

## **Full Length Research**

# **IMPACT OF MONETARY POLICY ON FISHERY FOR ECONOMIC GROWTH OF NIGERIA**

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**This study examined the impact of monetary policy on fishery growth in Nigeria economy. It adopted the error correction model (ECM) techniques to analyze the times series data. The result of the ECM confirms the existence of long-run equilibrium between the dependent and independent variables. Available information reveals policy instability and duplication of programs and projects under different policies. Analysis also shows fluctuation of fishery output over the years. The Augmented-Dickey Fuller (ADF) test indicates stationarity one-difference lagged length, except inflation rate. The study shows that long run relationship exists among the variables. The core finding of this study shows that money supply and interest rate are significant monetary policy instruments that drive the growth in Nigeria. It is consequently recommended that the Central Bank of Nigeria (CBN) should introduce more monetary instruments that are flexible enough to meet the ever-growing financial sector in order to attract both domestic and foreign investors; while more stringent punishment should be made for non-compliance to the monetary policies by financial institutions.**

**Keywords:** Economic growth, Error correction model, Co- integration.

## **INTRODUCTION**

Monetary policy includes a number of policies by which a country controls its money stock so as to achieve macroeconomic goals. It is a major economic stabilisation tool which involves measures designed to regulate and control the volume, cost, availability and direction of money and credit in an economy with the aim of achieving of achieving specific objectives (Anyanwu 1993). It involves all action taken by the monetary authorities to affect the

monetary base through influencing the availability and cost of credit in pursuance of sustainable growth of output and price stability (Iyoha and Oriakhi, 2002).

The primary objective of monetary policy is the achievement of price and exchange rate stability. The central focus is to effectively control anticipated liquidity injection that may arise from excessive government spending that may have negative impact on domestic prices of agricultural commodities, aggregate price and exchange rate. Some monetary policy issues introduced by CBN aimed at creating money to support investment in

agricultural production and stimulate economic growth include concessionary interest rate. Monetary policy also affects the general level of prices in the economy (i.e., the inflation rate). In the short run, an expansionary monetary policy generally causes farm commodity prices to increase more rapidly than input and nonfarm prices. Therefore, farmers may consider inflation to be beneficial in the short run due to higher farm commodity and land prices. However, in the long run, prices of other goods, including farm inputs, become more flexible and may increase more than farm prices. Attempts to reduce inflation through restrictive monetary policies will harm the agricultural sector because higher interest rates will result in higher costs of production, lower demand for agricultural inputs, a stronger-valued Nigeria naira, a reduction in export demand, and lower land prices. Therefore, a prolonged restrictive monetary policy stance by the Central Bank usually causes farm income to fall and increases cash flow instability.

Directly, agriculture comprises of a large part of the Nigeria economy while the fishery subsector accounted for just slightly more than 1.5% of the Nigeria gross national product (GNP) during the 2000s (Federal Department of Fisheries - FDF 2007). Policymakers usually change macroeconomic policies with little consideration of the impact on the agricultural economy, notwithstanding, its huge employment and export revenue generation or potential. However, both domestic and foreign macroeconomic policy changes can significantly affect the agriculture sector. Changes in monetary, fiscal, and trade policies affect the performance of the agricultural economy through their respective influences on input and output prices, land prices, and exchange rates.

The importance of fish as a source of protein and other essential nutrients required in the human diet cannot be over-emphasised so also is the potential contribution of a developed fisheries sub-sector of agriculture to overall development of the national economy. Fish is an important source of animal protein for many households. According to Food and Agricultural Organisation - FAO (2007), fish contribute more than 60% of the world supply of protein, especially in the developing countries. As a maritime nation with a vast population of over 170 million people and coastline measuring approximately 853 kilometers; fish production as an

enterprise possess the capacity to contribute significantly to the agricultural sector (Osagie, 2012). It has been estimated that the current effective yearly demand for fish in the country is in the region of 2.66 million metric tons as against the supply from all source of about 0.6354 million metric tons (FDF, 2010). The percentage of demand met by domestic supply was 23.9% in 2007. The demand and supply gap for fish protein in 2007 was partly augmented by importation of about 740,000 tons of frozen fish valid at 594.4 million U.S.A. Dollar (FDF 2007). The fisheries sectors provide more than one million employments to fishermen and giving livelihoods to 5.8 million fisher folk in the secondary sector.

