Oil Price Shock, Fiscal Policy and Manufacturing Sector in Nigeria: Evidence from SVAR

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Abstract

In this study, we used SVAR framework to investigate the impact of oil shocks on manufacturing output in Nigeria via fiscal variables using annual data from 1981 to 2019 which is sourced from Central Bank of Nigeria (CBN). We found that government revenue is explained by oil price in both short- and long-run while expenditure explains revenue in the long-run, though very weak. This is an indication that spending by government can further generate more revenue in the long-run. We equally found that government expenditure is not explained by its revenue which could suggest that it is financed largely by other means like borrowing. In Addition, variations in price level is weakly explained by expenditure- indicating the import-generating nature of inflation in Nigeria. Lastly, manufacturing output is jointly explained by inflation, revenue and oil price. This means that expenditure lost its explanatory power to price level in the process. We recommend that efforts should be made to diversify the economy such that government expenditure would be financed by its generated revenue rather than borrowing or unnecessary depending on foreign aids. Also, the monetary authority should always be quick in controlling inflation so that meaningful and real impact of expenditure can be felt by the manufacturing sector which will translate to growth of the aggregate economy.

Keywords: oil price, expenditure, revenue, inflation rate, manufacturing sector, SVAR.
JEL Classification Codes: E62, L60, C50

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1. Introduction

In recent times there have been numerous researches in the area of volatility in oil price. Evidences have shown that oil price shock has the potential to destabilise the workings of the economy via various macroeconomic variables. According to Adedokun (2018), oil price dropped from 130 dollars to 28 dollars in just twenty months to the earlier part of 2016. Recently, the price of oil has not been stable given the impact of novel corona virus that is ravaging the world over. In the first month of year 2020, the price has dropped from a high of 67 dollars to a low of 28 dollars in May, 2020 (CBN, 2020). These changes, given the nature of the Nigerian economy which is oil-dependent, has posed serious threats to the economy via various sectors, of which manufacturing sector is not left out.

The manufacturing sector is however being faced with many challenges ranging from inadequate electricity supply, poor infrastructure and poor maintenance, and heavy dependence on agricultural inputs, which they, themselves are vulnerable to shocks [Nigeria Bureau of Statistics (NBS 2014]. Nonetheless, its strengths are abundant workforce, availability of domestically sourced inputs and a huge demand for consumer products. It therefore displays a great potential for future expansion. In terms of performance, the contribution of the sector to real national output has been appreciating. Its growth rate in 2018 was around 24% (far higher than 12.8% of 2017) while its contribution to GDP was 9.7% which is quite better than 8.8% of 2017. In 2019, the sector performance has significantly improved. Its growth rate was 34.7% and its contribution to GDP was 11.6% (CBN, 2020).

In this regard, the role of the manufacturing sector in any economy could never be over-emphasized. In addition to its generation of employment opportunities for the teeming unemployed youths, the sector contributes greatly to the growth of output in economy. Tkalec and Vizek 2009) opined that manufacturing sector appears to be the most important tradable sector of the economy, which in turn means that it is often the most competitive. According to them, its significance stems from the fact that it is the carrier of innovation, research and development activities that eventually spill over to other sectors and result in increased level of productivity.

Due to these numerous contributions of the sector to the economy, the present Buhari-led administration whose policies are: to reduce corruption, ensure security of lives and property and to have a healthy economy is playing a greater role in improving the activities of manufacturing sector in the country. Recently, this administration temporarily closed the land borders with neighbouring countries which invariably has resulted to a banning of importation of many consumable items (including rice and some other items) to encourage and improve local production. Hammed (2020) blamed this policy on the unavailability of the alternative measures, though its positive impact is gradually being felt in the country.

Research on manufacturing output and fiscal policy, are very few. These include the work of: Ukoha (2000); Ajayi (2008) Sangosanya (2011) and Eze and Ogili (2013). Ukoha (2000) only focused on the effect of government expenditure on manufacturing sector measured through its output. On his own, Ajayi (2008) examined the effect of low implementation of fiscal policy on the growth of Nigeria Manufacturing sector. Also, the finding of Eze and Ogili was on the impact of government expenditure on manufacturing sector output in Nigeria. Some other studies that included oil price shock via its effect on fiscal policy did not consider the sectoral implication but in some cases, aggregate economy (Adedokun, 2018, etc.). To our knowledge, very scanty studies have examined the response of manufacturing output to oil price shock via fiscal policy variables. As such, it would be a thing of necessity to re-examine the impact of fiscal policy on manufacturing sector in Nigeria, given shock to oil price and using current data.

It equally becomes pertinent to know what exact effect a sudden change in the fiscal policy of government coming from oil price shock would have on the activities of manufacturing sector. A positive shock to oil

price would cause an increase in government revenue and possibly spending (both capital and recurrent) and which is expected to spur a positive check on the activities of manufacturing sector. However, this paper intends to carry out an empirical test on this fact. The rest of this paper is structured in the following order: literature review, methodology, findings and conclusion.

1.1. Stylised Facts about Fiscal Policy Variables and Manufacturing Sector Performance

Figure 1.1 shows the relationship among our variables of choice. A close examination of the pattern of these variables shows that all the variables shared similar pattern in the earlier part of periods under review than in the recent time. Between 1981 and 1998, government revenue was very low which could be explained by low oil price from 37 dollars in 1981 to 13 dollars in 1998. At these periods, government revenue and expenditure were very low, though the former is lower in comparisons. The implication of this is that government was running budget deficits in these periods which may not substantially pose a threat to the economy if the expenditure involves more of capital than recurrent. Manufacturing output was equally low in these periods. This shows the interconnection between spending and output of manufacturing sector. Oil price began to rise from 1999 when the country had just begun new pollical dispensation. This was supposed to be an opportunity for the government of that era to improve the economy after taking it over from the military. The opportunity was utilised but not to the expectation of the masses given the experience in low implementation of capital projects and many of them were not completed years after. The rise in oil price continued up to 2008 when the world experienced global financial crises that started from US housing price bubble in 2007. This crisis was so serious to such an extent that oil price fell from 97 dollars in 2008 to 62 dollars in 2009 and then pick up to an unprecedented value of 111 dollars in 2011.

