



## **Government Spending Pattern and Macroeconomic Stability: A Vector Autoregressive Model**

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### **ABSTRACT**

Macroeconomic stability has not kept pace with the pattern of public sector spending in majority of the developing countries. Unfortunately, past studies have mainly focused on the consequences of aggregate government spending on macroeconomic variables, or at most disaggregated government spending into capital and recurrent. In order to use government spending to effectively bring macroeconomic stability in developing countries, government spending must be decomposed according to sectors. Only very few studies have done this. We made effort to find out the components of government spending that cause macroeconomic instability in Nigeria, using vector autoregressive model. Result reveals government capital expenditure on economic services is the major cause of inflation in Nigeria. Impulse response function shows inflation will respond very sharp and positively to any shock in government capital spending in economic sector and social and community services. Therefore, if government must pursue economic stability through inflation control, she must re-examine her investment in those sectors.

**Keywords:** Government, Spending, Pattern, Macroeconomic, Stability

**JEL Classifications:** H5, E6.

### **1. INTRODUCTION**

Earlier than the great depression, government activities in an economy were seen as source of economic instability. The classical school believed that government intervention in economic activity in any way will disrupt the smooth functioning of the economic system, and possibly lead to crisis. Based on that premise, the classicals advocated for laissez fair economic system in which the market directs the type of goods an economy can produce and consume. In the classical economic system, the role of the government is limited to the maintenance of law and order needed to ensure that free market functions well for equilibrium to be maintained. The failure of the market to restore the economies of Europe to equilibrium in the 1930s put serious question mark on the laissez fair economic thought of the classicals. Keynesian revolution and the subsequent emergence of the Keynesian economics in the later part of 1930s revealed that government expenditure is a source of macroeconomic stability. Keynes in his general theory was able to convince even the classical scholars that government expenditure at a time of economic down turn

can increase the tempo of economic activities, and thereby bring the economy back to growth part. Keynesian revolution divided economic reasoning and economic scholars along the lines of private and public interest thinking (den Hertog, 2010). Because none of the schools had an upper hand till today, the debate on the effect of government expenditure on macroeconomic stability has continued.

According to Mohanty and Zampolli (2009) government expenditure can bring both macroeconomic stability and instability depending on the pattern of the expenditure. It can bring stability because larger government spending will lead to more provision of public goods and services, labor employment, and social security. All these will help to keep an economy working, active and stable. On the other hand, they argued that higher government spending is destabilizing when government expenditures are financed through public debt. Miron (2010) called public expenditure financed through money creation tax inflation. Wildavsky (2003) had before now argued that government expenditure can lead to inflation when it is financed through public borrowing, money

creation or both, stressing that government should weigh between cash control and volumes if public expenditure is to be rational or make impact on the citizens.

den Hertog (2010) identified some sectors of the economy where government spending can lead to smooth functioning of the economy. den Hertog's argument is that services provided by the sectors are very critical to economic growth and development. They include electricity and gas, water, transport, postal services and communication system. As sectors that provide services critical to economic development, if they are left to the private sector alone to provide, the motive to make profit may lead to their under production or scarcity. To see that an economy is not found in that situation, government investment in those sectors is necessary. Many other scholars support the argument that government investment in critical sectors of an economy is needed to make the economy work well. Dabla-Norris and Matovu (2002) and Miron (2010) accept that expenditure on infrastructure can lead to good economic performance. Miron (2010) believes that government expenditure is a source of economic stability as well as instability depending on its outcome. Miron did not agree with Keynes that no matter the manner government expenditure is made, the spending will be good for the economy.

Nigeria's public sector expanded with the rise in international price of oil in early 1990s. The increase in oil revenue raised the revenue profile of the government and consequently, the public sector saw itself in sudden affluence. As a country coming out of civil war, the oil windfall was an opportunity for the government to pursue her reconciliation, reconstruction and rehabilitation programs. There and then, public sector activities expanded and government went beyond the provision of public goods and social infrastructure to direct investment in industrial production of goods and services. Many elephant projects like Ajaokuta steel complex were embarked upon but remained unfinished till now. Public expenditure in Nigeria rose from N903.9 million in 1970 to N5, 942.6 million in 1975. By 1980, it has risen to N14, 968.5 million, showing that within a space of 10 years, government expenditure increased by more than 1500%. On expenditure composition, economic services and general administration were the priority of the government between 1970 and 2010. Government channeled 20.32% of her resources annually to capital expenditure on economic services, while 19.72% was spent annually on recurrent general administration between 1970 and 2010 (Central Bank of Nigeria, 2010). On macroeconomic stability, inflation rose from 13.8% in 1970 to 33.9% in 1975. It however fell to 9.9% in 1980 (Central Bank of Nigeria, 2007). Unfortunately, between 1970 and 2010, domestic inflation was on double digit (Central Bank of Nigeria, 2010).