Despite the myriads of information on the integral role of the fishery subsector to the nation's economy, there exist a dearth of empirical information on the linkage between monetary policy and fishery growth in Nigeria and its perspective for sustainable economic development with ought to form the basis for policy formulation towards enhancing the fishery subsection.

The objective of the study is to assess the impact of monetary policies in determining the performance level of fishery growth in Nigeria for the period 1963 to 2013.

## REVIEW OF RELATED LITERATURE

Monetary policy has been viewed as a combination of measures designed to regulate the value, supply, and cost of money in an economy in consonance with the expected level of economic activity to achieve some macroeconomic objectives such as price stability, full employment equilibrium, balance of payment position and rapid economic growth (Nnanna, 2001; Williams and Pasche, 2007).

Christopher (2006) contends that if inflation could be seen as too much money chasing few goods, then the theory of inflation, therefore implies that it can be controlled by monetary policy. Certainly, many schools of thought abound in the discussion of monetary theory. Monetary theory has undergone a vast and complex evolution since the study of the economic phenomenon first came to lime light. It has drawn the attention of many researchers with different views on the role and dimensions of money in the attainment of macro- economic objectives.

Classical theorist contends that money does not matter in the economy and therefore is merely a

veil. He opines that the economy tends towards full employment equilibrium, hence, general overproduction and general unemployment is impossible since supply creates its own demand.

The Keynesian school of thought suggests that money is exogenously determined by the central authority. This school assumes an economy under less than full employment equilibrium since according to it; the economy can never operate at full employment equilibrium. Therefore, we can only talk about the short –run period since in the long-run, we all must have been dead. The opportunity cost of holding money is bonds; hence, an increase in money supply creates excess supply of money which in turn leads to excess demand for bonds. Consequently, the price of bonds rises. A rise in the rate of interest has three effects; the wealth, the cost-of-capital and the credit rationing effects. One remarkable issue in this school of thought is that the weak cost of capital gives rise to the concept the 'liquidity Trap' where money ceases to matter in the economy. Here, the additional money supply would be trapped by the system and used as speculative balances. At this point, monetary policy ceases to be effective in controlling the level of inflation rather fiscal policy becomes the alternative measure that could be used to fine-tune the economy (Simon, 2002).

The monetarist essential quantity theorists consider five different forms in which wealth could be held, namely; money, bonds, equities, physical and non human goods and human capital or wealth. The demand for money therefore depends upon the relative rates of returns available on different competing assets in which wealth can be held.

The impact of monetary policy on growth has generated large volume of empirical studies with mixed findings using cross sectional, time series and panel data. Some of these studies are country-specific while others are cross-country. Few of the studies are selected for review as follows:

Onyeiwu (2012) examines the impact of monetary policy on the Nigerian economy using the Ordinary Least Squares Method (OLS) to analyse data between 1981 and 2008. The result of the analysis shows that monetary policy presented by money supply exerts a positive impact on GDP growth and Balance of Payment but negative impact on rate of inflation. Furthermore, the findings of the study support the money-prices-output hypothesis for Nigerian economy.

Amassoma et al., (2011) examined the effect of

monetary policy on macroeconomic variables in Nigeria for the period 1986 to 2009 by adopting a simplified Ordinary Least Squared technique found that that monetary policy had a significant effect on exchange rate and money supply while monetary policy was observed to have an insignificant influence on price instability.

Ajisafe and Folorunso (2002) examined the relative effectiveness of monetary and fiscal policy on economic activity in Nigeria using co-integration and error correction modelling techniques and annual series for the period 1970 to 1998. The study revealed that monetary rather than fiscal policy exerts a greater impact on economic activity in Nigeria and concluded that emphasis on fiscal action by the government has led to greater distortion in the Nigerian economy.