Both government revenue and expenditure were equally moving in the same direction in these periods, though the impact of oil price changes was more discernible in the pattern of government revenue than expenditure. At this time, manufacturing output was on the increase, though with small magnitude. Oil price began to fall shortly after year 2011 and a significant fall was recorded in year 2015 in both oil price and government revenue. Specifically, oil price fell from 99 dollars in year 2014 to 52 dollars in the year 2015 while government revenue, from 10.069 to 6.913 billion naira in the same year. The two variables fell slightly in 2016 and then rose afterwards in 2018. While oil price fell 2019 to 64 dollars, government revenue rose from 9.552 billion naira to 10.438 billion in the same year. Between 2015 to 2019 government spending and manufacturing output shared similar pattern while oil price continues to explain government revenue in the country.

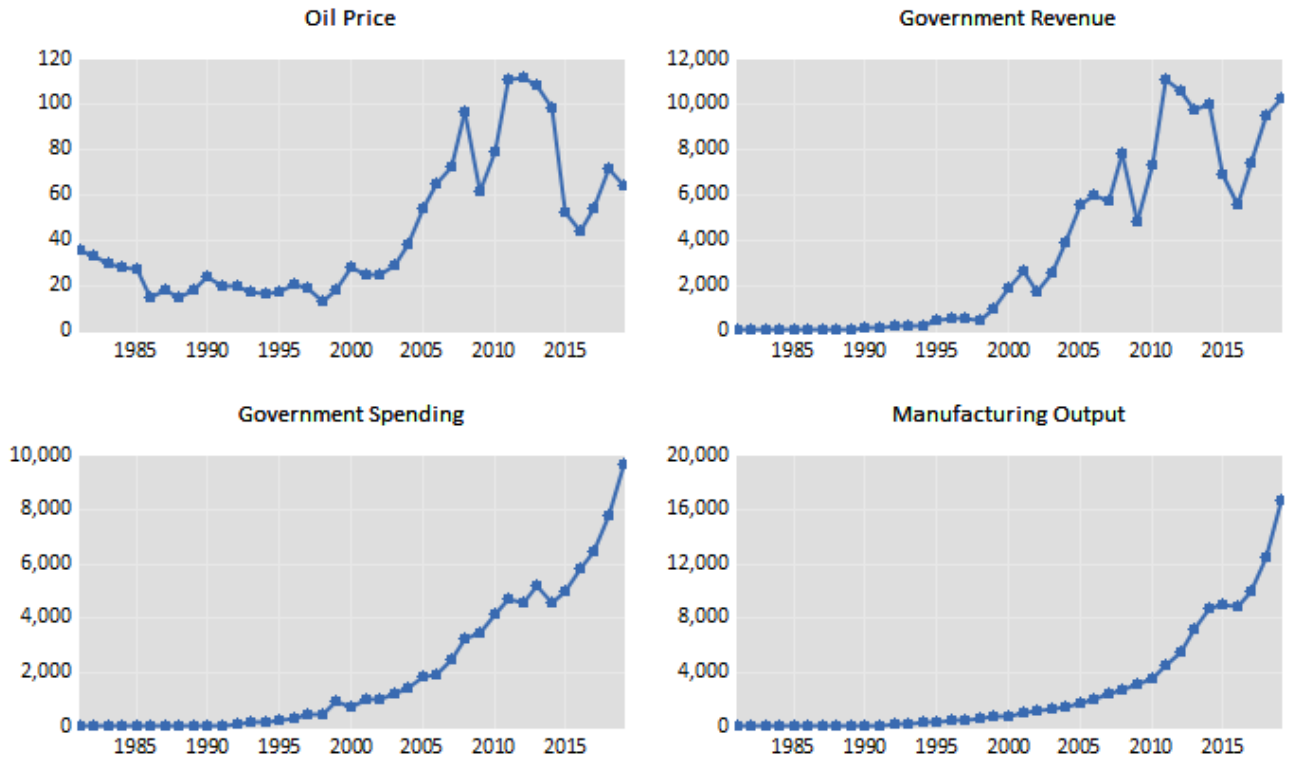

Figure 1.1: trends of Oil Price, Government Revenue, Expenditure and Manufacturing Output in Nigeria between 1891 and 2019. Oil price is measured in US Dollar while others measured in Billion Naira.

Figure 1.2 further shows the pattern of both manufacturing output and gross domestic product in Nigeria between 1981 and 2019. Both variables have exhibited same pattern over the years. Between 1981 and 2003, output from each were very low. However, they experienced very high growth rate afterwards. The growth rate of manufacturing sector in 2011 was 29.4% (a significant growth indeed) with 9% share of GDP, though fell in the subsequent years to 20.1% with higher share of GDP put at 9.7% (see figure 1.3). It further fell in the following years. And add a negative fall in the year 2016. This experience could be premised on the political transition of 2014 in the country which could suggest a change in the environment for investors. However, the sector has been improving right from year 2017 where the growth rate was 12.8% and doubled in the following year with 9.8% share of GDP (see figure 1.3). In the year 2019, the sector recorded an unprecedented growth of 34.7% and 11.6% share of GDP. This improvement is a product of various governmental policies of the present administration to improve the sector, one of them which is import substitution.

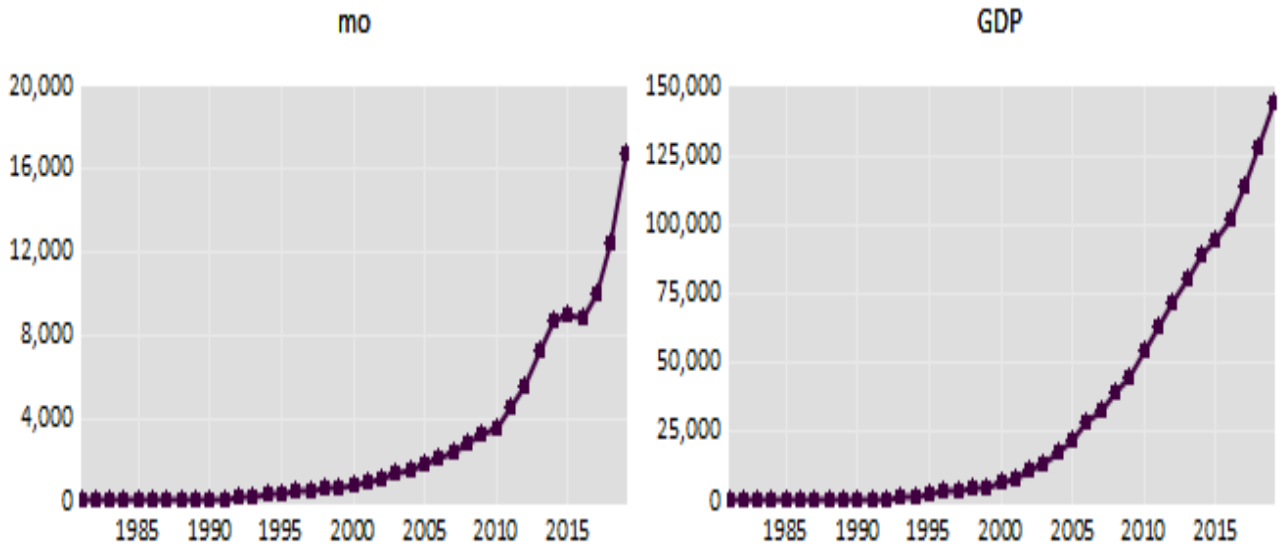

Figure 1.2: Trends of Manufacturing Output and GDP in Nigeria between 1891 and 2019. Both variables were measured in Billion Naira.

