

EMPIRICAL ANALYSIS OF THE DYNAMICS OF BETWEEN CORRUPTION AND SOME SELECTED MACROECONOMICS INDICATORS IN NIGERIA

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Abstract

This study is an empirical analysis of the dynamics between corruption and some selected macroeconomics indicators in Nigeria 1996 to 2017 based on quarterly data that spans over a period of 22 years. It used a trending and employed SVAR and co-integration as methodology the variables namely are inflation (CPI), log of money supply (LM2), log of real exchange rate (LRER), corruption perception index (CPIc), and log of real gross domestic production (RGDP). Inflation shock which exerts positive shock to itself accounted for an average of 63.6% of its total variation over the entire period horizon, the real GDP has positive relationship with inflation which accounted for an average of 26.6% total variation in inflation, corruption revealed a positive relationship with inflation and has contributed an average of 7.6% of the total variation in inflation, money supply has been confirmed to have a positive relationship with inflation but only accounted for an average of 1.3% of the total variation in inflation over the entire horizon and finally real exchange rate which exhibit a negative relationship with inflation accounted for smallest percentage of the variation in inflation over the period horizon the study concluded that, and recommended that, response of inflation to a structural one standard deviation innovation to real exchange rate justified that depreciation of exchange rate leads to an increase in inflation. The government should give emphasizes to control the level of corruption and inflation simultaneously; this will lead to boost economic growth.

Keyword; Corruption, Macroeconomic, Gross Domestic Product, SVAR

Introduction

Maintenance of price stability is one of the macroeconomic challenges facing Nigerian government in our economic history. It is widely accepted that the pursuit of price stability is primary to long-run growth and development, and should be concern of every economy. One of the reasons for this is the high varying inflation rates which has social and economic shocks on the economy as a result of its negative effect on price stability, savings and investment. Given this scenario, the focus of monetary policy is primarily to be narrowed to the pursuit of low inflation rather than output or unemployment and this is defined by economists as a continuous rise in prices.

There is large chunk of literature that examines the dynamics of inflation in Nigeria as well as in other economies. Nigeria has experienced varying degrees of inflation over time and various measures were taken to bring it within the desired level (Malumfashi, 2017). In the 1970s for instance, inflation averaged 15.2% and this was maintained up to the period 1983. Average inflation rose to 21% in the period 1984 to 1990 and this was the era of high liberalization and deregulation following the Structural Adjustment Programme (SAP). This average Skyrocketed to

40.3% in the period 1991 to 1997 and later fell to 11.5% in the period 1998 to 2003 during which the country witnessed the inception of a civilian administration (CBN, 2007). High double digits is still inimical to economic growth in the country, Inflation rate in the country has remain double digits signaling a great danger to growth, even though there is a very slight drop as reported by NBS that Nigeria's inflation rate for the month of October was 15.91% making it the 9th consecutive month the country has recorded a drop in inflation rate. The latest inflation rate data compares to the 15.98% reported in September 2017 on a month on month basis, the Headline index increased by 0.76 percent in October 2017, 0.02% points lower from the rate of 0.78% recorded in September the same year. This also represents the 5th consecutive month on month contraction in headline inflation since May 2017. slow but steady moderation in prices of goods and services this year, compared to 2016. Despite this good news, analysts still opine an inflation rate in the high double digits is still inimical to economic growth in the country. This is further disconcerting when you consider how sluggish the recent drop in inflation rate has been this year.

The main objective of this paper is to make an empirical analysis of corruption and selected macroeconomic dynamics in Nigeria. Nigeria's annual inflation rate stood at 11.37% in January 2019, little-changed from the previous month's 11.44% and below market expectations of 11.5%. Food prices rose 13.51%, compared with 13.56% in December. Inflation Rate in Nigeria averaged 12.47% from 1996 until 2019, reaching an all-time high of 47.56 % in January of 1996 and a record low of -2.49% in January of 2000.

Conceptual Literature

Concept of Macroeconomics

The economy is projected to gain some steam next year largely on the back of stronger household spending, supported by the full implementation of the minimum wage increase. The outlook remains fragile, however, dampened by high unemployment, insecurity challenges, power shortages, low oil prices and a more subdued global economic environment. Focus Economics panelists see GDP growing 2.4% in 2020, which is unchanged from last month's estimate, and 2.8% in 2021. Growth picked up modestly in the third quarter on the back of strengthening momentum in the non-oil segment of the economy. Notably, the industrial sector posted the strongest expansion in a year and a half, underpinned by more upbeat manufacturing and construction activity. Meanwhile, output in the all-important oil sector remained robust in Q3, despite weakening slightly, lending further support to the expansion. Turning to the fourth quarter, business dynamics seem to be improving: Bank lending was buoyant in October, with the manufacturing sector benefiting the most,. In other news, Parliament passed a record 2020 budget of NGN 10.6 trillion on 5 December—up from the NGN 10.3 trillion presented in October. This will likely lead the government to return to international capital markets to finance a large part of its spending, particularly in infrastructure projects. Looking ahead, economic activity is projected to gain speed next year, mainly on the back of more upbeat private consumption, which should be supported by the full rollout of the minimum wage hike. That said, the outlook remains challenging, weighed on by elevated unemployment, insecurity challenges, power shortages, low crude prices and a more subdued global economic backdrop. Focus Economics panelists project that the economy will grow 2.4% in 2020, which is down 0.1 percentage points from last month's forecast. In 2021, growth is seen accelerating to 2.9%.