Hameed et al., (2012) presented a review on how the decisions of monetary authorities influence the macro variables like GDP, money supply, interest rates, exchange rates and inflation. It asserts that the foremost objective of monetary policy is to enhance the level of welfare of the masses and it is instrumental to price stability, economic growth, checking BOP deficits and lowering unemployment. The method of Ordinary Least Square (OLS) explained the relationship between the variables under study. Tight monetary policy in term of increase interest rate has significant negative impact on output. Money supply has strong positive impact on output that is positive inflation and output is negatively correlated. Exchange rate also has negative impact on output which is show from the values. The study recommended that central bank can best contribute to a nation's Economic health by eliminating the price uncertainties associated with inflation. Nwosa and Saibu (2011) investigated the transmission channels of monetary policy impulses on sectoral output growth in Nigeria for the period 1986 to 2009. Using quarterly data, the study showed that interest rate channel was most effective in transmitting monetary policy to Agriculture and Manufacturing sectors.

Chukuigwe and Abili (2008) analyze the impact of monetary and fiscal policies on non-oil exports in Nigeria from 1974 to 2003. Using Ordinary Least Squares estimation, the study revealed that both interest rate and exchange rate, being proxies for monetary policy, negatively affect non-oil exports. Budget deficits – proxy for fiscal policy also had a negative effect on non-oil exports. Based on the findings, the study recommended that there is need

to formulate a new strategy to address the identified challenges. This would be anchored on macroeconomic stability, export promotion, rationalization of the role of government, fortification of infrastructural facilities and stimulation of demand for goods and services since it would create an enabling investment climate.

Ehinomen and Akorah (2012) assessed the effectiveness of the monetary policies in promoting agricultural development in Nigeria over the period 1970 to 2010. Using the Ordinary Least Square (OLS) technique they showed that although CBN's monetary policies play crucial role in influencing the level of agricultural productivity in the country, it has not recorded significant progress in terms of providing enabling environment for better performance in the agricultural sector.

Hassan (2012) evaluated the long-run neutrality of money supply on agricultural prices; the effect of money supply on agricultural prices; and effect of key macroeconomic indicators on agricultural prices in Nigeria. Using the least square estimation technique they showed that money supply had significant impact on agricultural prices and that agricultural prices do not react more sensitively than aggregate price to changes in money supply. Money supply and exchange rate also accounts for 86.2% of variations in agricultural prices.

In summary, the overall findings of the works reviewed so far indicate that there is somehow a general consensus that there is a direct relationship between monetary policy and agricultural growth. However, while the robustness of most of the works reviewed could be widely acclaimed, it will be noteworthy that there are some flaws inherent in some others which could somehow hinder the robustness of their results and which this work is intended to correct.

## RESEARCH METHODOLOGY

The data analysis technique employed in this study involves the use of the Ordinary Least Square (OLS) regression technique. However, the estimation of the model specified may yield spurious regression if the variables are not stationary. Thus the unit root test using the Augmented Dickey Fuller test (ADF) were employed in order to check this problem. Also the Co - integration test was carried out so as to test for long run equilibrium relationship between the series of the same order of integration, however, an

Error correction Mechanism (ECM) was applied to enable us to link the long run and short run relationships involved.

Borrowing from Solow's growth theory, a mathematical form of our model would be built on a single equation model which would involve specifying a multiple regression equation to check the economic relationship between agricultural output as the dependent variable, with Fish production Gross Domestic Product (FP) as a proxy, and the independent variables which comprises of monetary policy variables (i.e. money supply, exchange rate, commercial loan to agriculture , inflation ) .

## Model Specification

The model adopted in this study is a general specification type drawing from the literature on monetary policy in Nigeria. Hence, the model is based on the assumption that changes in price level depend on growth in real income, money supply, and exchange rate. Other factors include growth in domestic credit and government expenditure. Thus:

$$FP_t = \beta_0 + \beta_1 M_2 + \beta_2 IR + \beta_3 Inf + \beta_4 CLA + \beta_5 ER + \varepsilon_t \quad (1)$$

Where; FP refers to fish production;  $M_2$  is money supply; IR is interest rate; Inf is inflation rate; ER is exchange rate; CLA is commercial loan to agriculture ;  $\varepsilon$  is the Error term. A priori expectations are determined by the principles of economic theory and refer to sign and size of the parameters of economic relationship.

Then  $\delta fp / \delta M_2 > 0$ ;  $\delta fp / \delta IR < 0$ ;  $\delta fp / \delta Inf < 0$ ;  $\delta fp / \delta ER < 0$ ;  $\delta fp / \delta CLA > 0$ .