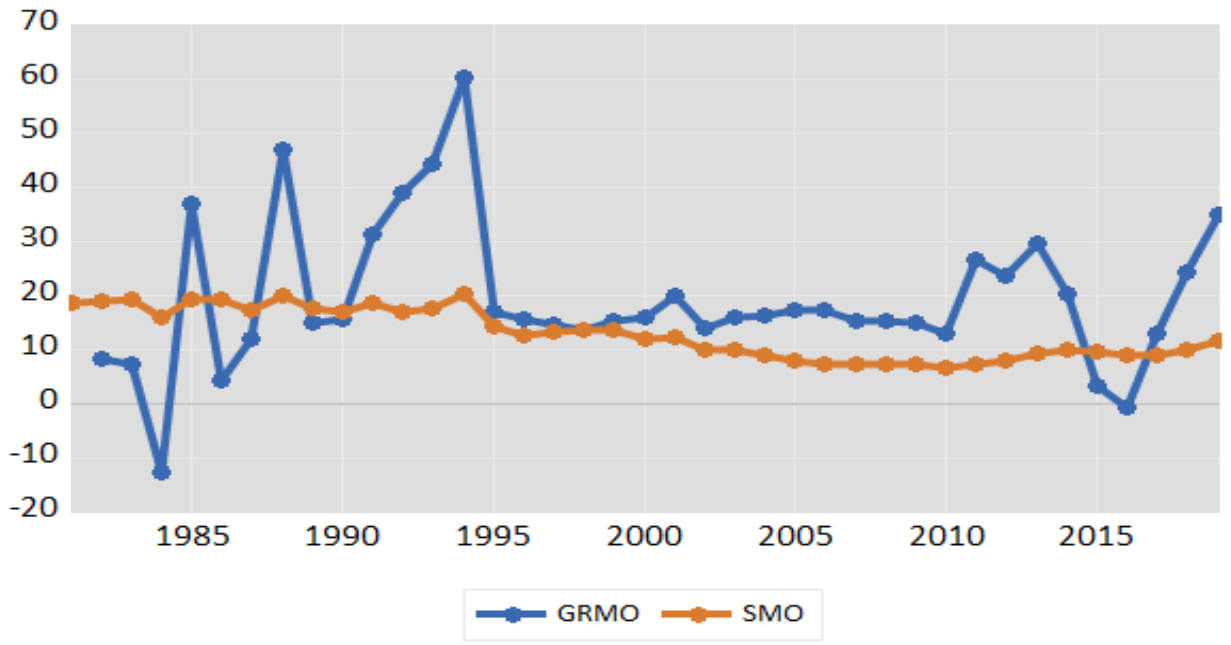

Figure 1.3: Growth rate of Manufacturing Output and its share of GDP in Nigeria between 1891 and 2019. Both variables were measured in per cent.

2.1 Concept of Fiscal Policy

Fiscal policy is associated with the use of taxation and public expenditure to influence the level of economic activities in a country. It is an essential tool routed through the government's budget. (Heakel, 2015). A budget can however be defined as a projection of the flow of funds and how such funds will be spent to achieve valued objectives, which may be of individuals, households, business firms, government and institutions. According to CBN (2011), fiscal policy involves the use of revenue collection through tax and amount of government spending to influence the economy. Fiscal policy has two main instruments and these are government taxation and expenditure. In Nigeria, there are various component of government expenditure, these include government capital expenditure and recurrent. This can be further categorised into expenditures on administration, defence, internal securities, health, education, foreign affairs, etc. and has both capital and recurrent components. Capital expenditure refers to the amount spent in the acquisition of fixed (productive) assets (whose useful life extends beyond the accounting or fiscal year). It also includes expenditure incurred in the upgrade/improvement of existing fixed assets such as lands, buildings, roads, machines and equipment, etc., including intangible assets. Expenditure on research also falls within this component of government expenditure (Oziengbe, 2013).

2.2. Literature Review

Studies on the impact of fiscal policy on manufacturing output are quite small. However, some of these studies concluded that government expenditure exerted tremendous impact on the level of manufacturing output. These studies include the work of Ukoha (2000), Ajayi (2011), Sangosanya (2011), Eze and Ogili (2013), Eze (2017), among others. Ukoha (2000) examined the determinants of capacity utilization in the Nigerian manufacturing industry between 1970 and 1998. He found that the exchange rate, federal government capital expenditure on manufacturing and per capita real income had positive effects on manufacturing capacity utilization. However, inflation and loans and advances to manufacturing were found to have negative effect. He concluded that improving capacity utilization in the Nigerian manufacturing sector would enhance growth of the sector which would subsequently result in industrial development in Nigeria.

Ajayi (2011) in a study of the collapse of Nigeria's manufacturing sector on economic growth, found out that the main cause of collapse in the Nigerian manufacturing sector was low implementation of Nigerian budget especially in the area of infrastructure. This means that low implementation of fiscal policy affects the level of growth in Nigerian manufacturing sector.

Sangosanya (2011) used panel regression analysis model and gibrat's law of proportionate effect to investigate firms' growth dynamics in Nigerian manufacturing industry. The study observed that the manufacturing firms finance mix, utilization of assets to generate more sales, abundance of funds reserve and government policies are significant determinants of manufacturing industry growth in Nigeria.

Eze and Ogili (2013) examined the impact of fiscal policy on the manufacturing sector in Nigeria using error correction analysis on the time series data from 1990 to 2010. The results of their study indicated that government expenditure significantly affected manufacturing sector output in Nigeria. The study equally confirmed the evidence of long run relationship between fiscal policy and manufacturing sector output.