Corruption

Defined and perceived across a spectrum of illegal payments and transactions such as bribes, embezzlement, and money laundering among others. Since corruption is illegal, capturing the amount of corruption is not possible, by analyzing the amounts of corruption that have proven to be so in court. The measurement of corruption is mainly made through the examination of perception levels of some segments of the population. The best indexes developed in this respect are the Bribe Payers Index (BPI), the Global Corruption Barometer (GCB), the Control of Corruption Index, the Corruption Perceptions Index (CPI), the Freedom from Corruption, and Business International. The Study used Transparency International's Corruption Perceptions Index (CPI) as a proxy for corruption. This dataset defines corruption as the 'abuse of public office for private gain'.

The Corruption Perceptions Index (CPI) measures the perception of corruption across big and small businesses, rich and poor citizens, country experts, local media and international organizations. These scores are amalgamated across surveys and standardized across countries every year.

Theoretical Literature

The Structuralist Theory

Proponents of the structuralist theory cite the presence of structural bottlenecks, especially in developing countries as key causes of inflation. Essentially, structuralists distinguish between basic or structural inflationary pressures and mechanisms that transmit or propagate such pressures (Kirkpatrick and Nixon, 1987). Major structural bottlenecks identified in structuralist analyses include distorting government policies, the conflict between investors and workers over the distribution of income between profits and wages (Agenor and Montiel, 1996), inelastic food supply, the foreign exchange and government budget constraints. In this view, the bottlenecks lead to price increases, which are transmitted into the inflationary process. Structuralists therefore argue that the factors that the orthodox view regards as the causes of inflation should rather be seen as symptoms of the underlying structural rigidities in developing countries.

Empirical Literature Review

Sahin and Ucler (2017) In this study, the nexus between corruption and inflation was investigated for 20 countries over the period 1995–2015. Estimation results indicated that high corruption increased inflation rates, and that there was a unidirectional causal relationship from corruption to inflation for ten countries in the sample.

Asekunowo (2016) employed ARDL model to empirically find the causes of persistent inflation in Nigeria and found that there existed a long run co-movement among the variables. Also, the ordinary least squares estimate showed that Real Effective Exchange Rate, Lagged Consumer Price Index, Real Broad Money and Real Profits were statistically significant in influencing Consumer Price Index. The study concluded that inflation in Nigeria, during the studied period, was driven by the pass-through of import prices to domestic prices via markup pricing by firms. According to Catao and Terrones (2005), in countries with high corruption levels and weak prosecution system, seigniorage becomes the primary source of income for governments.

Duhu&Hussain (2018) Examine the relationship between corruption and inflation in Nigeria for the period 1996 – 2016 using ARDL model and found that a positive relationship exists between corruption and inflation, corruption and M2, implying that an increase in inflation and money supply increase corruption respectively. However, the relationship is not significant. A negative

relationship was also found between corruption and real GDP growth rate as well as corruption and democracy in the study. Mansfield and Behraves (1998) are of the view that inflation is a general upward movement of prices. They further indicated that inflation means that goods and services that currently cost an amount may soon be priced at lower cost. According to them, inflation occurs only if the prices for most goods and services in a society move upward i.e. the average level of prices increase. Inflation is of the great macroeconomic concern because of its implication on the welfare of the citizens and the economy as whole (Malumfashi, 2017).

Kenneth, Denis and Ihugba (2016) The study employed a two stage least square estimation to examine a simultaneous equation model, their study shows that inflation is beneficial to growth though not significantly while growth is significantly beneficial to inflation; given the positive relationship between inflation and growth and the negative relationship between growth and inflation. The results further show that Money supply and trade openness are significant determinants of real GDP for the estimation techniques used, namely, two stage least square (2SLS), generalized method of moments (GMM) and the maximum likelihood estimation technique. While, real GDP, money supply and interest rate are significant determinants of inflation. The study therefore recommends that inflation should be controlled to have its optimal effect on output while production should be diversified to optimize its effect on inflation.

Alexendar et al (2015) analyzed the determinants of inflation in Nigeria using the estimated VAR result showed that fiscal deficits, exchange rate, import of goods and services, money supply and agricultural output have a long run influence on inflation rate in Nigeria. Only lending rate influenced inflation in the short and long run horizon. A major policy implication of this study is that concerted effort should be made by policy makers to stabilize prices (inflation) by reducing money supply and interest rate as well as increasing government expenditure and exchange rate; most importantly increasing exchange rate and reducing interest rate.

Ben Ali and Sassi (2016) investigate the corruption-inflation nexus for a sample of 100 developing countries drawn from five regions (America, Europe, Middle East and North Africa, sub-Sahara Africa and Asia Pacific) over the period 2000-2012. Using two step system generalized method of moment (SGMM) estimation. They found a significant positive relationship between all country corruption measures and inflation through seigniorage channel.