## DATA ANALYSIS

The summary of statistics used in this empirical study in Table 1. As may be observed from the table, IR has the lowest mean value of 15.75745 and the mean of money supply ( $M_2$ ) has the highest value of 998,342.4 whereas, the mean value of FP, CLA inflation (Inf) and exchange rate (ER) are 3110.12, 21,712.83 (in millions), 15.75745, and 33.82812 respectively. The skewness is a measure of the symmetry of the histogram while the kurtosis is a measure of the tail shape of the histogram. The rule for symmetrical distribution i.e. for the skewness is how close the variable is to zero. You will find out that FP and IR are the variable close to zero. FP is

**Table 1.** Descriptive statistics.

|             | FP       | M2       | INF      | CLA      | IR       | ER       |
|-------------|----------|----------|----------|----------|----------|----------|
| MEAN        | 3110.12  | 998342.4 | 16.8529  | 21712.83 | 15.75745 | 33.82812 |
| MEDIAN      | 2767.8   | 22299.24 | 11.6     | 1310.2   | 12       | 0.8938   |
| MAXIMUM     | 10395.6  | 11034941 | 72.8     | 149578.9 | 36.09    | 150      |
| MINIMUM     | 44       | 267.6    | 0.3      | 3.7      | 6        | 0.5464   |
| STD DEV     | 2998.969 | 2394842  | 17.2003  | 37572.63 | 7.554338 | 53.22064 |
| SKEWNESS    | 0.780376 | 2.985463 | 1.595714 | 2.081298 | 0.63552  | 1.268429 |
| KURTOSIS    | 2.594479 | 11.22924 | 4.74831  | 6.742553 | 2.46578  | 2.788336 |
| JARQUE-BERA | 5.525837 | 219.661  | 28.1388  | 66.58454 | 4.042219 | 13.77095 |
| PROB        | 0.063107 | 0        | 0.00001  | 0        | 0.132508 | 0.001023 |
| OBSERVATION | 51       | 51       | 51       | 51       | 51       | 51       |

positively skewed, platykurtic and probability value (0.06) of its Jarque Bera Statistic (5.5) denotes that its errors are normally distributed. MS is positively skewed, platykurtic and probability value (0.0) of its Jarque Bera Statistic (219. 6) denotes that its errors are normally distributed.

There is need to know the status of the variables used in the study. The unit root test is carried out to know if the data of variables are stationary with respect to time.

From the Table 2 below, the dependent variable (log FP) and the independent variables, log M2, log (CLA), log (IR) and log(ER) are stationary at first difference. That is the absolute ADF statistics value of all the variables is greater than the Mackinnon critical value at 5%. This means all the variables are integrated of order 0 and 1.

From the Table 3 below shows the result of the ADF test equation on each of the variables with their different levels of their stationary and lagged period. Also shown is their corresponding coefficient of multiple determinations.

### Co- Integration Test

In determining the number of co integrating vectors, trace test statistics was used on testing whether a long run relationship exists among the variables. The assumption of no deterministic trend and restricted constant was for all the variables. The result for trace statistic or likelihood ratio and critical value for co-integration test and presented in Table 3. The co-integration equation is specified as follows:  $FP = -0.534544Ms + 76.73356 CLA - 14373.83INF + 7715.960 IR - 29368.32ER$  (28.6770) (4032.60) (755391) (413430) (1542184)

NOTE: Standard Error statistics are in parenthesis. From the Table 4 above, it is observed that trace statistic and 5% critical value indicates two co-integrating equation at 5% level of significance. Based on the evidence, we can reject the null hypothesis ( $H_0$ ) which says that there are no co-integrating vectors and accept the alternative hypothesis ( $H_0$ ) of the presence of co-integrating vectors. The unit root tests confirmed that the series are integrated (integrated of order one, I(1)) thus satisfying the initial assumption for co-integration analysis. Lag length were selected to be two using information criteria and satisfied the mathematical stability condition. The results of the maximal eigenvalue and trace test statistics for the two models are presented in Tables 2 and 3.

The p-values at 5% and 10% level of significant indicate that the hypothesis of no cointegration among the variables can be rejected for Nigeria. Both Trace test and Maximum Eigenvalue test found one cointegrating relationships at 5% significant level. Since the variables are cointegrated, it is concluded that there exists a long-run equilibrium relationship between the variables.

