already existing data. Specifically, our target population covered economic policies in Nigeria. The regressor is economic policies measured by MPs (broad money supply and monetary policy rate), FPs (tax revenue and government expenditure), and trade policy (degree of trade openness) while the regressed is monetary credibility (Standard deviation of inflation rate) from 1990 to 2019.

### **Data Techniques and Model Specification**

The Autoregressive Distributed Lag (ARDL) Model served as the most feasible technique for this study. Prequel to the regression result proper, the model was subjected to descriptive statistics, unit root test, and ARDL Bound integration test using the Econometric Views Version 9.0. Our model in the ARDL form is stated below:

$$\Delta \log \text{MOCD}_t = \alpha_0 + \alpha_1 \Delta \log \text{MOCD}_{t-1} + \sum_{i=0}^m (\Delta \text{GOEX}_{t-1}) + \sum_{j=0}^n (X_j \Delta \log \text{TARE}_{t-j}) + \sum_{k=0}^p (\partial k \Delta \log \text{BMOS}_{t-k}) + \sum_{k=0}^q (\partial k \Delta \ln \text{MPR}_{t-k}) + \sum_{k=0}^q (\partial k \Delta \ln \text{TROP}_{t-k}) \Omega \text{ECT}_{t-1} + \xi_t$$

**Where:**

- MOCD = Monetary Credibility (Standard deviation of inflation rate)
- GOEX = Government Expenditure
- TARE = Tax Revenue (Oil and Non-oil Sources)
- TROP = Trade Openness
- BMOS = Broad Money Supply
- MPR = Monetary Policy Rate
- $\beta_0$  = Intercept
- $\beta_1$ - $\beta_5$  = Parameter Estimates
- ECT = Stochastic variable/error term.

**Apriori Expectation**

It was expected that MPs (broad money supply), FPs (tax revenue and government expenditure), and trade policy (degree of trade openness) give an

affirmative effect on MPC while and MPrate could give an invalidating effect on MPC.

**Results and Discussions**

**Data Analysis- Pre-estimation Tests**

Basically, macroeconomic aggregates may sometime exhibit some forms of non-stationary which most likely will generate spurious result if not tested to ascertain whether or not it is Stationary. In like manner, there is also need to ascertain if the model exhibit long run relationships or not. In this wise, we subjected our model to pre-tests. We began first with descriptive statistics, unit root test for Stationarity, then Akaike Information Criteria for testing the best order that fit the model, ARDL bound test for cointegration. Each of the results and summarized and discussed as follows:

**Table 1: Summary of Descriptive Statistics**

	MOCD	GOEX	TARE	BMS	MPR	TROP
Mean	1.760192	3077.930	5161.135	9853.663	12.94231	50.59846
Median	-0.581500	3056.176	5581.950	4462.655	13.50000	54.32000
Maximum	43.56700	7540.321	11116.85	34251.70	20.50000	81.81000
Minimum	-15.80400	110.4610	201.9108	230.2926	6.000000	20.72000
Std. Dev.	10.87272	2327.037	3719.862	10769.63	3.100248	19.10933
<b>Observations</b>	<b>26</b>	<b>26</b>	<b>26</b>	<b>26</b>	<b>26</b>	<b>26</b>

**Source: Econometric Views version (2021)**

Table 1 above reported that monetary credibility denoted by MOCD had an average value of 1.760192 and high standard deviation value of 10.87272. This means that MOCD deviate far away from its mean. Comparably, government revenue (GOEX), tax revenue (TARE), broad money supply (BMOS), monetary policy rate (MPR), and trade openness (TROP) had an average value of 3077.930, 5161.135, 9853.663,

12.94231, and 50.59846. Meanwhile, those variables reported a low standard deviation values. This means that they did not deviate much away from their mean value.

Furthermore, broad MS reported the highest maximum value while MP rate reported the lowest maximum value. Meanwhile, tax revenue (TARE) highest minimum value (201.9108) while MPC

reported the lowest minimum value (- 15.80400)

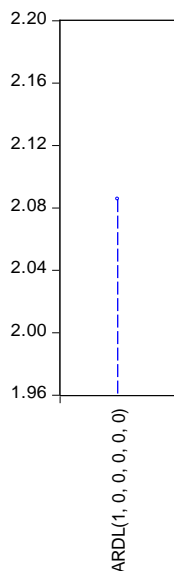
**Table 2: Summary of Unit Root Test**

Target Variables					Decision
Monetary Credibility	-4.812329	-2.986225	1(0)	0.0008	Stationarity
Government Expenditure	-3.611496	-2.991878	1(1)	0.0133	
Broad Money Supply	-3.489949	-2.991878	1(1)	0.0174	
Tax Revenue	-3.375225	-2.991878	1(1)	0.0224	
Monetary Policy Rate	-6.991077	-2.991878	1(1)	0.0000	
Trade Openness	-4.915108	-2.991878	1(1)	0.0006	

Source: Econometric Views version (2021)