Methodology

Sources of Data

The types of data used in the study and the description of the variables included in the models. Time series data sourced from world development indicators (WDI) and transparency international is used.

Method of Data Analysis

The Johansen Co-integration Tests

If from the results of the unit root tests discussed previously the variables are found to be of the same order of integration, namely if both series are found to be $I(1)$, but not a mixture of $I(0)$ and $I(1)$ and also if none is $I(2)$, then the Johansen co-integration test will be used in testing for co-integration between the series. The Johansen co-integration test is a VAR-based test given by the equation:

$$\Delta y_t = \Pi_0 + \Pi_1 \Delta y_{t-1} + \dots + \Pi_{p-1} \Delta y_{t-p+1} + u_t \quad (3.7)$$

The test is based on two test statistics, namely the trace statistic and the maximal eigenvalue statistic. The tests will be carried out to check for the existence of a long

runrelationship between the two series, and it will be based on the assumption that the level series y_t have no deterministic trend and that the co-integrating equation has an intercept represented by:

$$H_1^*(r) : \Pi y_{t-1} + Bx_t = \alpha(\beta' y_{t-1} + \rho_0) \quad (3.8)$$

3.3.1 The Structural Vector Autoregressive (SVAR) Model

The SVAR framework is generally focused on how the innovations to one endogenous variable affect other endogenous variables included in the model. In other words, a structural VAR analysis is focused on the direction of instant interdependencies between or among contemporaneous variables (Tashrifov, 2005).

MODEL SPECIFICATION

$$CRP = F (INF M2 CPI RGDP)$$

SVAR Model

Bernanke (1986) and Amisano and Giannini (1997) the structural VAR model for Nigeria can be represented by the following equations:

$$AX_t = C + A_1 X_{t-1} + \dots + A_p X_{t-p} + B e_t \quad (3.12)$$

thus, using the lag operator the above equation (3.17) becomes:

$$AX_t = C + A(L)X_{t-1} + B e_t \quad (3.13)$$

where $A(L)$ is a matrix polynomial in the lag operator of lag length p , C is an $n \times 1$ vector of constants / intercepts, A is an $n \times n$ matrix of the variables' contemporaneous interrelationships. among all the variables. These theories were all discussed in under theoretical literature.

However, it is noteworthy that the estimation of the SVAR model cannot be carried out in its structural form because the structural errors and the explanatory variables would be correlated hence a simultaneity problem arises. Therefore, to avoid this problem the structural VAR will be estimated in its reduced form (see Enders, 2010). Hence, the reduced form VAR can be written as:

$$x_t = c + \Gamma_1 x_{t-1} + u_t \quad (3.14)$$

Where $\Gamma_i = A^{-1}A_i$, $c = A^{-1}C$, and $u_t = A^{-1}B e_t$ = the reduced form / composite shocks, e_t is the vector that denotes the structural shocks, and u_t the vector of composite shocks to be recovered from the structural shocks. In the econometric literature, the structural shocks of an SVAR model are usually recovered from the composite shocks through identification (Enders, 2010; Dimitrious and Stephen, 2011).

The relationship between structural and composite shocks of SVAR model are

$$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ a_{31} & 0 & 1 & a_{34} & 0 \\ 0 & 0 & 0 & 1 & a_{45} \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 \end{pmatrix} \begin{pmatrix} u_t^{LM2} \\ u_t^{LRGDP} \\ u_t^{LRER} \\ u_t^{CPIcrpt} \\ u_t^{CPI} \end{pmatrix} = \begin{pmatrix} b_{11} & 0 & 0 & 0 & 0 \\ 0 & b_{22} & 0 & 0 & 0 \\ 0 & 0 & b_{33} & 0 & 0 \\ 0 & 0 & 0 & b_{44} & 0 \\ 0 & 0 & 0 & 0 & b_{55} \end{pmatrix} \begin{pmatrix} e_t^{LM2} \\ e_t^{LRGDP} \\ e_t^{LRER} \\ e_t^{CPIcrpt} \\ e_t^{CPI} \end{pmatrix}$$

The vector of endogenous variables included in the SVAR models is given as:

Description of the Variables/Data

The variables employed in this study include:

Corruption: Corruption perception index (PCI) is used as proxy for corruption published by the Transparency International (TI). CPI measures the perception of corruption across big and small businesses, rich and poor citizens, country experts, local media and international organizations. These scores are amalgamated across surveys and standardized across countries every year. CPI ranges between 0 and 10, where 0 means extreme case of a highly corrupt country and 10 means a perfect case of totally corruption free country. However, from 2012 to date, CPI is being scored out of 100.

Inflation: Measured by Consumer price index (CPI) which reflects changes in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals. In this work quarterly data is used.

Broad Money Supply (M2): is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper.

Real GDP (RGDP): GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Data are in constant local currency.

CPI corruption was sourced from World Bank Group, CPIA database and Transparency international annual reports (<http://www.worldbank.org/ida>), broad money supply and CPI Inflation were sourced from International Monetary Fund, International Financial Statistics and data files. GDP data was sourced from Central Bank of Nigeria (CBN) Statistical Bulletin.

