Effect of Open Market Operations (OMO) on Economic Development, 1986 -2016.

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Abstract
This Study examined the Effect of Open Market Operations (OMO) on Economic Development (1986-2016). The objective of this study was to examine the Effect of – Treasury Bills rates and Treasury Certificates rates on economic development. The study employed secondary data and used Nigeria as its sample; the investigation employed the OLS, Co-integration, Granger-causality and ECM Analytical techniques, to test the impact of the independent variables (treasury bill rates and treasury certificate rates) on the dependent variable, economic development (proxied by Human Development index) and tested at the 5% level of significance. The findings showed that Open Market Operations captured by Treasury Bills and treasury certificates, both had no significant effect on economic development in the short-run but showed a positive and significant effect in the long-run period on economic development with significant speed of adjustments. The study concludes that Central Bank Open Market Operations represented by Treasury Bills and Treasury Certificates do exert significant effect in the long-run on economic development and recommends amongst others the creation of adequate product awareness by the monetary authorities to raise public patronage of these financial products and also, to allow enough operational time lag to enable relevant formulated policies achieve their desired objectives.

Key Word: *Treasury Bills; Treasury Certificate Rates; Human Development index; Economic development; Open Market Operations.*

1.0 Introduction

Open market operations constitute a major instrument of monetary policy under the market based system of monetary management by the apex monetary authority (Nzota, 2000). It is used by the monetary authorities to control the cost and availability of credit in the banking system and thus influence the level of money supply. Open Market Operation (OMO) is the sale or purchase of government or other eligible securities thereby altering the reserve base of banks and their credit creating capacities, aggregate demand and the general level of economic activity.

Open market operation is based on the discretionary power of the central bank to buy and sell government securities or instruments in the money market, to banks and non-bank public, in order to achieve stated macroeconomic objectives of the government. The array of eligible instruments include – Treasury Bills, Treasury Certificates and Development stocks of not more than 3 years maturity.

Most researchers have been unable to come to an agreement on what should be the exact effect of Open market operations on economic development of a country and there has been array of debates on such outcome. For instance, Okpara and Nwoha (2010), and Adofu, Abula and Audu (2010), all agreed that there is a positive and significant relationship between monetary

policy instruments such as trade on treasury bills and treasury Certificate economic development. While, conversely Olubusoye and Oyaromade (2008), and Salisu (1993) hold that the relationship is not significant. However, other researchers such as Ditimi (2009) did not find any relationship.

This study on the Effect of Open Market Operations on Economic Development attempts to reconcile such disagreements by studying the outcome of such effect on economic development of Nigeria and divides the investigation into five sections, namely: Introduction, Review of Related literature, Methodology, Data Presentation and Analysis, and Recommendations and Conclusions.

2.0 Review of Related Literature

Open market operations is conducted in the secondary market for securities and it ensures that monetary expansion or contraction is carried out by altering the reserve base of banks through enhancing or limiting their credit creation capacity. If for instance, the government is pursuing an expansionary monetary policy, the apex bank purchases government securities from the commercial banks, thus causing their reserves to rise and hence, enhancing their credit creation ability. The purchase of securities is a direct injection of funds into the banking system.
However, the efficiency of monetary policy depends on the following factors: the problem of time lag, forecasting accuracy, non-banking financial intermediaries (structural changes in the financial market), and underdeveloped money and capital markets. Having this, in the view of Nzota (2000), monetary policy is therefore regarded as the key tool in economic management and in macroeconomic stabilization of prices. Its adjustment process in a developing country where inflation pressure is so high has become a major policy target.

2.1 Conceptual Framework

The most important and flexible tool of monetary policy is open market operations. It is the buying and selling of government securities in the open market (primary or secondary) in order to expand or contract the amount of money in the banking system. By purchasing securities, the central bank injects money into the banking system and stimulates growth whereas by selling securities it absorbs excess money. Thus, if there is excess liquidity in the system, the central bank will in a bid to reduce the money supply sell the government securities such as Treasury Bills. On the other hand, in periods of liquidity shortages, the central bank buys government securities so as to increase money supply. Instruments commonly used for this purpose include treasury bills, central bank bills, or prime commercial paper. The product components under this OMO include; i. Treasury Bills and ii. CBN Treasury Certificates

