



EFFECT OF MONETARY POLICY TRANSMISSION MECHANISM ON ECONOMIC GROWTH IN NIGERIA: AN AUTO REGRESSIVE DISTRIBUTED LAG (ARDL) APPROACH

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Abstract

This study uses the ARDL model and examined the effect of monetary policy transmission mechanism on economic growth in Nigeria spanning the period 1986-2019. The study sourced it data from National Bureau of Statistics (NBS) and Central Bank of Nigerian (CBN) Annual Statistical Bulletin. The study used ARDL model and analysed the effect of monetary policy transmission mechanism on economic growth in Nigeria. Real gross domestic product (RGDP) was proxy for economic growth while interest rate (INTR) and exchange rate (EXR) channels were selected and used as monetary policy transmission mechanism variables. The study finds that in both long-run and short-run ARDL estimation interest rate and exchange rate channels have negative effects on real gross domestic product but are statistically significant on real gross domestic product (economic growth) in Nigeria during the period under investigation. The coefficients of interest rate channel are -0.19 and -0.64 for both long-run and short-run ARDL estimation respectively. Exchange rate channel coefficients are -0.32 and -0.01 for both long-run and short-run ARDL estimation respectively. The study therefore concludes that interest rate channel is a strong determinates of monetary policy transmission in stimulating economic growth in Nigeria. The study, therefore, recommends that there should be efficient manipulation of interest rate that will give investors confidence to borrow for investment which would consequently increase production and economic growth in the country through the Central Bank of Nigeria.

Keywords: Economic Growth, Exchange Rate, Interest Rate, Monetary Policy

JEL Classification: C22; E5; E52

1. Introduction

Monetary policy is the policy adopted by the monetary authority of a nation to control either the interest rate payable for very short-term borrowing (borrowing by banks from each other to meet their short-term needs) or the money supply, often as an attempt to reduce inflation or the interest rate, to ensure price stability and general trust of the value and stability of the nation's currency (Levy & Sturzenegger, 2010).

Monetary policy consists of the management of money supply and interest rates, aimed at meeting macroeconomic objectives such as controlling inflation, consumption, growth, and liquidity. This is achieved by actions such as modifying the interest rate, buying or selling government bonds, regulating

foreign exchange (forex) rates, and changing the amount of money banks are required to maintain as reserves. One of the main objectives of monetary policy is price stability in addition to achieving sustainable growth and favourable balance of payment (Levy & Sturzenegger, 2010).

However, the power of monetary policy to achieve her objectives depends on the efficiency of its transmission mechanism. By transmission mechanisms, it means the various channels through which monetary impulse is transmitted to the target variable. The target could be economic growth or inflation.

Therefore, understanding the transmission process of the different channels is the determinant to answer a series of monetary policy questions (Mishkin, 1995). Yet there are multiple different perspectives among economists on this issue, especially on the importance of each channel. Under different conditions or different development levels of financial markets, the impacts of monetary policy on the economy through each channel are not the same (Senbet, 2008). For example, in the developing countries like Nigeria, the monetary transmission mechanism is somewhat less efficient than in developed countries (Mishra, 2010).

Monetary policy transmission mechanisms are the channels through which changes in the policy rate, affect the behaviour of other economic variables, mainly prices and output (Adebiyi & Mordi, 2009). Monetary policy affects prices in the economy through the following channels: consumption and investment decisions; exchange rate; asset prices; credit; and expectations. The transmission channel of interest rates to consumption and investment decisions is the most known monetary policy transmission mechanism (Anoruo, 2002). As monetary Policy Committee raises the target for the monetary policy rate, real interest rates also tend to increase, which in turn tend to lead to a decrease in investment and consumption of firms and households, reducing the demand for goods and services in the economy, thus contributing to the reduction of inflation (Ajayi, 2007).

Another important transmission channel of monetary policy operates through the exchange rate, especially in open economies. When the exchange rate rises, the domestic currency tends to depreciate reducing the price level of tradable goods expressed in national currency (Boivin, Kiley & Mishkin, 2010). The exchange rate, by its turn, affects inflation trend through two mechanisms. The first is the decrease in the prices of imported consumer goods and inputs used in the domestic production. The other mechanism operates through the aggregate demand. The cheaper dollar discourages exports and stimulates imports. Thus, the demand for domestic goods falls, reducing the pressure on the price level (Mbutor, 2009).