Result and discussions

Table 4.4 Structural VAR Estimates

Part A: Short Run Restrictions on the A Matrix				
1	0	0	0	0
0	1	0	0	0
C(1)	C(3)	1	C(6)	0
0	0	0	1	C(8)
C(2)	C(4)	C(5)	C(7)	1
Part B: Short Run Restrictions on the B Matrix				
C(9)	0	0	0	0
0	C(10)	0	0	0
0	0	C(11)	0	0
0	0	0	C(12)	0
0	0	0	0	C(13)
Part C: Structural VAR Estimates				
	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.100305	0.115798	0.866206	0.3864
C(2)	-0.237947	1.510685	-0.157509	0.8748
C(3)	-0.027864	0.038804	-0.718058	0.4727
C(4)	-5.442815	0.491782	-11.06754	0.0000
C(5)	-1.897107**	1.365462	-1.389351	0.1647

C(6)	0.003984	0.009838	0.405008	0.6855
C(7)	0.211997	0.163165	1.299280	0.1938
C(8)	-0.057283	0.083930	-0.682511	0.4949
C(9)	0.065842**	0.005020	13.11488	0.0000
C(10)	0.188733**	0.014391	13.11488	0.0000
C(11)	0.066567**	0.005076	13.11362	0.0000
C(12)	0.775277**	0.060775	12.75658	0.0000
C(13)	0.841004**	0.064594	13.01981	0.0000
Part D: LR Test for Over-Identifying Restrictions				
Chi-square(2) = 10.25266			Prob. = 0.0659	
Part E: Estimated Elements of the A matrix				
1.000000	0.000000	0.000000	0.000000	0.000000
0.000000	1.000000	0.000000	0.000000	0.000000
0.100305	-0.027864	1.000000	0.003984	0.000000
0.000000	0.000000	0.000000	1.000000	-0.057283
-0.237947	-5.442815	-1.897107	0.211997	1.000000
Part F: Estimated Elements of the B matrix				
0.065842	0.000000	0.000000	0.000000	0.000000
0.000000	0.188733	0.000000	0.000000	0.000000
0.000000	0.000000	0.066567	0.000000	0.000000
0.000000	0.000000	0.000000	0.775277	0.000000
0.000000	0.000000	0.000000	0.000000	0.841004

Source: Researcher's computation using EViews 10 econometric software.

Notes: The method used in estimating the model is method of scoring and the asterisks ** indicate statistical significance at the 5% level.

Nevertheless, the coefficients C(9) to C(13) are from the B matrix, which is the variance / covariance matrix of the model. These coefficients are statistically significant as revealed by the corresponding p -values which are all less than 0.05. Thus, the null hypothesis of parameter statistical insignificance can be conveniently rejected at the 5% level. Part D of the above table reports the Chi-square statistical test for over-identifying restrictions used in the model. The test indicates non rejection of the over-identifying restrictions used in identifying the shocks in the model because the p -value is greater than 0.05. Part E gives the estimated elements of the A matrix and part F gives the estimated elements of the B matrix respectively.

Statistical Diagnostic Checking for Model Adequacy / Robustness

Before using the SVAR model for any statistical inference or analysis, it is crucial to first and foremost subject the model to some conventional statistical diagnostic tests to ascertain its statistical adequacy. To achieve this, some statistical diagnostic tests have been carried out on the residuals of the model, namely serial correlation, heteroscedasticity and normality tests. Moreover, VAR stability tests were also carried out to ascertain the stability of the model. All the tests are reported in Tables 4.6, 4.7, 4.6 and 4.8 below.

Table 4.5 VAR Residual Serial Correlation LaGrange Multiplier(LM)Tests Null hypothesis is for no serial correlation at lags 1 to h

Lag	LRE* stat	Df	Prob.	Rao F-stat	Df	Prob.
1	14.62777	25	0.9497	0.575189	(25, 246.7)	0.9498
2	12.76783	25	0.9792	0.500232	(25, 246.7)	0.9793

Source: Researcher's computation using EViews 8 econometric software.

Note: The probabilities were computed from the Chi-square statistics with 25 degrees of freedom.

The serial correlation test reported in Table 4.5 above reveals that the null hypothesis of no serial correlation cannot be rejected because the probability values associated with the LM statistics are greater than 0.05 at all the test lags. Therefore, the test indicates the acceptance of the null hypothesis of no serial correlation at the 5% level of significance.