**Figure 1: Akaike Information Criteria**

Akaike Information Criteria



Source: Econometric Views version (2021)

The Akaike Information Criteria clearly revealed that the model supports the ARDL (1,0,0,0,0,0). Hence, we proceeded to

the ARDL Bound Test as stated in table 3 below:

Table 3: ARDL Bounds Test		
Date: 07/19/21 Time: 07:53		
Sample: 2 26		
Included observations: 25		
Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	5.288479	5
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
5%	2.62	3.79

Source: Econometric Views version (2021)

Table 3 accounted for the ARDL Bound cointegration test. The result reported a F-statistic value of 5.288479 and critical Value Upper (11) Bounds of 3.79. Since the F-statistic value is higher than the Critical Value Upper (11) Bounds, we conclude that economic policies on MPC.

### Regression Result

Before proceeding to the regression result, the model was subjected to litmus test (diagnostic test). Each of the diagnostic tests results are presented below:

**Table 4: Heteroskedasticity Test: Breusch-Pagan-Godfrey**

F-statistic	2.323842	Prob. F(6,18)	0.0774
Obs*R-squared	10.91243	Prob. Chi-Square(6)	0.0911
Scaled explained SS	6.400372	Prob. Chi-Square(6)	0.3799

### Source: Econometric Views version (2021)

The Heteroskedastic test (Breusch-Pagan-Godfrey) in table 4 above reported that the p-values of the F-statistics, Obs\*R-squared, and Scaled Explained SS were

greater than 5%. This implies that the model is Homoskedastic (i.e. the model satisfies the classical assumption of equal mean and equal variance).

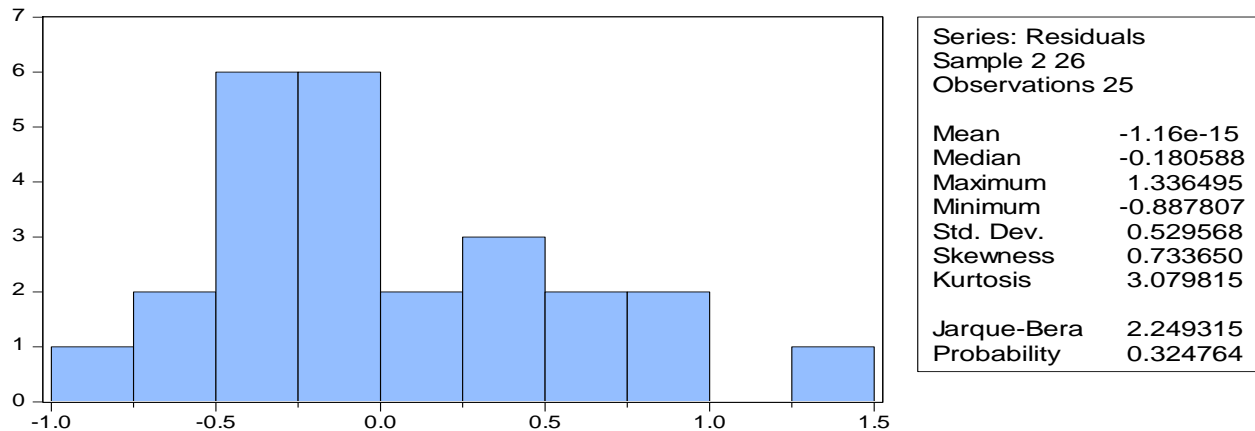
**Table 4: Breusch-Godfrey Serial Correlation LM Test:**

F-statistic	2.076054	Prob. F(1,17)	0.1678
Obs*R-squared	2.720759	Prob. Chi-Square(1)	0.0991

### Source: Econometric Views version (2021)

The Breusch-Godfrey Serial Correlation LM Test in table 5 above reported that the p-values of the F-statistics, Obs\*R-squared were greater than 5%. This

implies that the model is not serially correlated (i.e. the model satisfies the classical assumption of no serial correlation).

**Figure 1: Normality Test**

**Source: Econometric Views version (2021)**

The normality test in figure 1 above reported a Jarque Bera p-value of 0.324764. This means that the model is normally distributed. This means that the model was able to satisfy the classical assumption of OLS in favour of normality of the series.

It is on the above premise; we proceed to the regression result proper. The summarized ARDL Cointegrating and Long run results are presented in table 5 below

**Table 5: ARDL Cointegrating and Long Run Results**

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GOEX)	11.755453	0.641404	18.327696	0.0000
D(TARE)	0.117761	0.231329	0.509062	0.6169
D(BMS)	0.061193	0.432114	0.141614	0.8890
D(MPR)	-0.000314	0.000124	-2.528426	0.0210
D(TROP)	0.590068	0.768179	0.768138	0.4524
CointEq(-1)	-0.532521	0.221879	-2.400056	0.0281
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
GOEX	10.663603	0.491417	21.699691	0.0000
TARE	0.106823	0.209631	0.509578	0.6165
BMS	0.055510	0.392272	0.141508	0.8890
MPR	-0.000285	0.000107	-2.670024	0.0156
TROP	0.535262	0.691072	0.774539	0.4487
C	-18.183060	2.749140	-6.614091	0.0000
R-squared	0.971952	Mean dependent var		12.92000
Adjusted R-squared	0.962602	S.D. dependent var		3.162047
S.E. of regression	0.611493	Akaike info criterion		2.085668
Sum squared resid	6.730619	Schwarz criterion		2.426954
Log likelihood	-19.07085	Hannan-Quinn criter.		2.180326
F-statistic	103.9582	Durbin-Watson stat		1.517548
Prob.(F-statistic)	0.000000			