a). Treasury Bills

OMO enables the central bank to influence the cost and availability of reserves and bring about desired changes in bank credit and money supply. This important instrument of monetary policy has a number of advantages because it is flexible and precise, it is implemented quickly and easily reversed and the central bank has complete control. The effectiveness of OMO, however, depends on the existence of well-developed financial markets that are sensitive to interest rate movements. The OMO was introduced at the end of June 1993 and is conducted wholly on Nigerian Treasury Bills (NTBs), including repurchase agreements (repos). The OMO entails the sale or purchase of eligible bills or securities in the open market by the CBN for the purpose of influencing deposit money, banks' reserve balances, the level of base money and consequently the overall level of monetary and financial conditions. In this transaction, banks subscribing to the offer, through the discount houses, draw on their reserve balances at the CBN thereby reducing the overall liquidity of the banking system and the banks' ability to

create money via credit. In implementing the OMO, the Research Department of the CBN advises the trading desk at the Banking Operations Department, also of the CBN, on the level of excess or shortfall in bank reserves. Thereafter, the trading desk decides on the type, rate and tenor of the securities to be offered and notifies the discount houses 48 hours ahead of the bid date. The highest bid price (lowest discount rate quoted) for sales and the lowest price offered (highest discount offer) for purchases, with the desired size or volume, is then accepted by the CBN.

Onoh (2007), commented that if in the course of time, an economy experiences a cash crunch, the inadequacy of cash in the economy may cause the economy to move sluggishly or to stagnate. In order to stimulate the economy into greater activities, the central bank may choose to improve the economy's liquidity position by reversing its policy. In the place of a tight monetary policy which encouraged the withdrawal of currency from circulation through sales of government securities (Treasury bill) and which contributed to the cash crunch in the first place, a central bank embarks on a policy reversal, which pushes a large volume of money into circulation (creation of money) through the repurchase of government securities (Treasury bills) from the bank and the non-bank public. As securities return to the vaults of the central bank, the CBN legal tender money flows into the coffers of the former holders of those securities, who spend a small or a large chunk of the money, depending on the average propensity to consume.

b). Central Bank Treasury Certificates

Treasury certificate is a short term loan from the Central Bank when the Nigerian federal ministry of finance needs to borrow. With the shortage of treasury bills, a 91 days government-debt instrument, there was need to medium-term debt instruments to generate medium-term funds for the government and to offer government a relatively longer period of indebtedness to the public, than the treasury bills allowed. The introduction of the medium-term instruments was also aimed at satisfying the demand of finance institutions for further investment outlets for the excess cash in their vaults and to diversify money market investments. Onoh (2007), mentioned that in the fiscal year 2001, CBN high-yield certificates with 180 and 365 days tenor, and interest rate of between 19% and 20% were issued for the first time as additional instrument for combating the persisting excess liquidity in the economy. The instrument was targeted at banks, institutional investors and high networth individuals. The minimum subscription of N250,000 was beyond the reach of small savers. The CBN high yielding certificates failed to appeal to the banks, the home of excess liquidity, because the instrument was not classified as suitable assets for the purpose of satisfying a bank's statutory reserve requirement. Consequently, the first issues were grossly under-subscribed. As it became obvious to CBN, that banks were not participating actively in the purchase of the potent new money market instrument, another assist instrument to OMO, the certificates were redesignated as eligible for the purpose of satisfying the statutory reserve requirements of CBN.

2.2 Monetary Policy and Economic Development

Monetary policy is one of key drivers of economic development as it manipulates economic variables to achieve price stability. Economic development is relevant in an economy as it reduces poverty as well as improving livelihoods. The growing importance of monetary policy has made its effectiveness in influencing economic development a priority to most governments (Ajisafe and Folorunso, 2002; Khabo, 2002; Dornbusch et al, 1998).

Though most economists are yet to agree on how monetary policy really works and on the magnitude of its effect on the economy, there is a strong consensus that it has good measure of effect on the economy (Nkoro, 2005). Monetary policy 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 (Folawewo and Osinubi, 2006). For most countries, the targets of monetary policy include price stability, maintenance of balance of payments equilibrium, promotion of employment and output growth, and sustainable development. The pursuit of price stability invariably implies the indirect pursuit of other objectives such as economic development, which can only take place under conditions of price stability and allocative efficiency of the financial markets. Monetary policy aims at ensuring that broad money supply is at a level that is consistent with the growth target of real income, such that non-inflationary growth will be ensured. Monetary policy influences economic development through aggregate spending, changes in broad money supply and interest rates, influence consumer spending as well as investment decisions. Consequently, aggregate economic demand changes in response to monetary policy variations.