Victor and Roman (2017) examined the effects of fiscal policies on agriculture and industry in Ukraine, with the SVAR model using quarterly data for the 2001–2016 period. The results indicate a positive effect of the government spending on both agricultural production and industrial output, while an increase in the

government revenue is of the same expansionary impact for the latter. Findings also indicate that agricultural production in Ukraine is associated with a higher level of government spending in the short run, while a direction of causality seems to be just the opposite for industrial output. Both agriculture and industry bring about higher budget revenues in the short run, but for the latter, this effect is lagged and more persistent.

Eze (2017) investigated the effect of the interest rate liberalization policy of the government during SAP era on the performance of the industrial sector in Nigeria by using Vector error correction model, VECM. The study shows that exchange rate volatility has an insignificant positive impact on industrial output performance. It also shows evidence of significant positive impact of lending rate and financial depth on industrial output growth.

Arikpo, Ogar, and Ojong (2017) examined the impact of fiscal policy on the performance of the manufacturing sector in Nigeria from 1982 to 2014. The result from ordinary least square multiple regression statistical technique. revealed that increases in government revenue reduce manufacturing sector output in Nigeria.

Salman and Tahir (2018) analyzed the impact of real sector shocks on Islamic banking in Pakistan based on quarterly data for the period of 2006 to 2016 using vector error correction model, VECM. Their findings indicate that a shock in large scale manufacturing index has an increasing effect on financing and investments while a shock in the exchange rate has a declining effect. The study equally showed that a shock in large scale manufacturing index has an amplifying effect on non-performing loan, but a shock in the exchange rate does not have much effect on non-performing loan.

Also, Adedokun (2018) examined the effect of oil shocks on government expenditure and government revenue with exogeneity restriction. His study uses variety of econometric techniques which include VAR, VEC and SVAR with annual data from 1981 to 2014. The results show that oil price shock could not predict the variation in government expenditure in the short-run, while the predictive power of oil revenue shock is very strong both in run and in the long-run. His study also confirms the spend-tax fiscal synchronization hypotheses for the Nigerian economy

2.3. The Savers-Spenders Theory of Fiscal Policy

This theory was developed by Mankiw (2000) and used by Eze and Ogili (2013). The theory was developed to correct inadequacies in Barro-Ramsey theory of infinitely-lived family and Diamond and Samuelson theory of overlapping generation respectively. Savers-Spenders theory explains the behaviour of fiscal policy in an economy. The theory is based on some prepositions (Mankiw, 2000). The first is that temporary tax change has large effects on the demand for goods and services. In other words, the higher the tax cut, the higher the take-home pay of both the savers and spenders. As against the belief of Barro- Ramsey theory and Diamond-Samuelson theory, the spenders here would consume all his take-home on goods and services. In this case, consumption would rise thereby crowding out investment. This would put pressure on the interest rate to rise and the savers would then be motivated to save more. This would make them to benefit more from the tax cut.

The second is on government debt in relation to crowding out of capital in the long run. This proposition states that extra consumption reduces investment, which in turn raises marginal product of capital and as well decrease the level of economic growth. It is of the higher opinion that higher interest rate margin

induces savers to save more. This implies that extra consumption and higher interest rate margin would affect the growth of manufacturing sector which in turn reduce economic growth in the concerned economy.

The third proposition states that the government debt increases steady state inequality. This means that a higher level of debt would lead to a higher level of taxation to pay interest on debt. The tax would fall on both the savers and the spenders but interest would only fall on savers. This implies that a higher level of debt raises the income and consumption of the savers and lowers the income and consumptions of the spenders.

3. Methodology and Model Specification

This section will present analysis about the methodology adopted by the study and the specification of the model for the variables of choice.

3.1. Methodology

The broad objective of this study is basically to examine the impact of oil price shock via fiscal variables policy shocks on the manufacturing output in Nigeria. In order to realize this objective, an econometric investigation procedure is adopted to understand the behaviour of time series data which allows the development of suitable model. We base our operation on the St. Louis Equation:

$$\Delta Y = \alpha + \sum \beta_i \Delta M_{t-1} + \sum \gamma_i \Delta G_{t-1} + U_t \quad (1)$$

The notation is standard. The endogenous variable Y denotes nominal GNP while the exogenous variables are M and G which are respectively money stock and high-employment government expenditure. U_t is the usual random error. This equation relates economy's output (GNP) to money stock (monetary policy indicator) and government expenditure. For proper estimation, the model to establish the response of manufacturing output to oil price and fiscal variables shocks in Nigeria could be stated as follows.

The specification is expressed in functional form as:

$$MO = f(OP, FP, INF) \quad (2)$$

MO is manufacturing sector output; OP is oil price; FP is fiscal policy variables and INF is price level which is used as control variable. INF is included because changes in government expenditure will determine the price level which might have an indirect effect on the manufacturing output. This study will consider expenditure and revenue as the variables for fiscal policy. To our belief, the process of generating revenue and spending by the government could bring about a significant change in the performance of manufacturing sector. Aside this fact, many of the researches in this area (Eze and Ogili, 2013) used aforementioned variables to measure fiscal policy. On this basis, using necessary variables for the policy, we can then have the following specification:

$$MO = \phi_0 + \phi_1 op + \phi_2 rev + \phi_3 exp + \phi_4 inf + \xi \quad (3)$$

From equation (3) above, MO is the Manufacturing Output, op stands for oil price, rev, for revenue, exp for expenditure and inf, for price level. The ϕ's are the parameters of the model to be estimated. However, given the large magnitude of the values of the variables used, log-log mode is applied and this will provide for easy interpretation of the results.

3.2 SVAR Specification

We use Structural Vector Autoregressive Model to explain the behaviour of manufacturing sector in the Nigeria economy in relation to fiscal variables policy and oil price level shocks. A structural model is a model that is used to estimate the effects of deliberate policy actions or major shocks to the economy, either positive or negative [Sen and Kaya (2015) in Kpughur (2020)]. It is consistent with theory as it allows for imposition of both short run and long run restrictions and it does not require a structural model describing the general economy nor require the need to build a special mechanism for monetary and fiscal policy design. According to Aarle, Garretsen and Gobbin (2003) in Kpughur (2020), SVAR makes use of two important tools. These are impulse response function and variance decompositions and it gives information with regards to the impacts of shocks and policy innovations.