Changes in the interest rate also affect economic agents' wealth. An increase in the interest rate, by discouraging economic activity and corporate profits, tends to depress stock prices (Adofu & Audu, 2010). This reduction in the value of the financial wealth of households and corporations discourage consumption and investment plans. Monetary policy also works through the credit channel. A rise in the monetary policy rate tends to increase bank lending rates as well, reducing the supply of credit and/or its attractiveness to households and firms, discouraging consumption and investment (Itodo, Eche, & Kamo, 2012).

The failure of the monetary policy in curbing price instability has caused growth instability as Nigeria's record of growth has been very poor. An examination of the summary of the long-term pattern reveals the following secular swings: Rapid Decline (1965-68) (Civil War Years), Revival, (1969-1971) Boom, (1972-1980) crash, (1981-84) Renewed Growth, (1985-1991) Wobbling, 1992-2010) (CBN, 2010). More so despite the various monetary regimes that have been adopted by the Central Bank of Nigeria over the years, economic growth still remains a major threat to Nigeria's economic development. Nigeria has experienced high volatility in economic growth. The growth of money supply is correlated with this high inflation episode because money growth was often in excess of real economic growth (Bernanke, & Gertler, 2000). Moreso, the dualistic nature of financial and product market in Nigeria constitutes a fundamental constraint militating against the formulation and efficient implementation of monetary policy.

The informal sector in Nigeria accounts for about 30 percent of the GDP, thus the existence of a large informal credit market and exchange rate market in Nigeria has many implications for the transmission mechanism of monetary policy (Bhattacharya, Haslag, & Martin, 2009). Furthermore, the payment system is a vital link between the financial and the real sector of the economy. The payment system in Nigeria is predominantly cash and the prominence of cash for transaction purposes increases the volume of money/currency in circulation which renders monetary control difficult. In the light of the above therefore, this study intends to subject these issues to

empirical examination in order to evaluate the effect of monetary policy transmission mechanism on economic growth in Nigeria.

The study examines the effect of interest rate and exchange rate channels of monetary transmission on economic growth in Nigeria. The study is structure in five sections: The first section is the general introduction of the study; the second section covered the literature review while section three is the methodology of the study. The fourth section presented and analyses the results and finally drawn conclusion and recommendations in the last section.

2. Literature Review and Theoretical Literature

Kutu, Nzimande and Msomi (2017) examine the effect of monetary policy on growth of industrial sector in China spanning the period 1994-2013. Industrial output production was used as the dependent variable while interest rate, money supply, exchange rate and inflation rate as explanatory variables and Auto Regressive Distributed Lag (ARDL) modeling technique was used for estimation. The study revealed that monetary policy has significant impact on economic growth.

Borio and Gambacorta (2017) analysed the effect of monetary policy on bank lending in 14 developed countries for the period of 1995-2014. The study used annual growth rate of loans as dependent variable and also used lending rate, inflation rate and price growth as independent variables coupled with the use of the Generalized Methods of Moments, it was revealed that monetary policy has negative effect on bank lending. Hence, the setting of rates at low level was recommended to boost bank lending and growth of the economy

Chan (2016) examines the effect of money supply and inflation rate on economic growth in China spanning the period 1999-2015 using the Vector Error Correction Modeling technique. The study revealed that money supply and inflation rate as monetary policy variables have significant effect on economic growth. Hence, it was suggested that a cautious regulation should be implemented to boost economic growth

Mushtaq and Siddiqui (2016) investigate the effect of interest rate as a monetary policy variable on bank deposits in 46 countries across the world for the period 1999-2014 using Panel Auto Regressive Distributed Lag modeling technique. The study revealed that interest rate has positive effect on bank deposit.

Onyeke (2016) examines the impact of monetary policy on stock returns in Nigeria over a monthly time period covering January 2003 to June 2014 and Vector Autoregressive model was used for estimation. The estimated results revealed that monetary policy variables did not have a significant impact on the prices of stock in Nigerian equity market.

Adedeji and Nuhu (2015) examine the effectiveness monetary policy as an anti-inflationary measure in Nigeria using quarterly time series data spanning the period 1980Q1 - 2012Q4. The co-integration and error correction methods approach were employed on. The result reveals that for the period covered, interest rate, exchange rate, money supply and oil-price are the major causes of inflation in Nigeria. The Money supply variable shows a significant positive impact on inflation both in short and long runs.

El-Seoud (2014) examines the relationship between money supply and GDP in Bahrai spanning the period 2000-2003 using co-integration test. The result shows that real money supply had neutral effect on the real GDP growth in Bahrain during the study period.

