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MACROECONOMIC DRIVERS OF INTEREST RATE STRUCTURE IN NIGERIA FROM 1961-2014

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ABSTRACT

This study examines selected macroeconomic drivers of interest rate structure in Nigeria from 1961-2014. Data was extracted from the Central Bank of Nigeria (CBN) statistical bulletin and was analysed using Augmented Dickey-Fuller (ADF), Johansen Co-integration and Vector Autoregressive model (VAR) for three separate periods. The initial analysis covers all available data since Nigerian Independence till recent (1961-2014); then for a period of strict regulation (1961-1986) and deregulation (1987-2014). Findings from this study reveal that both monetary and fiscal policies adopted show varying level of efficiency and effectiveness across the three time frames analysed. For the entire sample, a negative significance of open market operations as a monetary policy instrument was noticed; for the regulation period, it is seen that government spending as a fiscal policy had a negative significance and finally for the deregulation period, open market operations had a negative significance on interest rate structure. It is recommended that the Nigerian government should develop an adequate tax system, have an achievable monetary policy rate and finally the CBN should ensure active involvements of the domestic banks in the open market operations.

Key Words: Macroeconomic Drivers, Interest Rate, Monetary Policy, Fiscal Policy

1.0 Introduction

In Economics, macroeconomic drivers are instruments adopted to drive the growth and development of an economy. These instruments are designed to manipulate price, demand and supply within an economy, balance of payment; created employment and expansionary or deflationary economy as need be. The two most important macroeconomic drivers generally used in achieving macroeconomic objectives and that affects interest rate structure in an economy are the monetary and fiscal policies.

Monetary policy is the deliberate action of apex monetary authority, the CBN, to use monetary instruments: Open Market Operations (OMO), Monetary Policy Rate (MPR), reserve requirements, discount window operations and repurchase agreements to influence the cost, value and credit supply of money. It is used to achieve desirable macroeconomic objectives of domestic and international balances (CBN, 2011b).

Fiscal policy is administered and controlled by Federal Ministry of Finance (FMF) or the Nigerian Treasury and the key policy instruments used are government spending, government revenue (particularly taxes) and transfer payments (CBN, 2011b). These tools are used to control the overall level of economic activities within the country either for expansionary or contractual purposes as deemed necessary in maintaining economic stability.

Interest rate structure is the link between the long and short-term market interest rates. Precisely, it is the relationship of interest rate to a security's time to maturity, which can be used to evaluate market expectations. Interest rate is one of the most essential variables in macroeconomics and in the functioning of any financial market. This is because it aids in the determination of financial instruments value and commonly affects the decisions of economic agents on consumption,

savings and investments.

The term structure of interest rate also measures the relationship between the yields of risk-free securities that are different only in their term to maturity (Oseni and Adesoye, 2016). A yield is the future rate of return from holding a security. A positive slope yield curve implies that the yields of a long-term maturing security are higher than the yields of a short-term maturing security (Cox et al.1985).

Studies such as Oseni and Adesoye (2016), Ikechukwu (2014) and Titus et al. (2014) observed that there is an existing relationship between macroeconomic drivers and interest rate structure in Nigeria. This study is influenced by the Nigerian financial sector present state of high interest rates. Therefore, the need to evaluate the impact macroeconomic drivers has on interest rate structure.

1.1 Objective of the Study

The primary objective of this study is to examine if macroeconomic drivers have an impact on interest rate structure in Nigeria from 1961-2014.

2.0 Review of Literature

Traditional Keynesian interest rate channel is a policy-induced increase in short-term interest rate that leads first to an increase in long-term nominal interest rate as investors try to arbitrage differences in debt instruments risk-adjusted expected returns (CBN, 2011b).

Cornelius et al. (2015) stated that there are four term structures of interest rate theories; firstly, the Expectation Theory, which describes the yield curve in relation to expected short-term rate, secondly, Market Segmentation Theory states that the supply and demand of a particular sector decides it interest rate. Third is the Substitutability Theory which states that both short-term and long-term securities are alternatives for borrowers and lenders in the market and finally, the Liquidity Premium Theory which is the mixture of both Expectation and Market Segmentation Theories.

However, theory does not show a clear relationship between macroeconomic drivers and interest rate structure.

Ang and Piazessi (2002) discovered that macroeconomic drivers have clear effects on yield curve in the short-run but do not in the long-run. However, Evans and Marshall (2007) revealed that long-term bond yields movement is strongly influenced by macroeconomic variables especially in the long-run. Titus et al. (2014) used bilateral relationships among economic variables and a market based monetary regime on the effects of money supply and fiscal deficits in Nigeria. They discovered that money supply have negative effect on interest rates whereas, fiscal deficits have positive effect on interest rates.

Studies of Wu (2001) and Ilmanem and Iwanowski (1997) revealed that about 80% of yield curve movements are caused by monetary policy interventions. Lastrapes and Selgin (1995) measured money supply as monetary base (M1 and M2) in the United States (US) to interest rate. They discovered that a permanent shock to money supply causes a temporary interest rate fall that is consistent with a shock in monetary policy. Gbenedio et al. (1999) studied the long-run equilibrium relationship that is between the spread of interest rates and the variability of money supply in Nigeria following the Structural Adjustment Program (SAP) introduction. The SAP is an extensive economic restructuring program that emphasized the increased reliance on market forces. They used pairwise granger causality and co-integration technique, and revealed there is no relationship between interest rate spread and variability of money growth in the long-run equilibrium between 1985 and 1992. However, they found an essential impact of the variability of money growth on term structure of interest rate similar to the hypothesis of Milton, (1973).