Table 4,6 White's Heteroscedasticity Tests on VAR Residuals

Part A: Joint Test					
Chi-Square Statistic = 331.4449, Degrees of freedom = 300, Prob. = 0.1023					
Part B: Individual Component Test					
Dependent	R-squared	F(20,20)	Prob.	Chi-Sq(20)	Prob.
res1*res1	0.191397	0.769278	0.7387	16.46015	0.6877
res2*res2	0.516392	3.470317	0.0001	44.40970	0.0013
res3*res3	0.400105	2.167612	0.0102	34.40901	0.0235
res4*res4	0.187535	0.750174	0.7596	16.12805	0.7086
res5*res5	0.524238	3.581141	0.0001	45.08443	0.0011
res2*res1	0.396874	2.138590	0.0113	34.13114	0.0253
res3*res1	0.341610	1.686283	0.0592	29.37845	0.0806
res3*res2	0.625423	5.426452	0.0000	53.78637	0.0001
res4*res1	0.170859	0.669721	0.8406	14.69391	0.7936
res4*res2	0.324953	1.564476	0.0902	27.94592	0.1107
res4*res3	0.237053	1.009798	0.4638	20.38656	0.4340
res5*res1	0.415277	2.308187	0.0060	35.71382	0.0166
res5*res2	0.529701	3.660502	0.0000	45.55431	0.0009
res5*res3	0.560357	4.142355	0.0000	48.19067	0.0004
res5*res4	0.270451	1.204809	0.2796	23.25881	0.2763

Source: Researcher's computation using EViews10econometric software.

White's heteroscedasticity test results reported in Table 4.6 above indicates acceptance of the null hypothesis of no heteroscedasticity because all the p -values associated with the Chi-square statistics are greater than 0.05, which suggests that the null hypothesis of no heteroscedasticity cannot be rejected at the 5% level of significance.

Table 4.7 Jarque-Bera Normality Tests on VAR Residuals

Individual Component Test	Skewness	Chi-Square Stat.	Degrees of freedom	Prob.
1	0.759589	8.269977	1	0.0040
2	-2.243572	72.14849	1	0.0869
3	3.753991	201.9917	1	0.0000
4	0.294952	1.246956	1	0.2641
5	-1.726011	42.70063	1	0.0000
Joint		326.3578	5	0.1236
Individual Component Test	Kurtosis	Chi-Square Stat.	Degrees of freedom	Prob.
1	4.302931	6.083169	1	0.0675
2	16.36066	639.6510	1	0.0841
3	26.77552	2025.570	1	0.0000
4	5.052472	15.09530	1	0.0001
5	9.669644	159.4016	1	0.0000
Joint		2845.801	5	0.2340
	Jarque-Bera Statistic	Degrees of freedom	Prob.	
1	14.35315	2	0.0567	
2	711.7995	2	0.5632	
3	2227.561	2	0.0875	
4	16.34225	2	0.0003	
5	202.1022	2	0.0612	
Joint	3172.159	10	0.1321	

Source: Researcher's computation using EViews 8 econometric software.

Note: The orthogonalization of the residuals is based on estimation from the structural VAR and approximate p-values do not account for coefficient estimation

The normality test results reported in Table 4.7 above show that the null hypothesis that the errors are multivariate normal could not be rejected because the p -value associated with the Jarque-Bera statistic for normality is 0.1321. Therefore, it can be inferred that the errors of the model are normally distributed. So this model passes all the three tests, namely the autocorrelation and heteroscedasticity tests, and the residuals normality test.

Table 4.8 VAR Stability Condition Tests

Roots of Characteristic Polynomial	
1.048472	0.912337
0.992873	0.992873
0.845625 - 0.181827i	0.864953
0.845625 + 0.181827i	0.864953
0.798979	0.798979
0.716844	0.716844
0.490103 - 0.290598i	0.569779
0.490103 + 0.290598i	0.569779
-0.147342	0.147342
-0.062855	0.062855

VAR satisfies the stability condition, No root lies outside the unit circle

Source: Researcher's computation using EViews 10 econometric software.