2.3 Economic Development indicators

Human development is one of the important areas of interest in developmental economics. According to Sen (1999), it defined human development as an expansion of the real term freedom that people enjoy. Human freedoms is regarded as a better measure of development than Gross National Product that measures changes in personal income, industrialization associated with technological advancements or social modernisation. Also, Wilson and Woods (1982) argued the importance of using multi-dimensional indices to measure welfare growth and human development. Initially, GDP per capita was used as a proxy to measure human development index but most researchers argued against this that that it was merely a measure of income. On this backdrop, other composite indices were developed by other social scientists which were considered more credible and appropriate to measure development and these include: Child Development Index developed by 'Save the Children' NGO and Gender related Development Index (GDI) originated by UNDP. One of the most important indices for measuring development index is the Human development index or HDI, invented by Mahboob-ul-Haq in the 1990s on the basis of developmental concepts of Amartya Sen. This was later adopted by the UNDP as the basis of its annual reporting known as UNDP's Human Development Report (HDR).

Sagar and Najam (1999) credited the performance of HDI as a fruitful index in measuring human development.

2.4 Friedman and the Monetarist Theory

The foremost proponent of the monetarist school of thought is Milton Friedman (1970), he argued that the quantity of money is the main determinant of the price level, or the value of money, such that any change in the quantity of money produces an exactly direct and proportionate change in the price level. They argue that money is a form of financial asset and as more of the asset is held, its yield falls. They maintain that the marginal utility of money falls as more of the financial asset is held. Arising from this view point, the monetarist believe that as the money supply increases the individual holding of money does likewise. This implies that the yield of money relative to others must fall. At this point it is important to mention that according to the monetarists, the relationship between money supply and price level is "***lagged***". Meaning that there is a time period between the change in the money supply and its effect on the price level. They suggest that such a time lag is between 6 months to 2 years.

The monetarist argue that there is a direct relationship between money supply and rate of inflation. As the money supply rises, so the level of prices can be expected to rise also. The major policy implication of the monetarist theory is that if the money supply can be controlled so can the rate of inflation. The monetarist believe that not only may the government influence

the price level through money supply but also, in the long-run, this is the only variable that the government may influence.

An essential feature of the monetarist model is its focus on the long-run supply-side properties of the economy as opposed to the short run dynamics (Philips, 1987).

2.5 Empirical Review

Studies by various researchers on this subject have produced conflicting outcomes over the years in different continents. Some of these include:

Canova (2005) established that a US monetary shock has a strong impact on macroeconomic development in US. Owing to a US contractionary monetary policy shock, interest rates are found to rise, which attracts capital inflows and pushes aggregate demand up and down.

Chuku (2009) used a structural vector auto regressive model with quarterly data from 1986:1 to 2008:4 to measure the effects of monetary policy innovations in Nigeria. Variables used in his model were: real Gross Domestic Product (GDP), Consumer Price Index (CPI), broad money (M_2), Minimum Rediscount Rate (MRR) and Real Effective Exchange Rate (REER). His study discovered that monetary policy innovations carried out on the price-based nominal anchors (MRR and REER) had neutral and fleeting effects on output. While the quantity-based nominal anchor (M_2) had modest effects on output and prices with a very fast speed of adjustment implying that the quantity of money (M_2) in the economy is the most influential instrument for monetary policy implementation in Nigeria.

Salisu (1993) using OLS to investigate the role of interest rate in the determination of the demand real cash balances, concluded that there existed no significant relationship between the duo, and that any attempt by the policy makers of the Nigerian Economy to influence this kind of money demand through the use of interest rate will not yield any positive result.

Omofa (1999) using the Quantity Theory of Money (QTM) established a positive but not significant relationship between money supply and price level. This means that though money supply contributes to price determination in Nigeria, it is not the major causal factor. Other variables of significance are price level lagged and exchange rate. They are both positively related to current price level and their coefficients are both high and significant.

Moreover, Nkoro (2005) on a topic "monetary policy and macroeconomic instability in Nigeria (1980 – 2000)" concluded that factors responsible for excess liquidity and inflationary pressure in Nigeria included: instability of the financial sector, which was attributed to bank distress and lack of managerial efficiency, resulting to financial institution failures, non-harmonization of fiscal and monetary policies and increase in government expenditure.