Christiano, Eichenbaum and Evans (2005) in Hammed (2020) stated that the fundamental tools for measuring shock in literature is VAR as it is a convenient device for summarizing the first and second moment properties of the data which make analysis very easy to execute. It is believed that shock to fiscal policy variables and price level would go a long way in influencing the activities of manufacturing sector in the country. The variables for fiscal policies, as adopted by this study are total revenue and total expenditure while that of price level is inflation rate. Our VAR model is structured by following basic economic principle. The belief here is that a positive change in government revenue (largely coming from a sudden change in oil price) would invoke the government to spend more on the economy. Such a spending would manifest in a sector like manufacturing sector and in this regard, there is possibility of having a rise in price level in the economy. This model incorporates significant fiscal policy variables into the analysis and recognize that they influence manufacturing sector. In that regard, our structural VAR model of oil price shock and fiscal variables shocks in a five-variable setting of manufacturing output measures is based on Kilian (2009). The VAR specification for lag i=1…j is as follows:

$$AZ_t = \delta_0 + \sum_{i=1}^{j} \delta_i Z_{t-i} + \mu_t \quad (4)$$

From equation (4) Z_t is a **kx1**-dimensional vector of the endogenous variable for model one, A is **kxk** matrix of parameters of current value of endogenous variables, δ_0 is a **kx1**-dimensional vector of constant and δ_i are **kxk**-dimensional autoregressive co-efficient matrices of parameters of lagged value of variables of Z_t and μ_t is the **kx1**-dimensional vector of the stochastic error term normally distributed with white noise properties $N(0, \sigma^2)$. In this case, it is regarded as shock or innovation to each of the variables use in this study. Identification of the structural innovation of the reduced form equation in (4) requires that we multiply it by the weighting matrix of the parameters of the endogenous variables. As such, the innovation can be identified by estimating the following equation:

$$A\mu_t = B\epsilon_t \quad (5)$$

Given the study's five variable shocks, our structural equation is identified by placing 31 restrictions and it is of the form:

$$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ \emptyset_{21} & 1 & 0 & 0 & 0 \\ \emptyset_{31} & \emptyset_{32} & 1 & 0 & 0 \\ \emptyset_{41} & \emptyset_{42} & \emptyset_{43} & 1 & 0 \\ \emptyset_{51} & \emptyset_{52} & \emptyset_{53} & \emptyset_{54} & 1 \end{pmatrix} \begin{pmatrix} \mu_{op} \\ \mu_{rev} \\ \mu_{exp} \\ \mu_{inf} \\ \mu_{mo} \end{pmatrix} = \begin{pmatrix} \gamma_{11} & 0 & 0 & 0 & 0 \\ 0 & \gamma_{22} & 0 & 0 & 0 \\ 0 & 0 & \gamma_{33} & 0 & 0 \\ 0 & 0 & 0 & \gamma_{22} & 0 \\ 0 & 0 & 0 & 0 & \gamma_{22} \end{pmatrix} \begin{pmatrix} \varepsilon_{op} \\ \varepsilon_{rev} \\ \varepsilon_{exp} \\ \varepsilon_{inf} \\ \varepsilon_{mo} \end{pmatrix} \quad (6)$$

In equation 8, μ_t is the matrix of structural shock and each element in the matrix denotes oil price shock, revenue shock, expenditure shock, price level shock and manufacturing shock respectively and each connotes the presence of contemporaneous relationship among oil prices, fiscal policy variables, price level

and manufacturing sector shocks in the model presentation. Correspondingly, the elements in matrix ϵ_t denote the residuals of the reduced form equations which represent the absence of contemporaneous relationship between oil price shock and variables shock in our model. In this model, row 1 represents oil price shock which is not affected by any other shock in the model because it is determined outside the model. Row 2 shows equation for revenue which is only affected by shock in the oil price. Equations for expenditure in row 3 is not affected by shocks to inflation rate and manufacturing output while that of the inflation rate (row 4) is not affected by shock to manufacturing output. In row 5, we structure manufacturing output to be affected by shocks to any of the other variables in the model.

3.3. Source of Data

This study makes use of secondary data. All data for the study were sourced from Central Bank of Nigeria (CBN) bulletin, 2020 edition. Annual time-series data on oil price, total government revenue, total government capital expenditure, manufacturing output and headline inflation were for the periods of 1981 to 2019. The sample period is determined by the availability of the data for some variables.

3.4. Tests for Stationarity and Lag Length

It is a matter of necessity that we test for stationarity, considering the fact that a VAR analysis requires that the time series data must be stationary. We therefore applied the Augmented Dickey-Fuller ADF) unit root test. The results are reported in Table 1. As it can be seen from the Table, all variables are I(1) except manufacturing output which is I(2). Going with the null hypothesis, "the series have unit root", which means the series are not stationary. However, when they were differenced, the series indicated stationarity.

Table 1. Augmented Dickey-Fuller (ADF) Unit Root Test Results, 1981 – 2019

Series	First Difference	Test statistic	P-Value (%)	Status
Mo	-6.8689 (3*)	-3.661987	0.0260	I(2)
gex	-5.8649 (3*	-2.617460	0.0901	I(1)
gre	-5.0203 (3*)	-4.013463	0.0015	I(1)
op	-5.4404 (3*)	-3.591538	0.0063	I(1)

Source: Author's computation (2020)

* Maximum lag length used for the unit root test

In table 2 we established the optimal lag length order of the VAR model through the Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), and Hannan-Quinn Information Criterion (HQIC), where AIC suggested a VAR model of order three i.e. VAR (3). We see no need to test for cointegration relationship among our variable since our intention is primarily on shocks coming from oil price using SVAR.

Table 2 Series: Optimal Lag Length Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-100.9487	NA	0.000350	6.232279	6.456743*	6.308827
1	-71.24954	48.91631	0.000271	5.955856	7.302644	6.415149
2	-36.73757	46.69267*	0.000171*	5.396328	7.865440	6.238366*
3	-8.264274	30.14820	0.000185	5.192016*	8.783453	6.416799

Source: Author's computation (2020)

4. Discussion of Findings

Our results from findings is presented under two headings: impulse and response function (IRFs) and Variance Decomposition.

4.1. Fiscal Policy Shock and Manufacturing Output in Nigeria

To get a more detailed picture on the study, we carried out the analysis of our model in which we examined fiscal variables' shock via oil price shock and analysed the impact of both shocks on the manufacturing output. The variables used for measuring fiscal policy in this study are total government revenue and total government expenditure while that of the price level is inflation rate. We included price level for the fact that pressure coming from expenditure will pass through it to manufacturing output.