Thomas (2010) used the no-arbitrage term structure model in evaluating interest rates sensitivity to fiscal policy shocks in sovereign default risk perceptions in two parts. The first part focused on a situation where default risk is yet to play a role. That is, US treasury debt. They showed that tightening fiscal policy reduces interest rates

because a decline in inflation and real activity causes Fed to respond in reducing short-term interest rates. The second part of the study focused on a situation where default risk has played a role. That is, European Monetary Union (EMU) government bonds. They revealed that there is interest rates sensitivity to fiscal positions of the EMU individual countries, when investors identify and value sovereign default risk. Ardagna et al. (2007) evaluated fiscal policy effects in 16Organisation for Economic and Co-operation Development (OECD) countries from 1960-2002. They discovered that when fiscal deficit to Gross Domestic Product (GDP) increases by 1%, there would be an increase in long-term interest rates by 10 (bps). They also found that an average deficit and an average debt have statistically important magnitudes of between 20-60 bps impacts on long-term interest rates. Ezeabasili and Mojekwu (2011) used structural analysis and co-integration techniques. They discovered that fiscal deficits have a positive significant relationship with interest rates in Nigeria.

Evidences abound in literature showing the effect of macroeconomic drivers on economic growth in Nigeria. Adeoye (2006) suggested that the use of both monetary and fiscal policies together is the most effective way of regulating inflation rate and controlling depression in an economy. Ajisafe and Folorunso (2002) studied the effectiveness of monetary and fiscal policy on the Nigerian economy from 1970-1998 using co-integration and Error Correction Model (ECM) approach. They found that government's fiscal policy actions have caused great distortion while monetary policy shows great impact to the economy. Adefeso and Mobolaji (2010) studied the effectiveness of monetary and fiscal policies on the economy's growth using annual data from 1970-2007. They discovered that monetary policy have a stronger impact than fiscal policy to the economy's growth. *Chuku (2010) examined the interactions of monetary and fiscal policy using quarterly data between the periods of 1970 and 2008.He used the VAR model and revealed that from 1980-1994; the interactions of monetary and fiscal policies are symmetric while at other periods, there is no evidence of symmetry.*

Ismail et al.(2013)studied the impact monetary policy have on the economy's growth from 1975–2010 using ECM. They discovered that economic growth are significantly driven by monetary policy instruments such as external reserves, exchange and inflation rates. Charles (2012) in his study of monetary policy impact on the economy from 1981-2008 using the Ordinary Least Squares (OLS) Model, concluded that there is positive impact on the country's Balance of Payment (BOP), GDP and a negative impact on inflation rate from money supply. Balogun (2007) in his study used the simultaneous models to test the hypothesis of monetary policy ineffectiveness. He discovered that monetary policy instead of promoting growth caused constant inflation and stagnation.

Olawunmi and Ayinla (2007) studied the impact fiscal policy has on economic growth sustainability using the OLS method to estimate a Solow growth model. They showed that in ensuring economic growth sustainability, fiscal policy has been ineffective. They also discovered drivers such as inadequate feedback mechanism for implemented policy, poor policy implementation, and wasteful spending occur which negatively impact the effectiveness of fiscal policy. Ezeoha and Chibuike (2005) revealed that government imprudent behaviour in deficit financing causes inflation to contradict monetary policy objective of price stability. It also has the potential of diminishing the economic growth and development.

3.0 METHODOLOGY

3.1 Sources of Data

The data for the purpose of this study is a secondary time-series data obtained from the CBN statistical bulletin 2011 and 2014 for the period of 1961-2014. A span of 54 years has been uniquely chosen to reflect the regulation (1961-1986) and deregulation (1987-2014) periods of interest rate in Nigeria.

Furthermore, log(s) of open market operations, tax policy and government spending have been taken for consistency.

3.2 Data Analysis Technique

The model to explicitly determine the determinants of interest rate structure in Nigeria is;

$$TS_{INT} = \alpha + \beta_1 MPR + \beta_2 LNOMO + \beta_3 LNTP + \beta_4 LNG\_SPEND + \varepsilon_i \quad eq.(1)$$

Where; *TS_INT*= Term Structure of Interest Rate, *MPR* = Monetary Policy Rate, *LNOMO* = Log of Open Market Operations, *LNTP* = Log of Tax Policy and *LNG_SPEND* = Log of Government Spending.

α = constant, $\beta_1 \ldots \beta_4$ = coefficients of the parameters and ε_t= Error term

Equation 1 is explained functionally as;

$$TS\_INT = f(TS\_INT, MPR, LNOMO, LNTP, LNG\_SPEND, \varepsilon) \quad eq.(2)$$

3.3 Unit Root Test

Unit root is tested in the series and in which order they become stationary using the ADF test. For the purpose of this study, the series must be integrated of the same order and order one, I(1) and for consistency, the trend and intercept and a user specified lag is used.

3.4 VAR Lag Order Selection Criteria

This is used to check the optimal lag length to use. The Akanke Information Criterion (AIC) and Schwarz-Bayesian Information Criterion (SBIC) are the two most popularly used information criteria. However, if they give different lags to use, SBIC is preferred as it is more consistent than AIC.

3.5 Autocorrelation Test

The autocorrelation LM test in VAR is used to determine if the variables are not serially correlated. For this study, the variables must not be serially correlated.

3.6 Co-integration Test

This is used to examine if there is a long-run relationship between the series. The Johansen Co-integration is used. This is preferable when conducting multivariate tests with more than two independent variables (Alexander, 1999). This is done at level and the variables must all be non-stationary in their level forms.

3.7 VAR Model

If no co-integration is found among the series, VAR model will be estimated. This is used to determine short-run relationship between the variables in time-series data.

3.8 VEC Model

If co-integrating equations is found among the series, VEC model proposed by Johansen (1991) will be estimated. This is used to determine the series annual speed of adjustments in the short-run disequilibrium to return to the long-run equilibrium.

3.9 Granger Causality Test

This is used to determine the variables direction of causality and this study is only concerned with the unidirectional causality from independent variables to the dependent variable.