Folawewo and Osinubi (2006) used rational expectation approach to conclude that the effort of Monetary Authority in Nigeria at using its credit and reserves as monetary tools in checking inflation and the rate of exchange has affected the volatility of the two variables over the years. Thus monetary policy, if not well targeted could yield negative results. This is because the speculations of the private agents may frustrate monetary effort (Berg and Pattillo, 1999), just as improper inflation targeting could affect real exchange rate volatility (Amato and Gerlach, 2002) and exchange rate intervention induce inflation (Galati, 2000). Thus monetary policy should be set in such a way that the objective it set to achieve is well defined, in a way that effort at stabilizing exchanging rate will not generate inflation and vice versa.

Additionally, several studies (Idowu, 2010; Uchendu, 2009 and Nkoro, 2005) have established that huge public spending has constrained the efficacy of monetary policy in Nigeria. They buttressed that huge public spending by the three tiers of government, over the years, had

hampered monetary management resulting in the missing of monetary targets by wide margins, while inducing serious pressure on the general price level. Moreover, the poor state of economic infrastructure, resulting from past neglect, influence monetary management adversely.

Suleman, Wasti, Lal and Hussaini (2009) in their study of money supply, open market activities, output and prices in Pakistan found out that M_2 (monetary policy instruments) positively impact on prices in the economy.

3.0 Data and Methodology

3.1 Source and Nature of Data

The study made use of data mainly from secondary sources, particularly published data from research work of monetary policy department of CBN, the World Bank and the United Nations Development Project (UNDP). Secondary data will be obtained from the statistical bulletin of the Central Bank of Nigeria and will be used for the analysis of the study. We will equally use data from the published works in CBN official websites, Statistical Bulletins, monthly journals, financial reviews as well as Annual Reports and various communiqués of the monetary policy committee meetings. Another source of data for the study will include statistics and published materials by the National Bureau of Statistics (NBS), Nigerian Economic Society, Newspapers, Magazines, Journals, Seminar papers as well as my previous lecture notes and similar studies conducted in this direction. The data obtained was analysed using Econometrics text kit (Software) called E-view –Version 9.

The data used for this study are those relating to:

1. Human Development Index (HDI) - Dependent Variable
2. Treasury Bill Rates, Central Bank Treasury Certificates - Independent variables.

3.2 Model Specification and Validity

This research work adopted the model of Onyeiwu (2012) with slight modifications (for example replacement of gross domestic product (GDP) with Human development index (HDI) and the use of inflation as a moderating variable due to its strong effect on price levels and money supply);

$GDP = a_0 + a_1lr + a_2M_2 + a_3Cr + Ui$ (1) (Onyeiwu, 2012)

Where GDP - Gross Domestic Product

Lr - Liquidity ratio

M_2 - Broad Money Supply

Cr - Cash ratio

A_0, a_1, a_2 and a_3 - Parameters

Ui - Error term

Adjusting above model after our work, we have;

HDI =f (OMO) ..... (2)

Transforming to multiple linear relationship;

$HDI = d_0 + d_1TBR + d_2CBTC + d_3 INFR + u$ ..... (3)

$\mu = Error\ term$

$do = Intercept$

$d_1 \_ d_3 = parameters/\ coefficients$

Apiriori expectation: TBR, CBTC, INFR > 0 (positive and significant)