**Source: Econometric Views version (2021)**



From the model summary, four (4) major estimates were discussed which are coefficient of determination ( $R^2$ ), adjusted  $R^2$ , Durbin Watson Statistics, and F-statistics. All indication revealed that both the coefficient of determination ( $R^2$ ) and adjusted  $R^2$  reported that the model had a high explanatory power. This is because 0.971952 and 0.962602 respectively signpost that the regressors were able to account for 97% and 96% variation in the regressed only about 3% and 4% were accounted for by the error term. Meanwhile, the Durbin Watson test result of 1.517548 implies that though the model is within the first order of serial correlation but the result is still within the tolerable state.

Hence, there is need to test for serial correlation. Moreover, the significance F-value above is estimated at 0.0000. This indicates that the model is fit for prediction since it falls below the 5% generally acceptable level of significance. Hence, we conclude that, economic policy instruments have high statistical evidential effect on MPC. In addition, the Cointegrating equation is found to both be invalidating and statistically evidential (-0.532521). This indicates that the variables converge after short run disequilibrium. This further indicates that 53.25% of past deviation is corrected in the current period.

The ARDL Cointegrating and long run result reported that among all the economic policies cited in this study, only government expenditure and MP rate passed the test of statistical significance in the short and long run. This is because in both instance their p-values were less than 5%. This revealed that both government expenditure and MP rate are instrumental to MPC. This further revealed that for the Nigerian monetary authority to think towards MPC, there is

need for her monetary policy vis-à-vis monetary policy rate to be reduced while government expenditure for developmental purposes must be encouraged. In a crux, it is no doubt that the study supported a goal oriented expansionary MP strands.

Furthermore, the ARDL Cointegrating and long run result reaffirmed that though tax revenue (oil and non-oil sources), broad MS, and trade openness were positive related to monetary credibility but they exhibited non-statistical evidential effect on MPC over the studied periods. This is evidenced based on their coefficient alongside their p-values. For instance, on the short run, broad money supply, tax revenue (oil and non-oil sources), and trade openness reported coefficient values of 0.117761, 0.061193, and 0.590068 while on the long run the parameters reported coefficient values of 0.106823, 0.055510, and 0.535262. More so, all their p-values were greater than 5% in both short and long run.

This further revealed that at the moment tax revenue (oil and non-oil sources), broad MS, and trade openness contributed minimally to MPC in Nigeria over the studied periods. This result is in support of the Osakwe, Ibenta and Ezeabasili (2019); Egbulonu and Ukwuoma, (2018); Omodero, Ihendinihi, Ekwe and Azubuike (2016); Abdurrauf (2015) but deviated from Ogugua (2021); Mlachill (2018); Lawrence, Odimgbe and Ezeabalisi (2018).

### **Conclusions and Recommendation**

This study modeled economic policy instruments vis-à-vis policies (broad MS and MP rate), FPs (tax revenue and government expenditure), and trade policy (degree of trade openness) against MPC (Standard deviation of inflation rate) covering a study

period of 26 years spanning from 1990 to 2019. Data for the study was sourced from the Central Bank of Nigeria Statistical Bulletin (2019). The study used the ARDL Methodology having subjected the model to pre-estimation tests (unit root test, Akaike Information Criteria, ARDL bound test for cointegration) and diagnostic tests such as Heteroskedasticity test, Breusch-Godfrey Serial Correlation LM Test, and Normality test.

The ARDL Cointegrating and Long run result reaffirmed that the model is fit for prediction. Specifically, all economic policies except monetary policy rates exerted direct impact on monetary credibility. However, only public expenditure and MP rate passed the test of statistical significant both in the short and long run. Hence, we concluded that at the moment tax revenue (oil and non-oil sources), broad money supply, and trade openness are minimal to the attainment of MPC in Nigeria. However, to this end, we recommend that:

1. The federal, state, and local government must ensure that most of public expenditures are used to finance developmental projects.
2. There is need to increase tax revenue in Nigeria since tax revenue has potential impact on MPC in Nigeria.
3. The current monetization ratio (broad money supply/GDP) should be sustained since broad MS has potential impact on MPC. Again, there is also need to re-orient both bank employees and customers on the dangers of contractions in the monetary transmission process.
4. The Nigerian monetary authority must ensure that the current MP rate should be reduced.

There is need to ensure that all trade barriers should be addressed since trade polices has potential effect on MPC.

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