4.0 Data Analysis

4.1 Descriptive Statistics

Table 1 describes the variables used for this study. It shows that term structure of interest rate has the highest mean, maximum and minimum (13.66123, 29.80000 and 6.000000 respectively) while OMO has the lowest mean, maximum and minimum (8.895142, 14.72448 and 0.867940 respectively). This means term structure of interest rate is very high. This is in line with it present state in Nigeria. Although OMO is a major monetary policy instrument, the buying and selling of Nigerian Treasury Bills (NTBs) and treasury certificates by the Central bank is low in Nigeria. In fact, most of the NTBs are bought by foreigners and not the citizens of the country. All the variables have slightly high standard deviations indicating they slightly depart from their mean. Term structure of interest rate, MPR, and tax policy is positively skewed to the right while OMO and government spending are negatively skewed to the left. All the

variables are less than the normal kurtosis of 3 which indicates they have platykurtic distribution. That is, lower peak distribution. Jarque-Bera indicates all the variables are normal.

Table 1: Descriptive Statistics of Individual Samples

	TS_INT	MPR	LNOMO	LNTP	LNG_SPEND
MEAN	13.66123	9.845901	8.895142	9.832488	10.54817
MEDIAN	14.33897	9.500000	8.861803	8.857079	10.11531
MAXIMUM	29.80000	26.00000	14.72448	15.00187	15.46134
MINIMUM	6.000000	3.500000	0.867940	5.410100	5.099244
STD. DEV.	6.510295	5.231134	3.743572	3.084450	3.373714
SKEWNESS	0.408518	0.691566	-0.275189	0.306505	-0.095254
KURTOSIS	2.099894	2.947113	2.241019	1.601146	1.744565
JARQUE-BERA	3.324910	4.310660	1.977678	5.248290	3.627925
PROB.	0.189673	0.115865	0.372008	0.072502	0.163007

4.2 Unit Root (ADF) Test.

Table 2(a) indicates that the null hypothesis of a unit root in the variables cannot be rejected. This is because their t-statistics is not more negative than the critical values at 1%, 5% and 10% significance level, indicating non-stationary.

Table 2(a): ADF at Level

Series	ADF t-stat.	1% CV	5% CV	10% CV	P-values
TS_INT	-1.694205				0.7398
		-4.144584	-3.498692	-3.178578	
MPR	-1.935602				0.6217
		-4.144584	-3.498692	-3.178578	
LNOMO	-2.703191				0.2397
		-4.144584	-3.498692	-3.178578	
LNTP	-2.196186				0.4816
		-4.144584	-3.498692	-3.178578	
LNG_SPEND	-1.453204				0.8328
		-4.144584	-3.498692	-3.178578	

Note: CV denotes Critical Values

Table 2(b) indicates that the null hypothesis of a unit root in the variables is rejected. This is because their t-statistics is more negative than the critical values at 1%, 5% and 10% significance level, indicating stationarity.

Table 2(b): ADF at First Difference

Series	ADF t-stat.	1% CV	5% CV	10% CV	P-values
D(TS_INT)	-7.225106				0.0000
		-4.148465	-3.500495	-3.179617	
D(MPR)	-7.645749				0.0000
		-4.148465	-3.500495	-3.179617	
D(LNOMO)	-7.633319				0.0000
		-4.148465	-3.500495	-3.179617	
D(LNTP)	-5.659205				0.0001
		-4.148465	-3.500495	-3.179617	
D(LNG_SPEND)	-4.481451				0.0040
		-4.148465	-3.500495	-3.179617	

Note: CV denotes Critical Values

The ADF test above indicates the variables are non-stationary at their level forms and stationary at their first difference. That is, they are integrated of order one, I(1).

4.2 VAR Lag Order Selection Criteria

Table 3 shows that AIC and SIC give different results of 2 and 1 lags respectively. Since SIC is consistent, 1 lag will be used.

Table 3: VAR Lag Order Selection Criteria

LAG	FPE	AIC	SIC	HQ
0	223.0962	19.59696	19.78816	19.66977
1	0.091704	11.79439	12.94160*	12.23125*
2	0.089582*	11.74022*	13.84345	12.54114
3	0.133310	12.05784	15.11707	13.22281
4	0.146714	11.99320	16.00844	13.52223

Note: * denotes selected lag order by the criterion
FPR - Final Prediction Error
AIC- Akaike Information Criterion
SIC – Schwarz Information Criterion
HQ – Hannan-Quinn Information Criterion

4.2 Autocorrelation LM Test

Table 4 indicates that the null hypothesis of no serial autocorrelation cannot be rejected,as the p-values are larger than 5% significance level.This means there is no correlation or co-movement between term structure of interest rate, MPR, OMO, tax policy and government spending in Nigeria.

Table 4: VAR Residual Serial Correlation LM Test

LAGS	LM-Stat	Prob.
1	16.36738	0.9034
2	20.26969	0.7325

Probs from chi-square with 25 df

Figure 1-5 shows the line graph of the variables. From 1987-2014, term structure of interest rate became very high and volatile. It also never went back to being constant or less volatile as observed from 1961-1986. This change is due to the deregulation of interest rate in Nigeria in 1987; where the determination of interest rate was left to market forces since 1987 till now. Similarly, MPR, OMO, tax policy and government spending were also stable and less volatile during the regulation period compared to the deregulation were there was increased volatility.