4.0 Data Presentation and Analysis

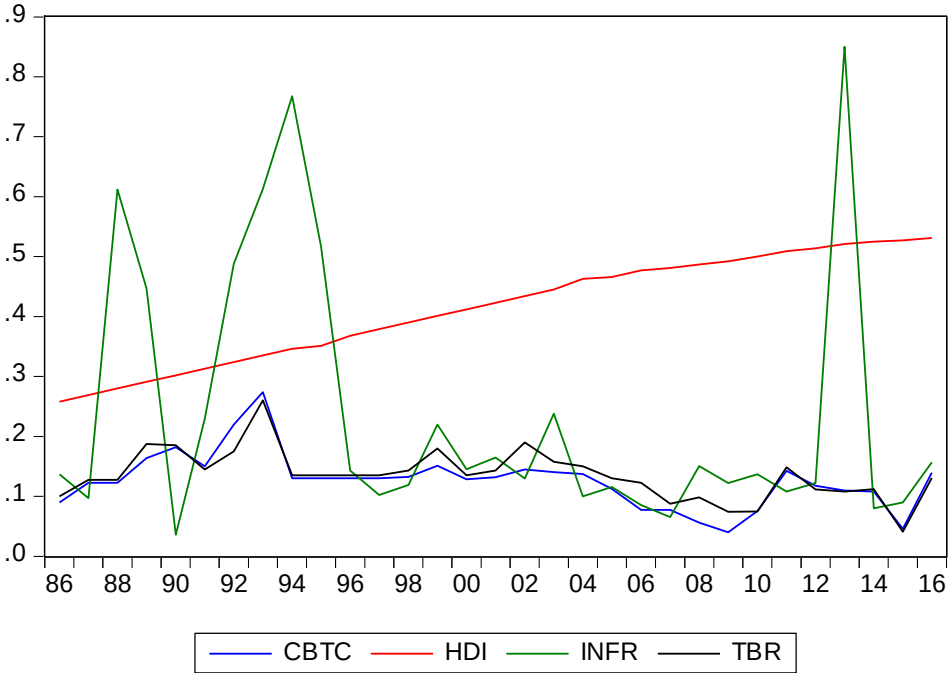
Table 4.1 Data for Selected Variables

YEAR	TBR	CBTC	HDI	INFR
1986	0.1000	0.090	0.258	0.1367
1987	0.1275	0.1225	0.269	0.0969
1988	0.1275	0.1225	0.280	0.6121
1989	0.1875	0.1638	0.291	0.4467
1990	0.1850	0.1820	0.302	0.0361
1991	0.1450	0.1500	0.313	0.2296
1992	0.1750	0.2200	0.324	0.4880
1993	0.2600	0.2740	0.335	0.6126
1994	0.1350	0.1300	0.346	0.7676
1995	0.1350	0.1300	0.351	0.5159
1996	0.1350	0.1300	0.368	0.1431
1997	0.1350	0.1300	0.379	0.1021
1998	0.1431	0.1325	0.390	0.1191
1999	0.1800	0.1510	0.401	0.2200
2000	0.1350	0.1285	0.412	0.1453
2001	0.1431	0.1320	0.423	0.1649
2002	0.1900	0.1450	0.434	0.1297
2003	0.1575	0.1405	0.445	0.2381
2004	0.1500	0.1375	0.463	0.1001
2005	0.1300	0.1125	0.466	0.1157
2006	0.1225	0.0775	0.477	0.0855
2007	0.0875	0.0775	0.481	0.0656
2008	0.0981	0.0561	0.487	0.1506
2009	0.0744	0.0400	0.492	0.1220
2010	0.0749	0.0758	0.500	0.1370
2011	0.1485	0.1427	0.509	0.1080
2012	0.1117	0.1177	0.514	0.1220
2013	0.1081	0.1097	0.521	0.8500
2014	0.1120	0.1080	0.525	0.0800
2015	0.0412	0.0457	0.527	0.0900
2016	0.1305	0.1396	0.531	0.1570

Source: CBN, NBS and UNDP (2017)

Where: CBN = Centra Bank of Nigeria.
NBS = National Bureau of Statistics
UNDP = United Nations Development Projects
TBR = Treasury Bill Rates
CBTC = Central Bank Treasury Certificate
HDI = Human Development Index

Fig. 4.1 – Graphical Illustration



Source: Computation by author using E-view 7

Figure 4.1, shows that in the model IV, while HDI (Dependent variable) has continued to show a consistent linear growth indicating composite economic development, it will however be observed that the use of open market instruments such as Central Bank treasury certificate (CBTC) and treasury bills (TBR), to control the level of money in the economy have remained flat over the period with occasional slips in due to fall in market rates in response to economic realities of the period. The effect of these movements on economic development measured by HDI has shown positive effect on the economy.

4.1 Diagnostic Tests

The aim here is to carry out various diagnostic tests to ensure that our data and model used in this research work conforms to the basic assumptions of the classical linear regression. This will ensure that the output of this process is not error prone and is reliable.

4.1.1: Test for Stationarity

The test for stationerity requires that the variables in the series model must be stationery at a given level and p-value must be significant at that level. Stationerity is attained where the test statistics is most negative and greater than the critical value of the chosen level of significance.

Table 4.2: Unit Root Tests

Variables	ADF Test Statistics	Critical Values @5%	P-value	Order of Integration
TBR	**-3.4300**	**-2.9640**	**0.0177**	**I(0)**
CBTC	**-6.0354**	**-2.9678**	**0.0000**	**I(1)**
INFR	**-3.8417**	**-2.9640**	**0.0066**	**I(0)**
HDI	**-3.6948**	**-2.9640**	**0.0094**	**I(0)**

Table 4.2 shows that all the variables are stationery at levels except for CBTC that is stationery at level one (1) at the 5% chosen level of significance with positive and significant p-values.