Given our five-variable structural VAR, a total of twenty-five shock responses are expected. However, owing to giving priority to relevance, we only analyse ten of them that are relevant to achieving the objective of the study. Figure 4.2 (i and ii) shows the response of fiscal variables to oil price shock. Revenue respond positively and significantly to the oil price in the short run (from year one to two). It assumes a negative response thereafter and through to the medium-run (year five). It becomes stabilised in the long run. As for the expenditure, it responds positively in the very early part of the short run and then turn negative up to year three. The response was then stabilised in the medium and long-run. On the other hand, the response of expenditure to revenue was positive all through, though not significant. This is an indication that Nigeria government expenditure is weakly explained by its revenue. The response of price level to oil price was more volatile in the long run than in short run indicating a long delay response. However, its response to revenue shock was fairly delayed in the early part of short run before showing an upward relationship with revenue. This same explanation was shown by price level to expenditure, though higher and with a slight delay in response at the very early part of the short run. Also, the response of price level to expenditure was more stable in the long run than to revenue. This indicates that expenditure is more closely related to price level than revenue.

Figure 4.2 (vii to x) shows the response of manufacturing output to the shock in our variables of choice. The response of manufacturing output to oil price shock was not stable. It was positive in the first two year, negative in the next three and become stabilise thereafter. As for the response to revenue shock, it starts by increasing in the short run and fade off thereafter. However, its response to price level was more stable than to expenditure. This is an indication that much of the impact of expenditure are likely to have been lost to inflation. The response of manufacturing to price level was significant in the very early part of the first year, though falling. From year two to four, the response was negative and stabilised fairly in the long-run.

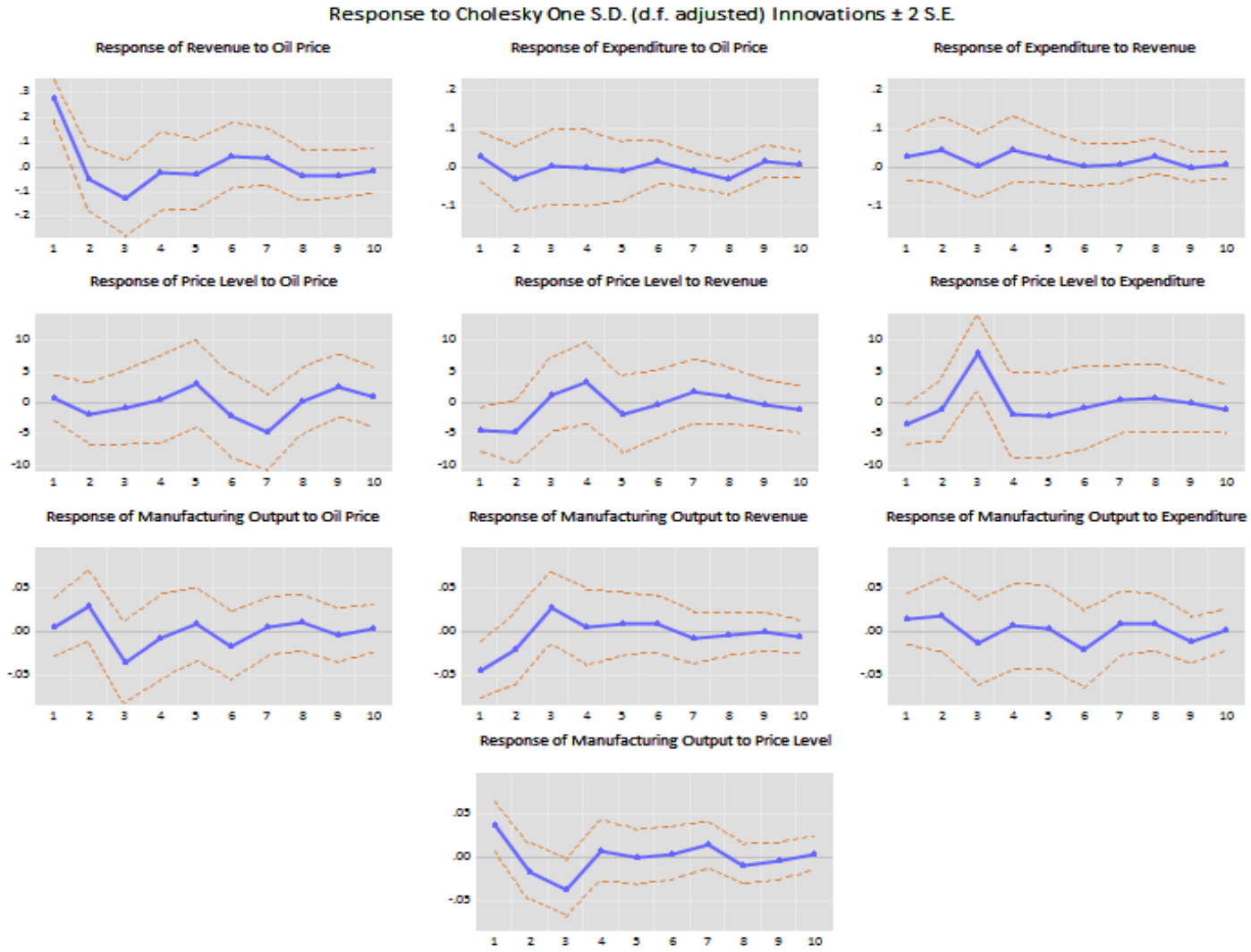

Figure 4.1: Showing the Response of variables of choice to Cholesky one S.D innovation

4.2 Variance Decomposition

V.D breaks down the ratio of variability of each response in relation to the variability resulting from shocks in other variables. It shares the fluctuation in one variable to the innovation in the system. Table 4.1 shows the forecast error variable of each individual variables of choice. Significant variation in oil price is explained by itself in both short-run (84%) and long-run (70.6%). Variation in revenue is explained by oil price. About 77% variation in revenue was explained by oil price in the short run while 50% was explained in the long-run. About 19% was explained by the expenditure in the long-run indicating that expenditure on meaningful projects would further generate more income to the government while the significant explanation of revenue by oil price evident oil-dependent nature of the Nigerian economy. Variation in expenditure was explained by itself in short- and long-run. This mean that government spending is largely financed through other means like borrowing, grants and aids. Changes in price level over time was weakly explained by expenditure (21.4%) and revenue (15.1%). As for manufacturing output and in totality, the variation in it is jointly explained by inflation (18%), revenue (17.8%) and oil price (14.8%) in the long - run. This suggests that the likely impact coming from expenditure have been consumed by inflation.