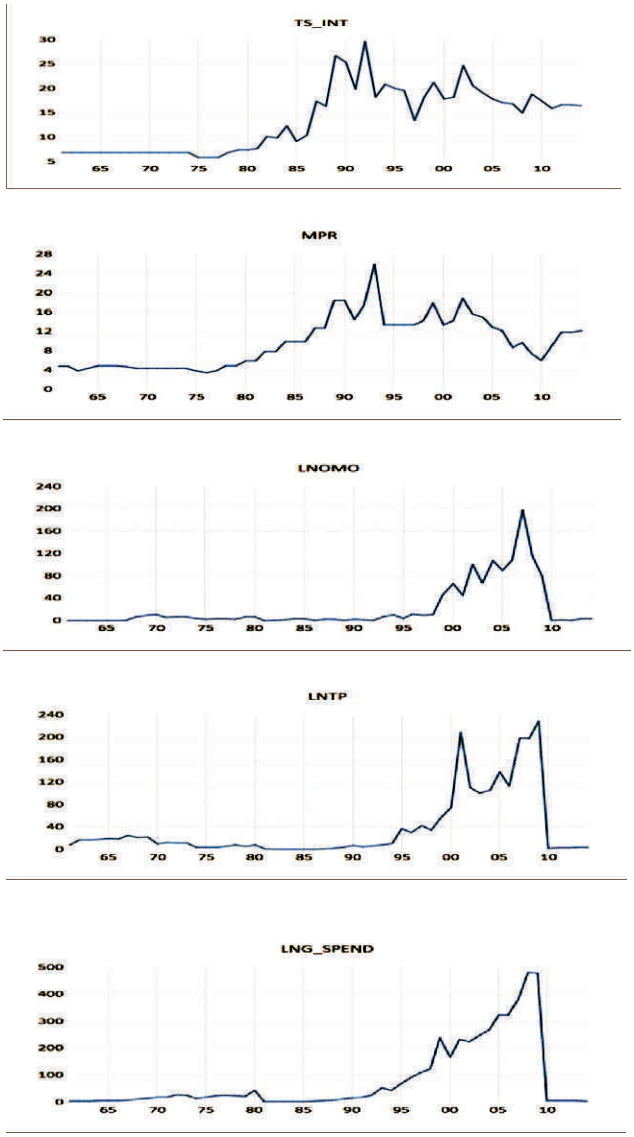


Figure 1-5: Line Graph of TS_INT, MPR, LNOMO, LNTP and LNG_SPEND

Further analysis is based on three periods; entire (1961-2014), regulation (1961-1986) and deregulation (1987-2014) periods to observe the structural change as seen in figure 1-5 above.

4.2 Entire Period

4.2.1 Johansen Co-integration Test

The result of the trace and max-eigen test-statistics in table 5 indicates there is no co-integration between the variables at 5% significance level. This means term structure of interest rate, MPR, OMO, tax policy and government spending have no long-run relationship for the entire period.

Table 5: Johansen Cointegration Entire Period

Hypothesized No. of CE(s)	Eigenvalue	Trace			Max-Eigen		
		Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.374777	58.3330	69.8189	0.2901	24.4217	33.8769	0.4252
At most 1	0.258219	33.9114	47.8561	0.5067	15.5325	27.5843	0.7050
At most 2	0.205550	18.3789	29.7971	0.5382	11.9655	21.1316	0.5511
At most 3	0.097514	6.41342	15.4947	0.6466	5.3353	14.2646	0.6991
At most 4	0.020520	1.07812	3.8415	0.2991	1.0781	3.84147	0.2991

Note: Trace test indicates no cointegration at the 0.05 level
Max-eigenvalue test indicates no cointegration at the 0.05 level
**** denotes rejection of the hypothesis at the 0.05 level***
*****denotes MacKinnon-Haug-Michelis (1999) p-values.***

4.2.1 VAR

Table 6 indicates that only MPR has positive coefficient. This means a 1% increase in MPR increases term structure of interest rate by 0.05%. However, this is statistically insignificant at 5% significance level. This could be due to continuous ineffective MPR as this is contrary to the MPR objective to address term structure of interest rate volatility. Term structure of interest rate, OMO, tax policy and government spending has negative coefficients. This means a 1% increase in them decreases term structure of interest rate by 0.51%, 1.92%, 0.93% and 1.04% respectively. However, only term structure of interest rate and OMO is statistically significant at 5% significant level. This negative effect is due to the low buying and selling of the NTBs and Treasury Certificates by the Central bank. Also, the negative insignificance of tax policy and government spending could possibly be due to poor tax system, over reliance on oil and misappropriation of government spending.

R-square indicates MPR, OMO, tax policy and government spending only explain 32.5% of term structure of interest rate. F-statistics indicates the overall VAR regression is statistically significant at 5% significance level. This means MPR, OMO, tax policy and government spending have a joint impact on term structure of interest rate in Nigeria for the entire period.

Table 6: VAR Estimates Entire Period

Series	Coefficient	Std. Error	t-Statistic	Prob.
C	1.127023	0.606953	1.856853	0.0697
D(TS_INT(-1))	-0.512724	0.125917	-4.071914	0.0002
D(MPR(-1))	0.050446	0.164463	0.306732	0.7604
D(LNOMO(-1))	-1.920291	0.719391	-2.669330	0.0105
D(LNTP(-1))	-0.931403	1.380988	-0.674447	0.5034
D(LNG_SPEND(-1))	-1.043143	2.033760	-0.512914	0.6105
Others;				
R-squared	0.325361			
F-statistics	4.436924			
Prob(F-statistics)	0.002216			
Durbin-Watson stat	2.017996			

4.5.3 Granger Causality Test

Table 7 indicates that only OMO is statistically significant at 5% significance level. This means OMO causes short-run dynamics to term structure of interest rate while MPR, tax policy and government spending do not for the entire period. The objective of OMO to influence the funds available in the Nigerian financial system has short-term effectiveness.