4.1.2- Test for Serial Correlation – Breusch-Godfrey (BG) Tests

The Breusch-Godfrey tests is used to test for the presence or absence of serial or autocorrelations in the model with the Null hypothesis stating that there is No autocorrelation. This holds if p-value is greater than the chosen level of significance otherwise reject.

Table 4.3: Breusch-Godfrey Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.427802	Prob. F(2,6)	0.6704
Obs*R-squared	2.371267	Prob. Chi-Square(2)	0.3056

Source: Author's E-view 7 computations

From table 4.3, the p-value is greater than the chosen level of significance of 5%, indicating the absence of autocorrelation in the model. This is further enhanced with a Durbin-Watson statistics of 1.90. Hence, we do not suspect any violation of the assumptions of classical linear regression. The applicable treatment was to led the variables by 5 periods (TBR, CBTC) while the moderating variable (INFR) was led by 3 periods.

4.1.3 Test for Heteroskedasticity (Arch)

The assumption of the classical linear regression that the variance of the errors is constant is known as *Homoskedastycity*. If the variance of the errors is not constant, this would be known as *Heteroskedasticity.* Hence, we test for the presence of heteroskedasticity with the intention of treating same if found. The treatment method adopted here is the Autoregressive conditionally Heteroscedastic test known as ARCH. The Null hypothesis states that there is no Heteroscedasticity if the p-value is greater than the level of significance (Brooks, 2014).

Table 4.4: Heteroscedasticity – Arch Test

Heteroscedasticity Test: ARCH			
F-statistic	0.699348	Prob. F(1,19)	0.4134
Obs*R-squared	0.745523	Prob. Chi-Square(1)	0.3879

Source: Author's E-views computation

The null hypothesis states that there is No heteroscedasticity if p-value is not significant and is greater than the chosen level of significance of 5%. Hence, in this case we accept the Null hypothesis that there is no evidence of heteroskedasticity since p-value is greater than 5% significance level.

4.2.0 Test of Hypothesis

H_{o1}: There is no significant relationship between open market operations represented by both the Treasury Bill Rate (TBR) and the Central Bank Treasury Certificate (CBTC), and economic development of Nigeria.

H_{i1}: There is significant relationship between open market operations represented by both the Treasury Bill Rate (TBR) and the Central Bank Treasury Certificate (CBTC), and economic development of Nigeria.

4.2.1 OLS Regression Test for Short-run Effect

Table 4.5: Regression Result for Open Market Operations Mechanisms

Dependent Variable: HDI				
Method: Least Squares				
Date: 03/27/18 Time: 16:33				
Sample (adjusted): 1988 2016				
Included observations: 29 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.018880	0.005964	3.165480	0.0042
CBTC(-2)	-0.017106	0.018484	-0.925430	0.3640
TBR(-1)	0.023679	0.019842	1.193330	0.2444
INFR(-1)	-0.001042	0.003201	-0.325562	0.7476
HDI(-1)	0.974389	0.009514	102.4120	0.0000
R-squared	0.998568	Mean dependent var		0.423690
Adjusted R-squared	0.998330	S.D. dependent var		0.080888
S.E. of regression	0.003306	Akaike info criterion		-8.430660
Sum squared resid	0.000262	Schwarz criterion		-8.194920
Log likelihood	127.2446	Hannan-Quinn criter.		-8.356829
F-statistic	4184.779	Durbin-Watson stat		2.402408
Prob(F-statistic)	0.000000			

Source: Author's computer generated Eviews result

In table 4.5, the R^2 and Adjusted R^2 both showed 99.86% and 99.83% respectively. This shows that the chosen regression model best fits the data. Hence, the goodness of fit regression model is 99.86% and implies that chosen explanatory variables explain variations in the dependent variables to the tune of 99.86%. Also, with a high Adjusted R^2 (99.83%) implies that the model can take on more variables conveniently without the R^2 falling beyond 99.83%, which is very commendable. F-statistics of 4184.779 is considered very good being positive and significantly large enough and it shows that there is significant positive relationship between the dependent and explanatory variables. The overall probability (F-statistics) of 0.0000 is rightly signed and very significant and displays a Durbin-Watson of 2.4024, which is considered good as it shows little or no effect of autocorrelation on the chosen data.