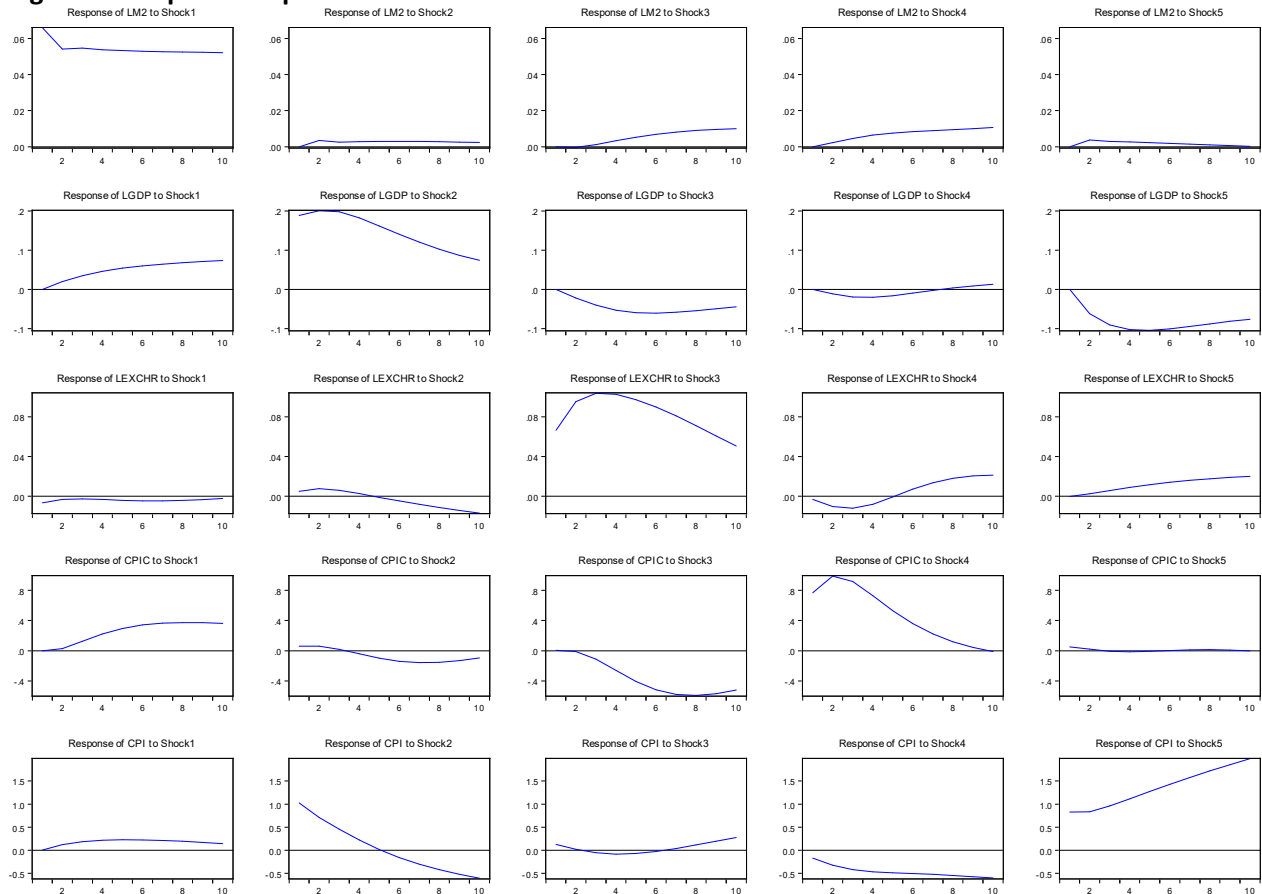
The last set of tests carried out on this model is the VAR stability test. The results of the test are reported in Table 4.7 above and they indicate that the SVAR model for Nigeria is stable as all its moduli lie in the unit circle, i.e., they are less than unity. For a VAR system to be stable any of the two conditions must be fulfilled. First, the moduli of the model must all lie in the unit circle, meaning that all the moduli must be less than 1. Second, all its eigenvalues must be less than unity. Note that the individual component test implies that each component of the test is independent of each other. It is noteworthy that the stability of a VAR system implies that the impact of the shocks is calculable and finite (see Patterson, 2000; p.602).

Therefore, this model has satisfied the conditions, because if the moduli were less than unity the eigenvalues too would be less than 1. Since this model has passed the conventional statistical diagnostic tests and satisfied the stability conditions, it can be used conveniently for statistical inference. Nevertheless, the impulse response functions and variance decompositions generated from the model could be deemed reliable. The impulse response and variance decomposition analyses are discussed below in the next sub-sections.

Structural VAR Impulse Response Analysis

The impulse response functions as depicted in Figure 4.1 below, traces out the dynamic response of each endogenous variable in the VAR to a one standard deviation shock in another variable. However, it is worth noting that the structural rather than the Cholesky impulse response approach is used. This is the impulse definition that is compatible with and appropriate for the structural VAR models. As can be observed from Figure 4.1 below, there are five shocks, namely money supply shock (shock 1), GDP shock (shock 2), exchange rate shock (shock 3), corruption shock (shock 4) and inflationary shock (shock 5). The effect of each shock is traced over 10 periods into the future.

Figure 4.1 Impulse Responses to Structural One Standard Deviation Innovations



Source: The graph was fitted using EViews10 Econometric Software

The response of inflation to a structural one standard deviation innovation from money supply (shock1) was positive throughout the horizon which commensurate with the monetarist school that money supply leads to an increase in prices, all things being equal.

The response of inflation to a structural one standard deviation innovation to Real GDP (shock 2) was positive from period eight it became zero in period five and later exhibits a negative shock up to period ten.

The response of inflation to a structural one standard deviation innovation to real exchange rate (shock 3) was positive in the first horizon but insignificant and zero as it approaches second horizon and remain negative and insignificant from horizon two up to sixth period horizon, from where it exhibit a significant and positive shock up to tenth horizon which justified that depreciation of exchange rate leads to an increase in inflation which go in line with the relationships between inflation and exchange rate as postulated in the hybrid New Keynesian Phillips curve.

The response of inflation to a structural one standard deviation innovation to the corruption perception Index (shock 4) was negative but insignificant from period eight, which shows that as corruption increase inflation will increase., as such high CPI means low corruption. Therefore the negative shock in structural impulse response indicates that higher corruption Perception Index (low corruption) leads to higher inflation and vice versa.

It can be observed from the graphical depiction of the impulse response functions that the response of inflation to its own structural one standard deviation shock (shock 5) is highly significant in period 2. After period 2 the positive shock is becoming more significant until period 10. This commensurate with the hybrid New Keynesian Phillips curve which added lagged of inflation as a variable that explain inflation dynamics.