Table 7: VAR Granger Causality/Block Exogeneity Wald Tests Entire Period

Dependent variable: D(TS_INT)			
Excluded	Chi-sq	df	Prob.
D(MPR)	0.094085	1	0.7590
D(LNOMO)	7.125321	1	0.0076
D(LNTP)	0.454879	1	0.5000
D(LNG_SPEND)	0.263080	1	0.6080

4.5.4 Impulse Response Function

Figure 6-10 indicates a one standard deviation shocks to term structure of interest rate. There is a positive start in shock to term structure of interest rate indicating it has an immediate positive effect on itself. Shocks in MPR, OMO, tax policy and government spending to term structure of interest rate are mostly zero. This means, they do not give an immediate effect on term structure of interest rate. Therefore, term structure of interest rate would have continued to follow the same path if there were no shocks to these macroeconomic drivers for the entire period.

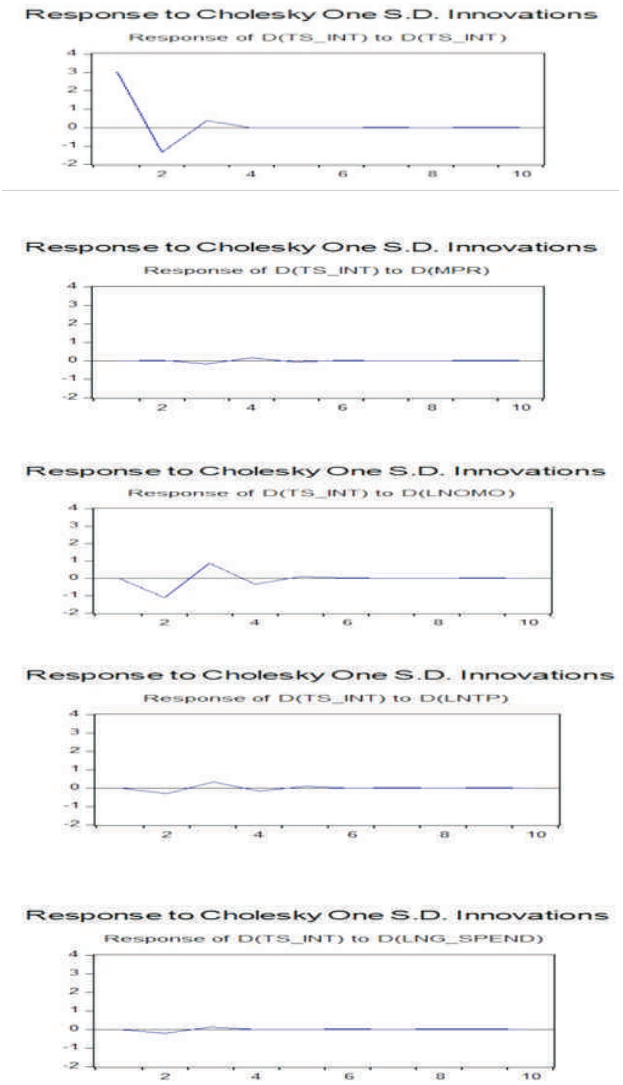


Figure 6-10: Impulse Response of TS_INT to TS_INT, MPR, LNOMO, LNTP and LNG_SPEND Shocks Entire Period

4.5.5 Variance Decomposition

Table 8 shows term structure of interest rate variation explained by MPR, OMO, tax policy and government spending. MPR, OMO tax policy and government spending have constant variation to term structure of interest rate. Term structure of interest rate in itself slightly accounted for its contemporary variance from its own innovations from 100% in the first period to about 81.64% in the tenth period. This means term structure of interest rate also slightly causes departure on itself for the entire period.

Table 8: Variance Decomposition Entire Period

Variance Decomposition of D(TS_INT):						
Period	S.E	D(TS_INT)	D(MPR)	D(LNOMO)	D(LNTP)	D(LNG_SPEND)
1	3.010380	100.0000	0.000000	0.000000	0.000000	0.000000
2	3.499611	88.77885	0.003144	9.912566	0.901971	0.403465
3	3.638764	82.99569	0.218453	14.65582	1.658870	0.471167
4	3.665746	81.77978	0.412099	15.42817	1.912411	0.467541
5	3.668639	81.65323	0.467398	15.45532	1.956229	0.467814
6	3.668843	81.64433	0.473218	15.45366	1.960159	0.468639
7	3.668878	81.64384	0.473298	15.45377	1.960348	0.468743
8	3.668887	81.64388	0.473313	15.45370	1.960365	0.468741
9	3.668889	81.64382	0.473317	15.45375	1.960375	0.468743
10	3.668890	81.64379	0.473317	15.45377	1.960380	0.468743

4.6. Regulation Period

4.6.1 Johansen Co-integration Test

The result of the trace and max-eigen test-statistics in table 9 indicates there is one co-integrating equation between the variables at 5% significance level. This means term structure of interest rate, MPR, OMO, tax policy and government spending have a long-run relationship for the regulation period.

Table 9: Johansen Cointegration Regulation Period

Hypothesized No. of CE(s)	Eigenvalue	Trace			Max-Eigen		
		Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None*	0.903982	97.8781	69.8189	0.0001	56.2373	33.8769	0.0000
At most 1	0.524714	41.6409	47.8561	0.1690	17.8521	27.5843	0.5075
At most 2	0.481460	23.7887	29.7971	0.2095	15.7617	21.1316	0.2391
At most 3	0.281837	8.0270	15.4947	0.4625	7.9454	14.2646	0.3843
At most 4	0.003395	0.0816	3.8415	0.7751	0.0816	3.84147	0.7751

Note: Trace test indicates 1 cointegratingeqn(s) at the 0.05 level
Max-eigenvalue test indicates 1 cointegratingeqn(s) at the 0.05 level
**** denotes rejection of the hypothesis at the 0.05 level***
***** denotes MacKinnon-Haug-Michelis (1999) p-values***

4.6. 2. VEC

The VEC estimates in table 10 indicates that only MPR and tax policy have positive coefficients. This means a 1% increase in them increases term structure of interest rate by 0.40% and 0.10% respectively. However, they are statistically insignificant at 5% significance level. This is due to ineffective MPR and poor tax system in Nigeria during the regulation period. Term structure of interest rate, OMO and government spending has negative coefficients. This means a 1% increase in them decreases term structure of interest rate by 1.46%, 0.18% and 1.34% respectively. However, only term structure of interest rate and government spending is statistically significant at 5% and 10% significance level. The negative impact of government spending is due to the misappropriation of funds during this period.The Error Correction Technique (ECT) indicates a positive coefficient of 1.459588 and statistically significant. This means term structure of interest rate, MPR, OMO, tax policy and government spending have no annual speed of adjustments in the short-run disequilibrium to return to the long-run equilibrium for the regulation period because the coefficient of ECT is inconsistent with the usual negative value.