### Result of Estimation

Having established the existence of a long run relationship among the variables, through the use of Johansen Co-integration test. This means that we can estimate the error correction model. An error correction model is designed for use with non-stationary series that are known to be co-integrated.

The ECM has co-integration relations built into the specification so that it restricts the long run

**Table 2.** Augmented-Dickey Filler (ADF) test.

| Variables | ADF test statistics | Mackinnon critical value @ 5% | Order of integration | Remark     |
|-----------|---------------------|-------------------------------|----------------------|------------|
| Log (FP)  | -7.054941           | -2.922449                     | 1(1)                 | Stationary |
| Log (MS)  | -3.789966           | -2.922449                     | 1(1)                 | Stationary |
| Log (CLA) | -5.836577           | -2.922449                     | 1(1)                 | Stationary |
| Log (INF) | -3.591520           | -2.921175                     | 1(0)                 | Stationary |
| Log (IR)  | -7.502614           | -2.923780                     | 1(1)                 | Stationary |
| Log (ER)  | -5.511258           | -2.922449                     | 1(1)                 | Stationary |

**Table 3.** Co-integration test Unrestricted co-integration Rank Test (Trace).

| Hypothesized no of CE(S) | Eigen value | Likelihood ratio or Trace statistics | 5% critical value | 1% critical value |
|--------------------------|-------------|--------------------------------------|-------------------|-------------------|
| None **                  | 0.757889    | 155.0656                             | 94.15             | 103.18            |
| At most 1**              | 0.635393    | 85.56596                             | 68.52             | 76.07             |
| At most 2                | 0.316827    | 36.12816                             | 47.21             | 54.46             |
| At most 3                | 0.230036    | 17.45883                             | 29.68             | 35.65             |
| At most 4                | 0.089779    | 4.649642                             | 15.41             | 20.04             |
| At most 5                | 0.00082     | 0.040290                             | 3.76              | 6.65              |

(\*\*) denotes rejection of the hypothesis at 5%, (1%) significant level. LR test indicate 2 co-integrating equations at 5% level.

behaviour of the endogenous variables to converge to their co-integrating relationships while allowing for short-run adjustment dynamics.

Parsimonious error correction model is estimated by setting the lag length long enough in order to ensure that the dynamics of the model have not been constrained by a two short length.

## DISCUSSION

The results of co-integration test have revealed the existence of co-integration among variables in the econometric growth models. This analysis on the effect of monetary policy on fishery growth is presented above. We observed that all the results from the test statistics of the model are good. As a matter of fact, the R square is high (about 70.9%). This means that the independent variables explain the dependent variable for about 70.9 percent. The adjusted  $R^2$  tends to purge the influence of the number of included explanatory variables, the adjusted  $R^2$  of 59.80 percent shows that having

removed the influence of the explanatory variables, the dependent variable (FD) is still explained by equation with 59.80 percent.

The Durbin Watson (D.W) statistics of 2.07 is within 2.0 which is the bench mark, therefore the study can conclude that there is no auto- correlation or serial correlation in the model specification; hence the assumption of linearity is not violated.

In terms of the signs, it can be seen that the coefficient of money supply (MS), interest rate (IR) and exchange rate (ER) are in conformity with the 'apriori' expectations. It was also observed that commercial loan to fisherman (CLA) and inflation rate ( $IN_F$ ) had signs contrary to apriori theoretical expectation.

More so, the ECM otherwise known as the speed of adjustment is significant with the appropriate sign i.e. negative sign in conformity with the priori expectation. This means that the present value of fish production FP adjust to changes in money supply, (MS) commercial loan to fishermen (CCF), Inflation ( $IN_F$ ), interest rate (IR) and exchange rate (ER). Coefficient of -0.825 is interpreted as speed of