Hence, from table 4.5, CBCT(-2) at lag 2, has a t-statistic value of -0.9254 and a p-value 0.3640 while TBR(-1) at lag 1, had a t-statistic value of 1.1933 and a p-value of 0.2444, were found to have both negative and positive effect on HDI respectively and these effects were statistically not significant at 5% level since their p-values were greater than 0.05. Therefore, we accept null hypothesis to reject the alternative. Similarly, the INFR, has a t-statistic value of -0.3254 and p-value of 0.7476 and this effect is negative and statistically not significant at the 5% level. The implication of this result is that a 1% increase in CBTC, will result to a 1.7106% decrease in economic development (HDI) while a 1% increase in TBR, will result to a 2.3679% increase in HDI and the coefficients of the past levels of CBTC and TBR variables have both negative and positive sign and at the 5% significance level.

4.2.2 Co-integration test for long-run effect

Table 4.6: Co-integration result

Date: 03/28/18 Time: 05:46				
Sample (adjusted): 1988 2016				
Included observations: 29 after adjustments				
Trend assumption: Linear deterministic trend				
Series: CBTC HDI INFR TBR				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.720396	80.29545	47.85613	0.0000
At most 1 *	0.608563	43.33842	29.79707	0.0008
At most 2 *	0.347990	16.13845	15.49471	0.0400
At most 3	0.120853	3.735302	3.841466	0.0533
Trace test indicates 3 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.720396	36.95702	27.58434	0.0024
At most 1 *	0.608563	27.19997	21.13162	0.0062
At most 2	0.347990	12.40315	14.26460	0.0964
At most 3	0.120853	3.735302	3.841466	0.0533
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Author's E-views computation

The Johansen Co-integration Tests reveal the existence of co-integration with significant p-values below the chosen level of significance of 0.05. The co-integration table 4.6, shows a co-integrating vector of 3 under the trace tests that are positively significant (p-values-0.0000, 0.0008, 0.0400) and also, the maximum eigenvalue shows a 2 co-integrating vector that are also positively significant (p-values- 0.0024 and 0.0062) in table 4.6. Hence, the trace test and the maximum Eigenvalue both show co-integration between the Central Bank treasury certificate, Treasury bill rate and level of economic development in Nigeria with 3 co-integrating equations.

Decision rule: We reject null hypothesis of the co-integration relationship to accept the alternative that there is Co-integration. We thus, conclude from the result that Central Bank treasury certificate and the Treasury bill rate both have a long-run effect on Economic development proxied by HDI (Human Development index).

4.2.3 Granger-Causality test

Table 4.7: Granger-Causality Result

Pairwise Granger Causality Tests			
Date: 03/28/18 Time: 06:00			
Sample: 1986 2016			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
HDI does not Granger Cause CBTC	29	2.73576	0.0851
CBTC does not Granger Cause HDI		0.86593	0.4334
INFR does not Granger Cause CBTC	29	1.55241	0.2323
CBTC does not Granger Cause INFR		4.54746	0.0212
TBR does not Granger Cause CBTC	29	3.22189	0.0576
CBTC does not Granger Cause TBR		4.21937	0.0269
INFR does not Granger Cause HDI	29	0.42694	0.6574
HDI does not Granger Cause INFR		2.35825	0.1161
TBR does not Granger Cause HDI	29	0.60733	0.5530
HDI does not Granger Cause TBR		4.37404	0.0240
TBR does not Granger Cause INFR	29	1.71301	0.2016
INFR does not Granger Cause TBR		2.31263	0.1207

Source: Author's E-views computation

The result in table 4.7 shows that CBTC does not granger-cause HDI and similarly, HDI does not granger-cause CBTC, both showing a p-values of 0.4334 and 0.0851 respectively. Also, TBR does not granger-cause HDI but HDI granger-causes TBR, their respective p-values being 0.5530 and 0.0240 compared to the chosen level of significance. Hence, we conclude that TBR does not granger-cause economic development proxied by HDI but economic development granger-causes treasury bill rate proxied by TBR.

4.2.4 Error Correction Term

Table 4.8: Residual Unit Root test

Var	ADF stat	Critic.value@5%	P-value	Order of Integ.
ECT4	-6.39954	-2.9719	0.0000	I(0)

Source: Author's E-views computation (See appendix 15 for details)

The residual unit root in table 4.8 is stationery at levels and effectively confirms the existence of co-integration.