Odude (2013) examined the impact of monetary policy and the Economic growth of Nigeria economy spanning the period 1981-2012 using the Vector Error Correction Mechanism (VECM). The study concluded that monetary policy did not impact significantly on economic growth of Nigeria within the period under review.

Ogbulu and Torbira (2012) investigate the empirical relationship between measures of monetary policy and the bank asset (BKA) channel of the monetary transmission mechanism as well as the direction of causality between them using data for the period 1970-2010 and employing co-integration, error correction mechanism and variance decomposition techniques. The study found a positive and significant

long run relationship between BKA, money supply (MNS), cash reserve ratio (CRR) and Minimum Rediscount Rate (MRR) as well as uni-directional Granger causality from BKA and CRR to MNS respectively. The results of the variance decomposition of BKA to shock emanating from CRR, MRR and MNS show that own shocks remain the dominant source of total variations in the forecast error of variables.

The Monetarist Theory of Money

The modern theory was propounded by Friedman (1960). Friedman's contribution to monetary theory is precise, as he does not waste time trying to explain the motives for hoarding money, rather he analyzes the factors that determine how much money people will want to hold under various circumstances.

This theory holds a completely different view. They believe that when the Central Bank purchases securities in open market, it sets in motion substitution and wealth effects, as the public portfolio consists of wide variety of assets such as bonds, equities, savings, mortgage, etc. These effects will ultimately increase aggregate money demand and expand output. This theory is related to monetary economics which is essentially concerned with the role of money in an economy. It specializes on the development of monetary theory and policy, and it is used in influencing the level of economic activities and money in circulation. Monetary policy affects almost every facet of the economy like inflation, interest rate, an employment etc. Monetary economics also studies the behavior of financial institutions such as deposit money banks which are significant in determining the pace of growth and development in the economy. According to Kimberly, (2017), Monetarism is an economic theory that says the money supply is the most important driver of economic growth. As the money supply increases, people demand more. Factories produce more, creating new jobs. Monetarists warn that increasing the money supply only provides a temporary boost to economic growth and job creation. Over the long run, it will increase inflation. As demand outstrips supply, prices will rise. Monetarists believe monetary policy is more effective than fiscal policy.

That's government spending and tax policy. Stimulus spending adds to the money supply, but it creates a deficit. This adds to the country's sovereign debt. That will increase interest rates. Monetarists say that central banks are more powerful than the government because they control the money supply. Monetarists watch real interest rates rather than nominal rates. Most published rates are nominal rates. Real rates remove the effects of inflation. They give a truer picture of the cost of money. Today, monetarism has gone out of favour. That's because the money supply is a less useful measure of liquidity than in the past. Liquidity includes cash, credit and money market mutual funds. Credit includes loans, bonds and mortgages. But the money supply does not measure other assets, such as stocks, commodities and home equity.

People are more likely to save money in the stock market as money markets. They receive a better return. (Source: "Has the Fed Abandoned Monetarist Theory?" World Economic Forum, September 23, 2015). That means the money supply does not measure these assets. If the stock market rises, people feel wealthy and are more willing to spend. That increases demand and boosts the economy. These assets created booms that the Fed ignored. They led to the 2001 recession and the Great Recession.

3. Methodology

3.1 Types and Sources of Data

The data used for this study is a secondary data sourced from the NBS and CBN. Real gross domestic product (RGDP) was used as the dependent variable while interest rate (INTR) and exchange rate (EXR) were used as explanatory variables spanning the period 1986-2019.

3.2 Model Specification

The Mathematical model for this study is:

$$RGDP = f(INR, EXR) \dots\dots\dots 1$$

The econometrics form of the model is:

$$RGDP = \lambda_0 + \lambda_1 INR + \lambda_2 EXR + \mu_t \dots\dots\dots 2$$

Where; RGDP = Real Gross Domestic Product; INTR= Interest rate and EXR = Exchange rate. The a priori expectation for the study: λ_1 (Negative) and λ_2 (Positive)

3.3 Techniques of Estimation

The study investigates stationarity of the time series data through the use of Augmented Dickey-Fuller (ADF) test. The study also adopted the bounds testing approach to co-integration based on Autoregressive Distributed Lag (ARDL) model framework, as proposed by Pesaran, Shin, and Smith (2001). Finally,

this study employed the use of ARDL model to trace the effects of monetary policy transmission on economic growth in Nigeria.