Table 4.1: Response to shocks among our variables of choice

Horizon	Op	Grv	gex	Inf	Mo
Variance Decomposition of Oil Price					
Year 1	100.0000	0.000000	0.000000	0.000000	0.000000
Year 2	85.43664	11.82827	0.578297	2.150982	0.005813
Year 3	84.08712	10.79222	0.652993	3.920005	0.547664
Year 5	72.12381	13.06228	3.618173	5.297147	5.898595
Year 8	71.18174	13.49214	3.808236	5.097318	6.420571
Year 10	70.67311	13.54515	4.199401	5.115927	6.466412
Variance Decomposition of Expenditure					
Year 1	77.45294	22.54706	0.000000	0.000000	0.000000
Year 2	70.08918	25.83763	0.097702	0.773123	3.202365
Year 3	58.56284	18.26263	19.64358	1.038818	2.492125
Year 5	51.37082	23.99702	19.26339	1.291482	4.077295
Year 8	51.08586	23.51442	18.62042	1.489393	5.289911
Year 10	50.25941	23.73651	19.10117	1.601393	5.301515
Variance Decomposition of Expenditure					
Year 1	2.198808	2.485643	95.31555	0.000000	0.000000
Year 2	3.653203	5.877056	89.91821	0.002460	0.549067
Year 3	2.997771	4.845294	90.72316	0.982010	0.451768
Year 5	2.849825	8.664788	82.82595	4.776028	0.883413
Year 8	4.154816	9.257787	79.22286	5.236378	2.128159
Year 10	4.530313	9.191242	78.56679	5.602088	2.109569
Variance Decomposition of Price Level					
Year 1	0.652570	16.38369	9.910201	73.05354	0.000000
Year 2	2.407299	24.15160	7.367142	60.66326	5.410705
Year 3	1.699424	15.82293	28.57675	49.40369	4.497204
Year 5	4.150045	16.16397	24.39311	45.14970	10.14317
Year 8	10.23510	15.39164	21.88122	40.38832	12.10372
Year 10	11.83380	15.13974	21.35165	39.11330	12.56150
Variance Decomposition of Manufacturing Output					
Year 1	0.328803	19.58738	2.216371	13.99879	63.86865
Year 2	8.020174	18.67337	4.714577	13.28375	55.30813
Year 3	13.72218	19.16644	4.576113	18.72115	43.81412
Year 5	13.71373	18.73927	4.766961	18.02673	44.75331
Year 8	14.95170	17.88407	7.730067	18.07434	41.35982
Year 10	14.89964	17.78021	8.204530	18.01437	41.10124

Source: Author's Computation

5. Conclusion and Recommendation

In this study, we used SVAR framework to examine how manufacturing output in Nigeria has responded to oil shocks using fiscal variables as intervening variables with a goal to provide policy guidelines for policy makers in achieving stability in the economy. We used annual data from 1981 to 2019 and they were sourced from CBN.

The result of our impulse response function shows that government revenue in Nigeria is being determined by oil price while the expenditure is weakly explained by revenue. Also, we found that expenditure is closer to price level than revenue while output from manufacturing sector is more explained by price level than expenditure. As for the variance decomposition, the variation in revenue is explained by oil price in both short- and long-run while expenditure explained revenue in the long run, though very weak. This implies that spending by government can further generate more revenue in the long-run. We equally found that government expenditure is not explained by its revenue suggesting that it is financed largely by other means like borrowing. Also, variation in price level is weakly explained by expenditure indicating the import-generating nature of inflation in Nigeria while manufacturing output is jointly explained by inflation, revenue and oil price. This means that expenditure lost its explanatory power to price level in the process.

We hereby recommend that efforts should be made to diversify the economy. This will ensure that government expenditure would be financed by its generated revenue rather than borrowing or unnecessary depending on the foreign aids. Also, the monetary authority should always take quick action in controlling inflation so that meaningful and real impact of expenditure can be felt by the manufacturing sector which will translate to growth of the aggregate economy. Further researches in this area can examine the fiscal policy shocks with other sectors of the economy and/ or the aggregate economy at large.