Table 4.9: Error Correction Model

d(hdi) = c + d(cbtc(-1)) + d(tbr(3)) + d(infr(3)) + d(hdi(-1)) + ect4(-1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.004368	0.003504	1.246545	0.2277
D(CBTC(-1))	0.024646	0.017892	1.377539	0.1844
D(TBR(3))	-0.004192	0.015942	-0.262966	0.7954
D(INFR(3))	-0.000850	0.002978	-0.285603	0.7783
D(HDI(-1))	0.553724	0.356411	1.553610	0.1368
ECT4(-1)	-0.855220	0.402898	-2.122672	0.0471

Source: Author's E-views computation

This section presents the result of the ECM test. The model of the ECM is on the table 4.9 and the estimates of the short-run and long-run movements, as well as the error correction term, which proxies speed of adjustment, are provided in the table 4.9. The table shows useful long-run information. The equilibrium adjustment coefficient 85.52% enters with a correct sign "negative". This suggests that both Central Bank treasury certificate rate and treasury bill rate, with economic development proxied by Human Development index (HDI) converges to long-run equilibrium; it can also be observed that ECT4(-1) coefficient tends to one, indicating that the speed of adjustment to equilibrium is fast. It shows that 85.52% of the deviation from the equilibrium path is corrected on a yearly basis. The ECM result therefore confirms the long-run relationship between Central Bank treasury certificate, treasury bill rate (TBR) and economic development (HDI) from the residual unit root test and the co-integration tests respectively.

4.3 Discussion of Findings

The findings of this work shows that treasury bill rates (TBR) has a positive but not significant effect on economic development (p-value = 0.2444) with a t-statistic of 1.19333 at the 5% chosen level of significance in the short-run. Similarly, Central Bank treasury certificate has a negative and insignificant effect on economic development (p-value= 0.3640) with a t-statistic of 0.9254 at same level of significance. The co-integration tests however, revealed a positive and statistically significant effect of treasury bill rate and Central Bank treasury certificate on economic development. While the findings of the short-run, OLS test is corroborated with the findings of Mohammed and Ahmed (1995); Saibu and Nwosa (2011) and Dotimi (2009), who found no significant relationship between the monetary policy instruments and economic growth. The coefficient of TBR of 0.023679 is positive and indicates that 1% increase in TBR will result to 2.3679% rise in economic development of Nigeria. Similarly, the coefficient of CBTC of -0.017106 is negative and indicates that a 1% rise in CBTC will result to a 1.7106% decline in economic development of Nigeria. Also, the co-integration result of positive and significant effect of TBR is consistent with the outcome of the research work in Chimaobi and Uche (2010) and Sanchita and Rina (2011), who discovered a positive and significant effect of monetary policy instruments on economic growth. The granger-causality test only showed a significant uni-directional relationship between HDI and TBR (p-value= 0.0240). The speed of adjustment is also impressive from short-run to long-run at 85.52% for the Error correction term with a significant value of 0.0471, and agrees with the findings of Olubusoye and Oyaromade (2008) and Bongunjoko (1997), who discovered a significant speed of adjustment for monetary policy instruments on economic growth using Error correction term. The monetarist theory will however, hold true for the long-run relationship only.

5.0 Conclusion and Recommendation

The finding from our objective for this study shows that Central Bank Open Market Operations measured by treasury bill rates and treasury certificate rates though does not show a significant impact on economic development in the short-run, it however, had positive and significant effect in the long-run period.

5.1 Conclusion

This research work studied the impact of Central Bank Open Market Operations on the economic development of Nigeria following largely from the work as postulated by Friedman and the monetarist theory that the quantity of money is the main determinant of the price level, or the value of money, such that any change in the quantity of money produces an exactly direct

and proportionate change in the price level. They largely held that the economy grows with proper and appropriate monetary policies.

5.2 Recommendations

In line with the objective of this study, we recommend that;

1. There should be greater awareness on the importance of Open market operations and the economic benefits of available market instruments such as Treasury bills and treasury certificates. Attractive rates should be offered in the open market to encourage development of the treasury bills and certificates markets.
2. More monetary instruments should be introduced into the open market to ginger economic development.
3. Central Banks should minimize the issuances of emergency policies that are usually short lived as effective policies require ample gestation for achievement and consolidation of intended objective.

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