4. Presentation of Data and Analysis

4.1 Descriptive Statistics

The study verified the property of the data to observe whether or not the data satisfy some statistical properties such as normality and skewness. This is important in ensuring the reliability and accuracy of the estimated results from the data as reported in table 1 below.

Table 1: Statistical Summary

	RGDP	INTR	EXR
Mean	152.953	31.6734	84.397
Median	11332.25	8.42687	97.0132
Skweness	12.91	10.05	-19.18
Kortusis	12.27	-31.45	0.89
Std. Dev.	219.958	3.35417	6.2819
Probability	0.42677	0.00012	0.00489
Observations	35	35	35

Source: Author's compilation from E-views 9.0

Table 1 shows the summary of statistics for the time series data used for the study. Interest rate (INTR) channel and exchange rate channel (EXR) have mean values of less than 100, suggesting a fairly robust distribution while real gross domestic product (RGDP) has larger mean values of more than 100. This is a clear indication that the distribution is not fair. Also, the standard deviations for real gross domestic product (RGDP) variable is large suggesting that the estimated results for the variable is far from their mean values. Furthermore, the skewnesses of the distribution for all the variables are positive except for

exchange rate. That is, the skewness measures suggest that some of the variables are positively skewed (to the right) and others negatively skewed to the left. This implies that that data set used in this study is asymptotically normally distributed.

4.2 Unit Root Test Result

The ADF test shows the order of integration and the number of times the series were differenced. The variable were stationary at level and at first difference implying an integrated order of I(0) and I(1) respectively.

Table 2: Unit Root Test Result

VARIABLE S	ADF TEST AT LEVELS		ADF TEST AT FIRST DIFF		ORDER OF INTERGRATION
	ADF statistics	Critical Value at 5%	ADF statistics	Critical Value at 5%	
ΔRGDP	-3.295847	1.95133	-3.274774	1.95133	I(0)
ΔINTR	-2.149105	1.95100	-5.327747	1.95100	I(0)
ΔEXR	-2.01428	2.95402	-4.814639	2.95402	I(1)

Δ = Difference Operator, I(d) = No. of times of integration, Level = 5% level of significance

Source: Author's compilation from E-views 9.0

Table 2 show the results of the unit root test conducted using the Augmented Dickey-Fuller (ADF) method to check the order of integration of the variables. The treatment which involves differencing the data to determine the level of integration is carried out using Augmented Dickey Fuller test (ADF). The results show that real gross domestic product (RGDP) and interest rate (INTR) are stationary at level [I(0)] while exchange rate (EXR) is stationary at first difference [I(1)]. The result shows that the variables employed in respect to this study are combination of I(0) and I(1) series or are

integrated of different orders. These call the use of co-integration test method for appropriate investigation of the long-run relationship among the variables.

4.3 ARDL Co-integration Test Result

Since the variables of our study are integrated of different order as indicated in the unit root test result, the data set has met necessary condition for the use of ARDL model.

Table 3: F-Bound Test for Co-integration H_0 : No Co-integration

Test Statistic	Value	Degree of freedom	Probability
<i>F-statistic</i>	93.68	(9,227)	0.0000
<i>Chi-square</i>	843.2	9	0.0000

Pesaran Critical values

Lower bound

Upper bound

1.70	2.83	(10%)
2.47	3.18	(5%)
2.54	3.91	(1%)

Source: E-view 7.1 Output

Table 3 shows the result of the F-bound test for co-integration. The test was conducted by using long-run coefficient restrictions to compute the *Chi-square* statistic for determining the acceptance or rejection of the null hypothesis of no co-integration among the variables in the ARDL model. The results in table 3

show that the calculated *Chi-square* value is 843.2 and is higher than all the Pesaran lower and upper bound limits at 1%, 5% and 10% respectively. Therefore, the null hypothesis of no co-integration among the variables of the study is rejected while the alternative hypothesis is accepted. This suggests the existence of long-run relationship among the variables of the study.