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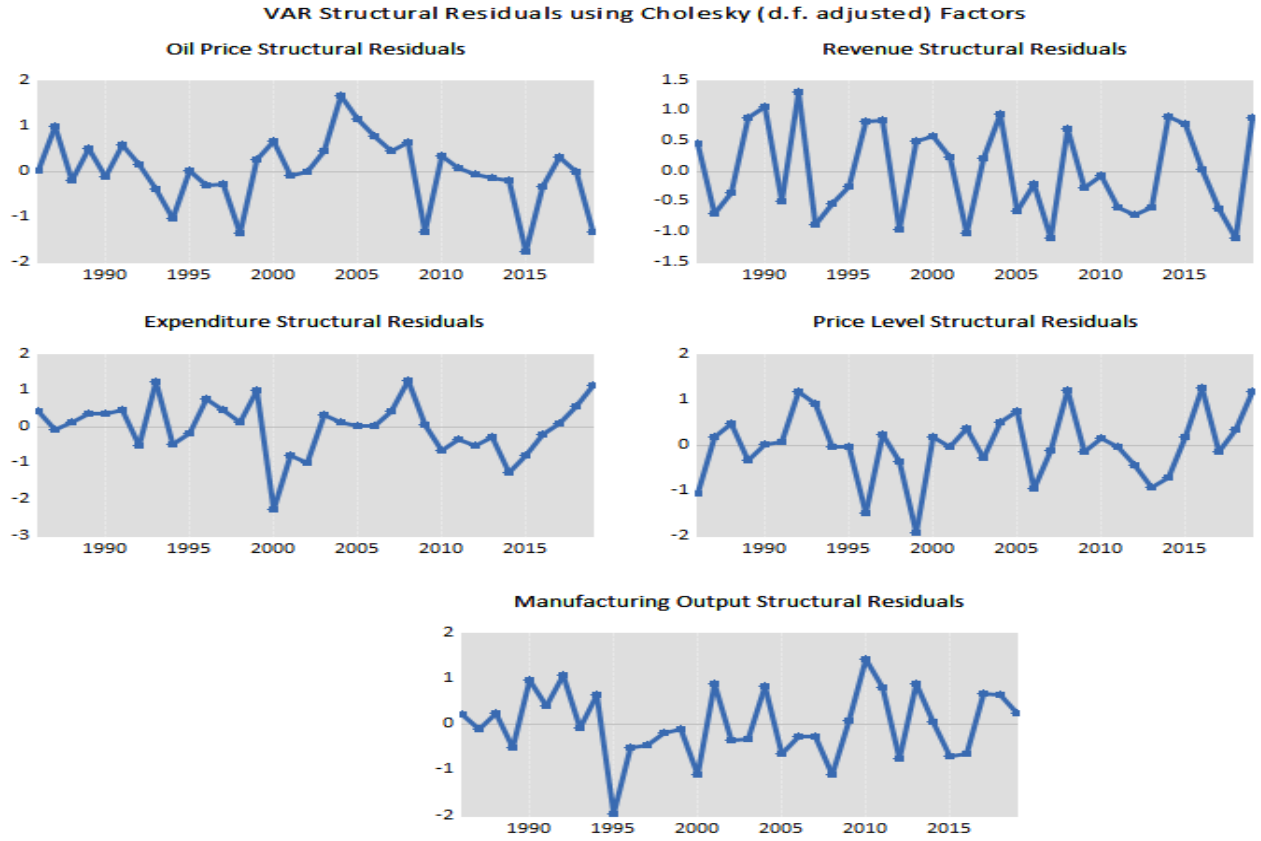
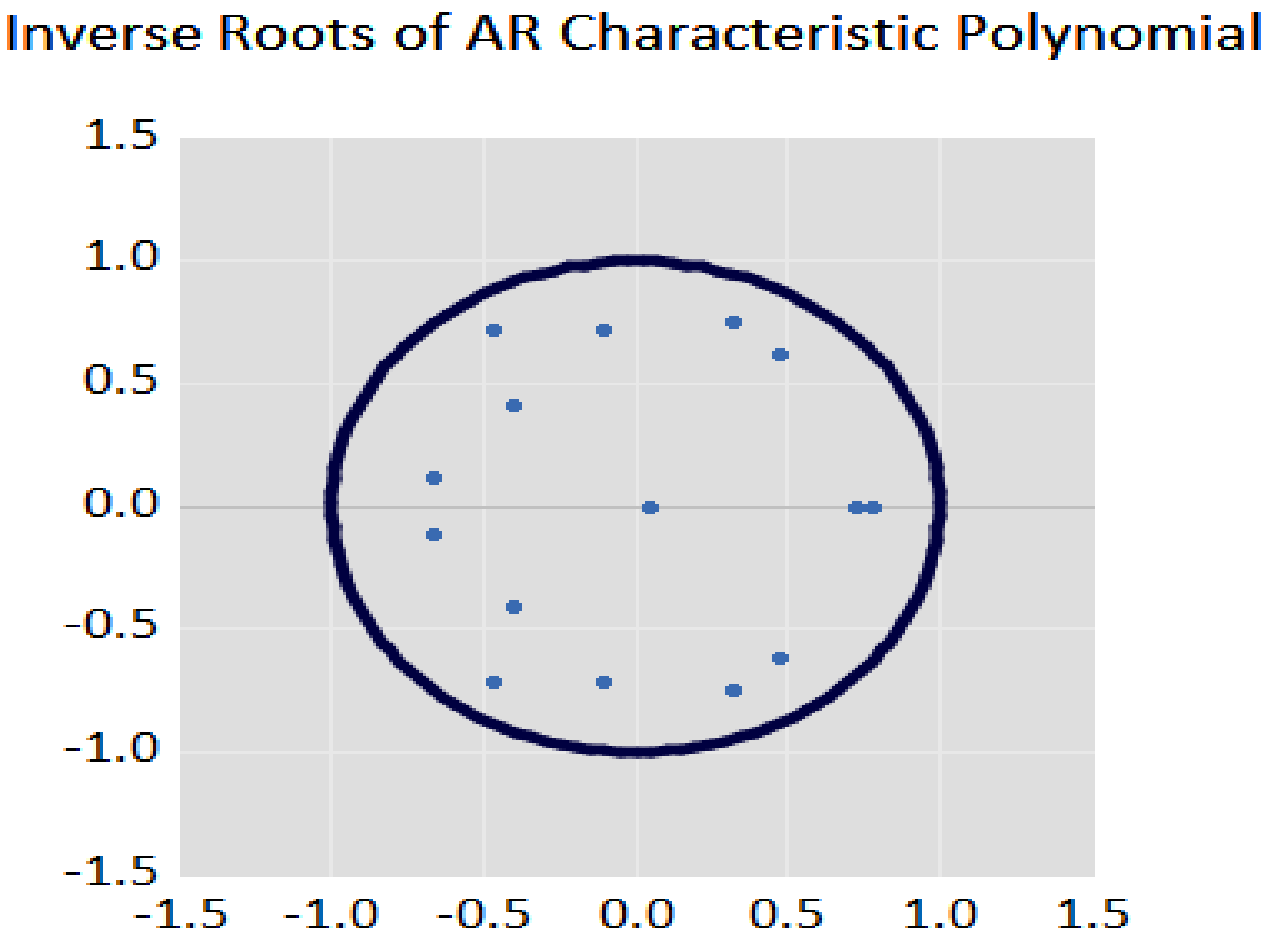


Stability Test for our Model



Normality Test for Our Model

Component	Skewness	Chi-sq	df	Prob.*
1	-0.424971	1.023403	1	0.3117
2	0.110473	0.069158	1	0.7926
3	-0.689870	2.696887	1	0.1005
4	-0.435311	1.073811	1	0.3001
5	-0.269220	0.410717	1	0.5216
Joint		5.273975	5	0.3834
Component	**Kurtosis**	**Chi-sq**	**df**	**Prob.**
1	3.376223	0.200520	1	0.6543
2	1.613423	2.723679	1	0.0989
3	4.192831	2.015697	1	0.1557
4	3.322978	0.147779	1	0.7007
5	2.952310	0.003222	1	0.9547
Joint		5.090897	5	0.4049
Component	**Jarque-Bera**	**df**	**Prob.**	
1	1.223923	2	0.5423	
2	2.792837	2	0.2475	
3	4.712584	2	0.0948	
4	1.221590	2	0.5429	
5	0.413939	2	0.8130	
Joint	10.36487	10	0.4091	