R-square indicates MPR, OMO, tax policy and government spending explain 61.5% of term structure of interest rate. F-statistics indicates the overall VECM regression is statistically significant at 5% significance level. This means MPR, OMO, tax policy and government spending have a joint impact on term structure of interest rate in Nigeria during the regulation period.

Table 10: VEC Estimates Regulation Period

Series	Coefficient	Std. Error	t-Statistic	Prob.
ECT(1)	1.459588	0.569605	2.562457	0.0202
D(TS_INT(-1))	-1.462853	0.414583	-3.528493	0.0026
D(MPR(-1))	0.402505	0.379693	1.060080	0.3039
D(LNOMO(-1))	-0.181422	0.309760	-0.585685	0.5658
D(LNTP(-1))	0.104954	0.671490	0.156301	0.8776
D(LNG_SPEND(-1))	-1.348580	0.672239	-2.006103	0.0610
C	0.486544	0.243236	2.000298	0.0617
Others;				
R-squared	0.615470			
F-statistics	4.534965			
Prob(F-statistics)	0.006381			
Durbin-Watson stat	1.842586			

4.6.3 Granger Causality Test

Table 11 indicates only government spending is statistically significant at 5% significance level. This means government spending causes short-run dynamics to term structure of interest rate while MPR, OMO and tax policy do not. This is because

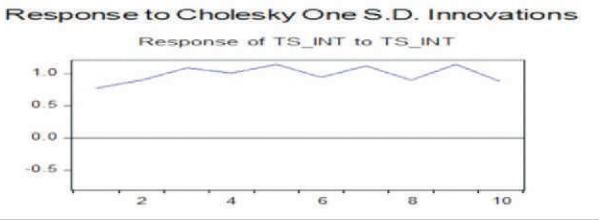
of the high government spending and misappropriation of funds in Nigeria during the regulation period.

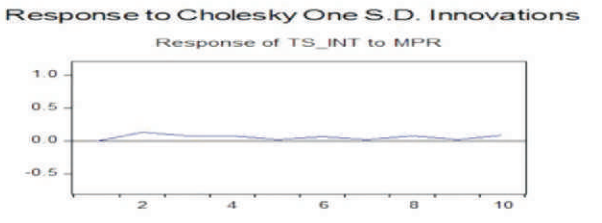
Table 11: VEC Granger Causality/Block Exogeneity Wald Tests Regulation Period

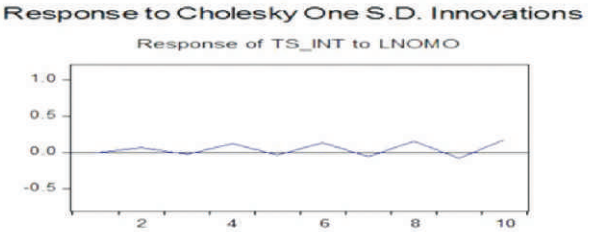
Dependent variable: D(TS_INT)			
Excluded	Chi-sq	df	Prob.
D(MPR)	1.123769	1	0.2891
D(LNOMO)	0.343027	1	0.5581
D(LNTP)	0.024430	1	0.8758
D(LNG_SPEND)	4.024448	1	0.0448

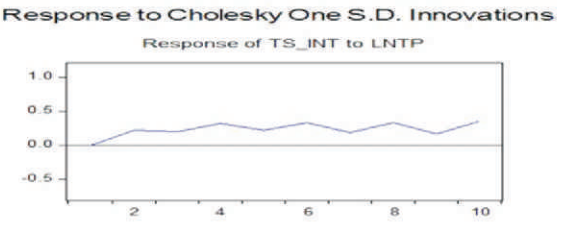
4.6.4 Impulse Response

Figure 11-15 show a positive start in term structure of interest rate and a zero start of shocks in MPR, OMO, tax policy and government spending to term structure of interest rate is the same as the entire period. However, they started to have unstable shocks to term structure of interest rate from the second period.









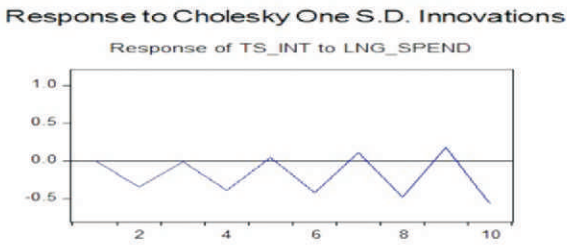


Figure 11-15: Impulse Response of TS_INT to TS_INT, MPR, LNOMO, LNTP and LNG_SPEND Shocks Regulation Period

4.6.5 Variance Decomposition

Table 12 indicate that MPR and OMOcauses constant variation to term structure of interest rate similar with the entire period. However, tax policy and government spending causes unstable deviation to term structure of interest rate. Also, term structure of interest rate in itself slightly accounted for its contemporary variance from its own innovations from 100% in the first period to about 84.33% in the tenth period.