Table 4: Estimated Long-run Coefficients of ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INR-1)	-0.1936	0.0058	2.9235	0.0000
D(EXR-1)	-0.1074	0.0942	3.0818	0.0381
C	-0.3296	3.8480	6.5383	0.0017
R-Squared	0.769	Mean Dep Var	118.4	
Adjusted R-Square	0.757	S.D Dep Var	121.7	

Source: E-views 9.0 Output

Table 4 shows the estimated result for long run coefficients of ARDL. The result shows that interest rate (INTR) has negative impact on economic growth over the study period. A unit increase in interest rate decrease economic growth (RGDP) by about 19 per cent. This is as expected. This is because interest rate creates uncertainty in the economy and affects the decision to invest. High interest rate reduces the

investment opportunity of investors, reduces income and purchasing power of the economic agents and as such reduces aggregate demand in the economy. Similarly, with high interest rate, the marginal efficiency of investment falls and the propensity to invest is reduces. This simply suggests that if interest rate in the Nigerian economy is not properly managed, it could have a dampening effect on the growth of the

economy. This result partially corroborates works of Kutu, Nzimande and Msomi (2017).

result shows that a unit increase in exchange rate decreases RGDP by about 33 per cent. However, the finding disagrees with works of Kutu, Nzimande and Msomi (2017).

However, exchange rate (EXC) has a negative and significant impact on economic growth (RGDP). The

Table 5: Estimated Short-run Coefficients of ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INTR)	-0.6429	0.1033	7.29947	0.0000
D(EXR)	-0.01962	0.02718	2.01710	0.0381
ECMt(-1)	-0.4081	0.12032	-3.74252	0.0017

Source: E-views 9.0 Output

Table 5 shows the result for short-run ARDL model estimated at first difference. The result reveals that the Error Correction Term (ECM (-1)) is negative, as expected, and is highly statistically significant. The negative sign implies that there is adjustment from short-run to long-run equilibrium among the variables of the study. That is, the real gross domestic product responds to deviations from equilibrium such that if the short run variables deviate from equilibrium, they tend to re-adjust back to equilibrium in the long run. The coefficient of ECM(-1) indicates an annual speed of adjustment of about 0.408% from long-run disequilibrium per annum. This means that about 41%

of the disequilibrium errors, which occurred the previous years, are corrected in the current year.

Furthermore, all the estimated short-run coefficients are statistically significant and have the expected signs. The result shows that 1% increase in interest rate (INTR) and exchange rate (EXR) decreases real gross domestic product (RGDP) by about 0.64% and 0.02% respectively. These results are in tandem with the result of long-run ARDL model, but differ only in the magnitudes of the estimated coefficients.

4.4 Serial Correlation LM Test Result

Table 6: Breusch-Godfrey Serial Correlation LM Test Ho: No Serial Correlation

F-statistic	12.747	Prob. F(2,24)	0.0319
Obs*R-squared	10.3557	Prob. Chi-Square(2)	0.0216

Source: E-views 9.0 Output

Table 6 above shows the probability value is 0.0216 meaning that the study cannot reject null hypothesis rather we accept null hypothesis. It means that the model has no serial correlation. Therefore the model

can be used for policy making without re-specification. It can therefore, be deduced that the estimated model is valid and can be used for policy making.

4.5 Heteroskedasticity Test Result

Table 7: Heteroskedasticity Test: ARCH Ho: No Heteroskedasticity

F-statistic	0.549682	Prob. F(1,29)	0.8728
Obs*R-squared	0.28129	Prob. Chi-Square(1)	0.7253

Source: E-views 9.0 Output

Table 7 above shows Breusch-Pagan-Godfrey residual diagnostic test was piloted to test for heteroskedasticity of the ARDL model. The test result shows that probability of (0.87) is greater than 0.05 (5% significant level). The study conclude by

rejecting of the presence of heteroskedasticity; indicating the residuals are homoscedastic, meaning that, the respected model is valid and can be used for policy making.

5. Conclusion and Recommendations

The study revealed that interest rate channels of monetary policy transmission has inverse relationship (Negative) with economic growth and also statistically significant. The exchange rate channel of monetary transmission is negative but significant. Therefore, monetary policy transmission channels are significant in stimulating economic growth in Nigeria

The finding by this study that the interest rates channel of monetary policy transmission is strong in stimulating economic growth indicates the need for an immediate review of monetary policy transmission mechanism in the country through efficient manipulation of interest rate that will give investors confidence to borrow for investment which would

consequently increase production and economic growth in the country. In addition, the Nigerian government through the CBN should set lending rate an optimum level as these would help to boost credit expansion, money supply and invariably returns and profitability of deposit money banks in Nigeria.

Exchange rate channel have been revealed in this study as a significant monetary policy channel of transmission despite the non-confirmation of the coefficient signs. Proper management of exchange rate would improve the value of the country local currency. The monetary authorities should used monetary policies to create a favourable investment climate by facilitating the emergency of exchange rate regimes that attract both domestic and foreign investments.

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