Taking a look at the response of log exchange rate (shock 2) to other shocks, it can be observed that the response of Nigeria's exchange rate variable to the shock in oil price was negative in the first two periods, but from period 3 to period 10 it has a significant positive impact. However, the response of Nigeria's exchange rate to its own structural one standard deviation shock was positive and significant throughout the 10 periods, though with a slight decline from period 8 to period 10. The response of Nigeria's exchange rate to a structural one standard deviation innovation to the money supply (shock 3) was positive but insignificant (almost zero) throughout the ten periods. The response of Nigeria's exchange rates to a structural one standard deviation shock to inflation (shock 4) was almost zero throughout the ten periods. The response of the exchange rate to a structural one standard deviation shock to GDP (shock 5) was negative throughout the ten periods.

Structural VAR Variance Decomposition Analysis

Variance decomposition in a VAR framework gives the proportion of the overall forecast error variance of a variable that is ascribable to each structural shock at a specific forecast horizon (Favero, 2001). Therefore, as can be observed, the variance decomposition of each of the five macroeconomic variables namely log(M2), log(ER), log(GDP), CPI corruption and CPI inflation over a 10-period forecast horizon is shown in Tables 4.9 and 4.10 below. I look at the variance decomposition of CPI inflation because is my variable of interest in work.

From Table 4.10 below, it can be observed that in period 1 (short run), 100% of the fluctuations in money supply are due to its own shock, while shocks from other variables contributed 0% to the forecast error variance money supply. These results are logically and theoretically sensible as money supply is exogenously determined by monetary authority. In periods 2 and 3, money supply shocks accounted for the largest proportion of the variation in it variation with 99.57% and 99.33% respectively and until period 10 money supply is contributing more than 96% of it variations, only shock 3 (Exchange rate shock) and shock 4 (CPIc shock) were able to accounted for fluctuations in money supply of more than 1% from along the period horizon.

Table 4.9 Variance Decomposition Analysis Based on Structural Factorization

Variance Decomposition of Log(M2)						
Period	S.E.	Shock1	Shock2	Shock3	Shock4	Shock5
1	0.065842	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.085422	99.56705	0.170620	0.002035	0.071491	0.188805
3	0.101589	99.33205	0.180413	0.014156	0.259712	0.213674
4	0.115190	98.97520	0.198777	0.092891	0.512634	0.220502
5	0.127288	98.54927	0.214626	0.249295	0.775006	0.211805
6	0.138318	98.09340	0.226788	0.460943	1.022308	0.196563
7	0.148536	97.63703	0.233744	0.698702	1.251374	0.179151
8	0.158101	97.19508	0.235748	0.939832	1.467438	0.161906
9	0.167122	96.77392	0.233873	1.169764	1.676433	0.146013
10	0.175680	96.37612	0.229382	1.380079	1.882228	0.132187
Variance Decomposition of Log(RGDP)						
Period	S.E.	Shock1	Shock2	Shock3	Shock4	Shock5
1	0.188733	0.000000	100.0000	0.000000	0.000000	0.000000
2	0.284281	0.500801	93.96353	0.600452	0.170241	4.764971
3	0.362481	1.249041	87.56161	1.610693	0.398453	9.180199
4	0.424771	2.096154	82.13806	2.734695	0.530001	12.50109
5	0.473441	2.997376	77.76562	3.779833	0.552019	14.90516
6	0.511208	3.947700	74.22834	4.653988	0.513090	16.65688
7	0.540681	4.949899	71.29935	5.334441	0.462048	17.95426
8	0.564063	6.003762	68.80083	5.835991	0.427692	18.93172
9	0.583075	7.103480	66.60763	6.187601	0.420634	19.68065
10	0.599006	8.238487	64.63574	6.419431	0.441081	20.26526
Variance Decomposition of Log(REXCH)						
Period	S.E.	Shock1	Shock2	Shock3	Shock4	Shock5
1	0.067123	0.968269	0.560431	98.26395	0.206552	0.000798
2	0.117392	0.383522	0.616559	98.11116	0.836258	0.052497
3	0.157402	0.240196	0.496247	98.04525	1.050294	0.168013
4	0.188371	0.195074	0.367529	98.18748	0.907534	0.342387
5	0.212396	0.189672	0.291541	98.23079	0.714347	0.573648
6	0.231226	0.200658	0.287966	97.95479	0.703334	0.853250
7	0.246040	0.213741	0.365655	97.30833	0.937574	1.174694
8	0.257624	0.221373	0.530662	96.35191	1.360124	1.535934
9	0.266576	0.221920	0.786026	95.18137	1.872824	1.937857
10	0.273424	0.217334	1.128875	93.88600	2.386505	2.381289

Source: Researcher's computation using EViews 10 econometric software.