Table 12: Variance Decomposition Regulation Period

Variance Decomposition of D(TS_INT):						
Period	S.E	D(TS_INT)	D(MPR)	D(LNOMO)	D(LNTP)	D(LNG_SPEND)
1	0.774067	100.0000	0.000000	0.000000	0.000000	0.000000
2	1.260647	87.83248	1.037183	0.204717	3.041912	7.883712
3	1.679138	91.53079	0.751050	0.153163	3.108455	4.456540
4	2.022781	87.53443	0.633371	0.414444	4.601474	6.816276
5	2.330858	89.70181	0.485809	0.335810	4.320204	5.156370
6	2.570894	86.91819	0.462238	0.530488	5.128752	6.960333
7	2.809950	88.45785	0.389696	0.487066	4.708325	5.957067
8	3.010700	85.84799	0.401415	0.670626	5.281163	7.798802
9	3.228150	87.09506	0.350579	0.652763	4.838086	7.063511
10	3.414172	84.32699	0.374505	0.853971	5.364983	9.079548

4.7 Deregulation Period

4.7.1 Johansen Co-integration Test

The result of the trace and max-eigen test-statistics in table 13 indicates there arefive and one co-integrating equations respectively between the variables at 5% significance level. This means term structure of interest rate, MPR, OMO, tax policy and government spending have a long-run relationship for the deregulation period.

Table 13: Johansen Co-integration Deregulation Period

Hypothesized No. of CE(s)		Eigen value	Trace			Max-Eigen		
Trace	Max-Eigen		Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None*	None*	0.7357	89.8185	69.8189	0.0006	37.2637	33.8769	0.0189
At most 1*	At most 1	0.4923	52.5548	47.8561	0.0170	18.9794	27.5843	0.4161
At most 2*	At most 2	0.4658	33.5754	29.7971	0.0175	17.5541	21.1316	0.1474
At most 3*	At most 3	0.2967	16.0213	15.4947	0.0416	9.8554	14.2646	0.2216
At most 4*	At most 4*	0.1977	6.1659	3.8415	0.0130	6.1659	3.8415	0.0130

Note: Trace test indicates 5 cointegratingeqn(s) at the 0.05 level
Max-eigenvalue test indicates 1 cointegratingeqn(s) at the 0.05 level
**** denotes rejection of the hypothesis at the 0.05 level***
***** denotes MacKinnon-Haug-Michelis (1999) p-values***

4.7.2 VEC

The VEC estimates in table 14 indicate that only MPR have positive coefficient. This means a 1% increase in MPR increases term structure of interest rate by 0.07%. However, this is statistically insignificant at 5% significance level. This could be due to the ineffective MPR that is still in existence. Term structure of interest rate, OMO, tax policy and government spending has negative coefficients. This means a 1% increase in them decreases term structure of interest rate by 0.55%, 3.17%, 1.15% and 0.51% respectively. However, only term structure of interest rate and OMO is statistically significant at 5% significance level. This negative effect is due to the relatively low buying and selling of the NTBs and treasury certificates by the Central bank that is still in existence. Also, tax policy and government spending have negative non-significant impact on the term structure of interest rate. This is due to the continuous misappropriation of funds and poor tax system in existence. The ECT indicates a positive coefficient of 0.012741 and statistically insignificant. The f-statistics indicates that the overall VECM regression is statistically significant at 10% significance level. This means that MPR, OMO, tax policy and government spending have a joint impact on term structure of interest rate in Nigeria during the deregulation period.

Table 4.14: VEC Estimates Deregulation Period

Series	Coefficient	Std. Error	t-Statistic	Prob.
ECT(1)	0.012741	0.066022	0.192976	0.8488
D(TS_INT(-1))	-0.545970	0.189603	-2.879543	0.0090
D(MPR(-1))	0.071195	0.317078	0.224533	0.8245
D(LNOMO(-1))	-3.167156	1.323110	-2.393722	0.0261
D(LNTP(-1))	-1.152339	3.255823	-0.353932	0.7269
D(LNG_SPEND(-1))	-0.506107	7.044953	-0.071840	0.9434
C	1.352148	1.380230	0.979654	0.3384
Others;				
R-squared	0.385036			
F-statistics	2.191390			
Prob(F-statistics)	0.084889			
Durbin-Watson stat	1.863369			

4.7.3 Granger Causality Test

Table 15 indicates that only OMO is statistically significant at 5% significance level. This means OMO causes short-run dynamics to term structure of interest rate while MPR, tax policy and government spending do not. This is consistent with the result derived in the entire period VAR estimates granger test. This reveals that OMO causes a short-run direction to term structure of interest rate.

Table 15: VEC Granger Causality/Block Exogeneity Wald TestsDeregulation Period

Dependent variable: D(TS_INT)			
Excluded	Chi-sq	df	Prob.
D(MPR)	0.050415	1	0.8223
D(LNOMO)	5.729903	1	0.0167
D(LNTP)	0.125268	1	0.7234
D(LNG_SPEND)	0.005161	1	0.9427

4.7.4 Impulse Response

Figure 16-20 show a positive start in term structure of interest rate and a zero start of shocks in MPR, OMO, tax policy and government spending to term structure of interest rate similar with the entire and regulation period impulse response. However, after the first period, MPR, OMO and government spending had negative constant shocks to term structure of interest rate whereas tax policy had a constant zero shock.