**Table 4.** Error correction model and Parsimonious result.

| <b>Dependent Variable: D(LOG(FP),2)</b>                    |                    |                   |                    |              |
|------------------------------------------------------------|--------------------|-------------------|--------------------|--------------|
| <b>Method: Least Squares</b>                               |                    |                   |                    |              |
| <b>Date: 12/02/16 Time: 10:46</b>                          |                    |                   |                    |              |
| <b>Sample(adjusted): 1963 – 2013</b>                       |                    |                   |                    |              |
| <b>Included observations: 48 after adjusting endpoints</b> |                    |                   |                    |              |
| <b>Variable</b>                                            | <b>Coefficient</b> | <b>Std. Error</b> | <b>t-Statistic</b> | <b>Prob.</b> |
| D(LOG(FP(-1)))                                             | -0.30034           | 0.288272          | -1.04186           | 0.3048       |
| D(LOG(FP(-1)),2)                                           | -0.31109           | 0.174818          | -1.77951           | 0.0841       |
| D(LOG(MS(-1)))                                             | -0.82746           | 0.506813          | -1.63268           | 0.1118       |
| D(LOG(MS(-1)),2)                                           | 1.112192           | 0.489777          | 2.270816           | 0.0296       |
| D(LOG(CLA(-1)))                                            | 0.081338           | 0.145475          | 0.559121           | 0.5797       |
| D(LOG(CLA(-1)),2)                                          | -0.03355           | 0.105186          | -0.31893           | 0.7517       |
| D(LOG(INF(-1)))                                            | -0.00994           | 0.081651          | -0.12167           | 0.9039       |
| D(LOG(INF(-1)),2)                                          | 0.008991           | 0.050594          | 0.177716           | 0.86         |
| D(LOG(IR(-1)))                                             | -1.29509           | 0.543549          | -2.38266           | 0.0229       |
| D(LOG(IR(-1)),2)                                           | 0.531997           | 0.285276          | 1.864852           | 0.0709       |
| D(LOG(ER(-1)))                                             | 0.586853           | 0.319203          | 1.838491           | 0.0747       |
| D(LOG(ER(-1)),2)                                           | -0.39402           | 0.214343          | -1.83826           | 0.0748       |
| ECM(-1)                                                    | -0.82535           | 0.200665          | -4.11306           | 0.0002       |
| R-squared                                                  | 0.709191           |                   |                    |              |
| Adjusted R-squared                                         | 0.597999           |                   |                    |              |
| Durbin-Watson stat                                         | 2.070674           |                   |                    |              |

adjustment to the long run equilibrium, this implies that approximately 82% of all the deviations in the past will be corrected (adjusted to the equilibrium) during the present period.

The F-test shows the overall or aggregate significance of the model. Since the F-calculated is greater than the F-tabulated, the null-hypothesis ( $H_0$ ) is rejected while the alternative ( $H_1$ ) hypothesis is accepted. That is the overall significance of the model.

In addition to the above, the coefficient of individual variables is examined to determine the nature of the relationship between monetary policy and other variables. The coefficient of money supply (1.112) and interest rate (-1.29) appeared with the expected signs and conformed to expectations. This shows that 1% increase in money supply, will lead to an increase in Fish production by 1.112% this is in line with the new quantity theory of money that an increase in money base will directly increase output. Also, 1% increase in interest rate reduces Fish production growth by 1.29%. This result is in consonance with findings of Nwosa and Saibu

(2011), and Chukwuigwe and Abili, (2008).

The coefficient of exchange rate observed negative and significant at 10% level, this result supports the findings of Hassan (2012). It means that cheaper exchange rate will lead to higher Fish production.

Contrary to the expectation, the coefficients of both commercial loan of agriculture and inflation rate were observed to be insignificant. The insignificant relationship between commercial loan to agriculture and inflation in Nigeria, suggest that monetary policy option had been inactive in influencing fishery growth in Nigeria.

## CONCLUSION

It has been established in this study that the insignificant relationship between commercial loan to agriculture and inflation rate could be explained by the under developed nature of the financial institution to transmitting monetary policy to the ultimate variables in the economy which is usually

economic growth and price stability. Concessionary low interest rate should be implemented, as it encourages fisherman to borrow and invest in large scale in fishing activities.

It was also discovered that the autonomy that is granted monetary authority have been adopted to mitigate inflation in Nigeria. The study conclude that the inability of monetary policies to effectively maximise its policy objective most times is as a result of inconsistency in policy initiatives that have been adopted such as interest rate and exchange rate deregulation and inflation targeting. There should be an effective and prudent management of monetary policies on the part of the monetary authorities.

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