As can be seen from Table 5.18 below, in period 1 (short run), the greatest percentage of 97.59% of the variations in inflation is due to its own shock. Then in period 2, money supply (shock 3) accounted for the highest percentage of 96.74% of the fluctuations in inflation. It can be observed that even in the subsequent periods, money supply (shock 3) continued to contribute a greater percentage of the variations in inflation. These results are intuitively appealing with regards to their economic meaning because changes in the money supply often tend to have effects on

inflation. When monetary authorities increase the quantity of money in circulation, it often tends to have a multiplier effect on inflation.

Table 4.10 Variance Decomposition Analysis Based on Structural Factorization Cont'd

Variance Decomposition of CPIc						
Period	S.E.	Shock1	Shock2	Shock3	Shock4	Shock5
1	0.769399	5.32E-06	0.581616	0.008622	99.02738	0.382379
2	1.254375	0.047257	0.418099	0.011898	99.35828	0.164463
3	1.562146	0.680188	0.279580	0.513751	98.41705	0.109428
4	1.757799	2.125847	0.282083	2.577987	94.91876	0.095328
5	1.905544	4.202208	0.522111	6.719018	88.47272	0.083944
6	2.039846	6.463917	0.936602	12.25694	80.26923	0.073315
7	2.168387	8.554546	1.360917	17.93188	72.08517	0.067486
8	2.286639	10.35332	1.668197	22.81381	65.10008	0.064591
9	2.388988	11.89223	1.821488	26.54817	59.67709	0.061022
10	2.472940	13.24360	1.848133	29.15576	55.69555	0.056949

Variance Decomposition CPI						
Period	S.E.	Shock1	Shock2	Shock3	Shock4	Shock5
1	1.335256	0.000539	58.85101	0.872393	1.584963	38.69109
2	1.762305	0.477580	50.02361	0.513016	4.273195	44.71260
3	2.110665	1.106128	39.61982	0.424697	6.860749	51.98861
4	2.452494	1.601783	30.17141	0.434734	8.625359	59.16671
5	2.815921	1.863684	22.88993	0.395265	9.493403	65.35771
6	3.209400	1.918755	17.85505	0.311366	9.727101	70.18773
7	3.633043	1.834953	14.61054	0.254021	9.613597	73.68689
8	4.083863	1.674581	12.61382	0.279180	9.349419	76.08301
9	4.558249	1.481606	11.42403	0.406934	9.040708	77.64672
10	5.053024	1.283558	10.73425	0.631183	8.734909	78.61610

Source: Researcher's computation using EViews 10 econometric software.

It is imperative to look at the variance decomposition of Inflation which is the variable of interest in this structural VAR analysis. In period 1 shock 2 (real GDP shock) and shock 5 (Inflation shock) accounted for the highest fluctuation in inflation with 58.85% and 38.69% respectively, followed by shock 4 (CPI corruption shock) which account for 1.5% variation in inflation. In period 2 also shock 2 (real GDP shock) and shock 5 (Inflation shock) accounted for the highest fluctuation in inflation with 50.02% and 44.71% respectively, followed by shock 4 (CPI corruption shock) which accounted for 4.2% variation in inflation. Shock 1 (money supply shock) and shock 3 (exchange rate shock) accounted less than 2% in the variation in inflation in the first and second period horizon.

Although shock 2 (real GDP shock) and shock 5(own shock) maintain dominance in accounting for the variation in inflation in period 3 to 10 the marginal contribution of shock 2 (GDP shock) and shock 5 (own shock) have been declining and increasing throughout the entire period horizons, respectively. In period 3 to 10 the share of shock 2(real GDP shock) and shock 5(own Shock) to inflation variation was 39.62%, 30.17%, 22.89%, 17.86%, 14.61%, 12.61%, 11.42%, 10.73% and 51.99%, 59.17%, 65.36%, 70.19%, 73.69%, 76.08, 77.65, 78.62%, respectively. However the percentage contribution of corruption to the variation in inflation over the period horizon has

been increasing, from first to tenth period horizon it was 1.58%, 4.27%, 6.86%, 8.63%, 9.49%, 9.73%, 9.61%, 9.35%, 9.04%, and lastly 8.73%. This indicates that the contribution of corruption to inflation variation in Nigeria has been increasing over the period horizons. Shock 1 (money supply shock) and shock 3(exchange rate shock) accounted for the lowest percentage of contribution of not more than 2% at each period to the variation in inflation throughout the period horizon, although the contribution has been on increase over the period but its comparatively minimal compared to real GDP , corruption and shock from inflation itself.

Conclusion and Recommendations

Inflation shock which exerts positive shock to itself accounted for an average of 63.6% of its total variation over the entire period horizon, the real GDP has positive relationship with inflation accounted for an average of 26.6% total variation in inflation, corruption revealed a positive relationship with inflation and has contributed an average of 7.6% of the total variation in inflation, money supply has been confirmed to have a positive relationship with inflation but only accounted for an average of 1.3% of the total variation in inflation over the entire horizon and finally real exchange rate which exhibit a negative relationship with inflation accounted for smallest percentage of the variation in inflation over the period horizon.

The government should give emphasizes to control the level of corruption and inflation simultaneously; this will lead to boost economic growth. The government should advocate strong commitment on institutional that minimizes the level of corruptions in Nigerian context.

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