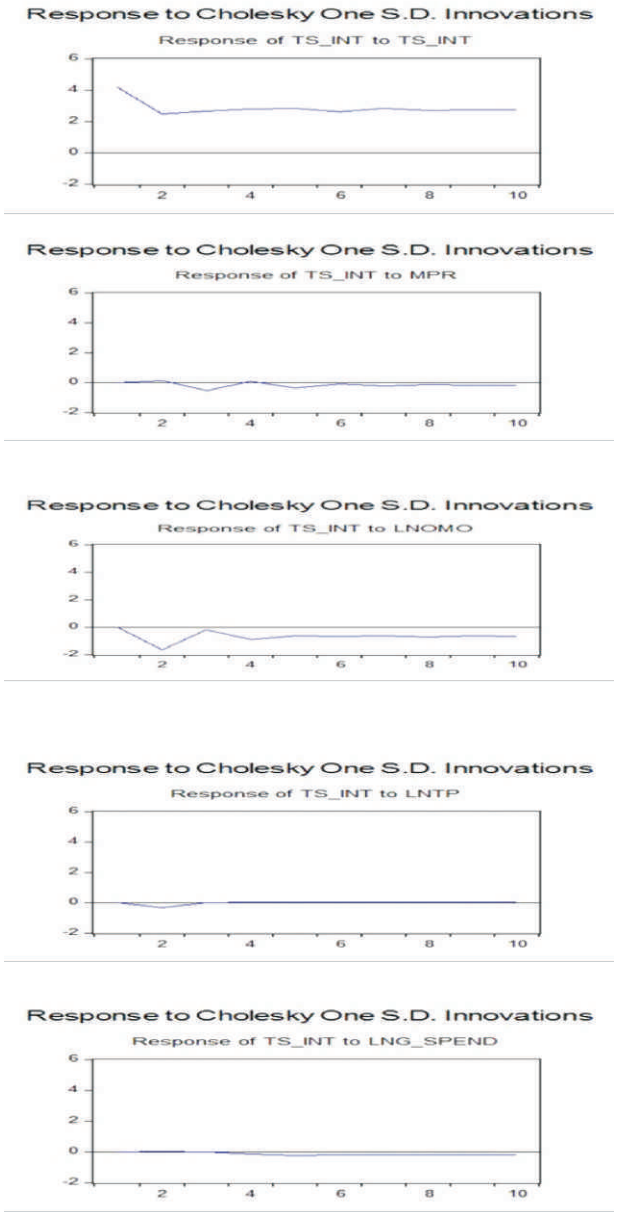


Figure 16-20: Impulse Response of TS_INT to TS_INT, MPR, LNOMO, LNTP and LNG_SPEND Shocks in the Deregulation Period

4.7.4 Variance Decomposition

Table 16 is the same with the entire period that MPR, OMO, tax policy and government spending causes constant variation to the term structure of interest rate. Term structure of interest rate in itself slightly accounted for its contemporary variance from its own innovations from 100% in the first period to about 91.81% in the tenth period. This means term structure of interest rate also slightly causes departure on itself in the deregulation period.

Table 16: Variance Decomposition Deregulation Period

Variance Decomposition of D(TS_INT):

Period	S.E	D(TS_INT)	D(MPR)	D(LNOMO)	D(LNTP)	D(LNG_SPEND)
1	4.161424	100.0000	0.000000	0.000000	0.000000	0.000000
2	5.132604	88.96989	0.036145	10.53799	0.454399	0.001569
3	5.809334	90.43524	0.881887	8.321612	0.356483	0.004774
4	6.496879	90.31862	0.715631	8.630102	0.285174	0.050469
5	7.127715	90.74660	0.857602	7.999319	0.237354	0.159122
6	7.626235	91.02352	0.773321	7.801005	0.207639	0.194514
7	8.169160	91.37838	0.751140	7.452485	0.182575	0.235420
8	8.637480	91.47921	0.713856	7.375409	0.163404	0.268126
9	9.093241	91.70071	0.698674	7.162810	0.148137	0.289666
10	9.527406	91.80573	0.671772	7.077824	0.135263	0.309410

4.7 Discussion of Research Results and Policy Implication of Findings

From the analysis, findings show that monetary policy has a strong negative impact on interest rate structure for the entire period (1961-2014). This is shown by the negative significance of OMO and the fiscal policy has a weak negative impact shown by the negative insignificance of tax policy and government spending.

This study reveals that there is a difference in the level of monetary and fiscal policy effectiveness to interest rate structure during the regulation and deregulation periods. For the regulation period, fiscal policy has a strong negative impact on interest rate structure as seen by the negative significance of government spending while the monetary policy has a weak impact on interest rate structure.

The deregulation shows that monetary policy has a strong negative impact on interest rate structure as

seen by the negative significance of the OMO while the fiscal policy has a weak impact on interest rate structure. This difference indicates there is a change in the monetary and fiscal policies level of effectiveness during the regulation and deregulation periods.

Also, all three periods show that the variability of monetary and fiscal policies has an impact on interest rate structure

.

5.0 CONCLUSION

This study examined the impact macroeconomic drivers have on interest rate structure in Nigeria. Conclusions that can be drawn are that macroeconomic drivers do have an impact on interest rate structure in Nigeria especially in the short-run. This indicates that macroeconomic drivers of monetary and fiscal policies are responsible for the volatility in the interest rate structure in Nigeria.

Findings from this study support earlier results of Ang and Piazessi (2002) that macroeconomic drivers have an impact on term structure of interest rate in short-run, but do not in the long run. This study also support findings of Titus et al. (2014) and Ezeabasili and Mojeku (2011) that in Nigeria, monetary policy have a negative effect on term structure of interest rate but contrary to their finding that fiscal policy have a positive effect on term structure of interest rate in Nigeria. However, this contrast must have been due to the fiscal deficits used in their study whereas, tax policy and government spending was individually used in this study.

This study recommends that the Nigerian government and the CBN should have an achievable monetary policy rate and open market operations. The CBN should also ensure active involvements of domestic banks in the open market operations. Also, the Nigerian government together with the Federal Ministry of Finance should develop an adequate tax system and ensure it is being complied with. In addition, the Nigerian government should ensure there are no misappropriation and embezzlements of funds. Lastly, the Nigerian government and the CBN should provide adequate means for research purposes in order to create new innovations and ideas on how to ensure monetary and fiscal policies as macroeconomic drivers have a positive impact on interest rate structure both on the short and long-run.

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