As inflation has remained on double digit despite continuous increase in government expenditures over the years, the central question to ask is: What components of government expenditure have contributed to macroeconomic instability in Nigeria between 1970 and 2010? The objective of this study is to answer this question by investigating the components of the government expenditure that have contributed to macroeconomic instability in

Nigeria. The finding will reshape public expenditure prioritization in Nigeria and some other developing countries.

## 2. THEORETICAL FRAMEWORK

Before 1930, the size of the public sector in almost all the countries of the world was relatively small in response to the ideology of the classical economists. The classical school believes that the role of the government in every economy should be restricted to the activities which will provide enabling climate for the market to work well. Government should limit itself to the provision of defence which will guarantee law and order in the society together with efficient market operation. The classical argument is that any work outside that of law and order in the name of the public sector can distort the economy and cause economic crisis. Based on this, the classicals recommended laissez fair system for every economy.

The work of H.C. Adams at the tail end of 19<sup>th</sup> Century and A. Wagner in early 20<sup>th</sup> Century led to the growing interest on the relationship between public expenditure and macroeconomic stability on one hand, and why the size of government must increase. H.C. Adams points out that government spending and output always grow in the same proportion. Wagner was more or less concerned about why public sector activities increases, and this he says is a result of progress in the society which makes it inevitable for the state to expand. Wagner's argument led to the Wagner's law often cited in public finance literature which says that the state activities must expand if the progress achieved in the society is not to be reversed. That is, there must be constant supply of defence, power and social services such as education and communication which are necessary for the smooth functioning of the economy.

Development model developed by Musgrave and Rostow points out that government expenditure must change in line with the stage of economic growth and level of economic development. The argument of the model is that the level of government expenditure is a function of the state of economic growth which the economy finds itself. For that, government expenditure is expected to be higher at the early stage of economic development when it is important to put in place essential infrastructure that will facilitate industrialization. The theory posits that once an economy moves to the next stage, government expenditure will fall. At the second stage, which is the stage of rapid economic growth, mobilization of private savings is no more a big problem. Hence, government activities can fall as the private sector activities rise. Lastly, and at the stage of high income and consumption, government expenditure must rise to complement the activities of the private sector, especially in education.

John Maynard Keynes is hardly unreferenced in any work in public finance in the past seven decades because of his economic revolution during the great depression. Keynes was able to convince economic scholars of the time who supported minimum government activities that increase in government spending, especially during economic recession will help to revive the economy back to life. According to Keynes, people should not

wait for the long run before they take action to bring the economy back to full economic activities. Waiting for the long run when market will adjust itself back to equilibrium is dangerous because in the long run, we may have all died. Conversely, government spending in an economy has short run solution to economic crisis. Keynesian school recommended increase in government expenditure during economic slump and fall during economic prosperity.

### 3. RELATED LITERATURE

There is lack of unanimity in arguments concerning government expenditure and economic stability as of today. Even empirical researches have produced diverse result also. The stand of Miron (2010) is that large government expenditure in recurrent items is counterproductive, and believes smaller size of government is better for growth. Saville (2008) did not see any good thing coming from government expenditure because according to him, government is a giant parasite which sucks its host (economy) at an increased rate when the host (economy) is healthy, but sucks it at a reduced rate when it is not healthy. His argument is that increasing government expenditure during period of economic downturn will worsen the crisis.

Contributing to the debate on government expenditure and economic stability, Lindauer and Velenchik (1992) identified two-way through which government spending can bring improvement in economic performance. The first is when government acts as a producer of goods and services instead of acting as a provider. The other one is when government spending is good to correct market failures. By implication, government spending if well-made is good for economic stability. On the empirical front, scholars have studied the effect of aggregate government spending on economic stability (Magazzino, 2011; Ayo et al., 2012; Ogbole, 2014; Ezirim et al., 2008; Gali, 1994). Magazzino (2011) in a study in Mediterranean countries found different effects of government expenditure on inflation in Italy, France and Portugal. In a study in Nigeria by Ayo et al. (2012), the causality that ran from government expenditure to inflation in the short-run did not persist in the long-run. However, Ezirim et al. found a bidirectional relationship between government expenditure and inflation in United States. Their result suggests that if government is interested in reducing inflation, she has to cut its expenditure. In a cross-country research of 22 OECD counties, Gali (1994) tested the automatic stabilization of government tax and purchases according to the Keynesian model. Result from the study was in line with Keynesian theory that government expenditure is an important economic stabilization tool.

Many other researchers used disaggregated government expenditure to assess the effectiveness of government spending on macroeconomic stability in different countries. Some revealed negative relationship between government expenditure and output growth and volatility (Attari and Javed, 2013; Mohanty and Zampolli, 2009; Chamorro-Narvaez, 2012). Okoro (2010) found capital expenditure to have positive effect on output in the log-run while the effect of recurrent expenditure was negative. On causality, Okoro (2010) and Udoka and

Anyingang (2015) found government capital and recurrent expenditure to cause economic growth in Nigeria. Unfortunately, the causal relationship between government capital and recurrent expenditure in Nigeria was not found in a later study by Ojarikre et al. (2015).

Study by Fan and Rao (2003) revealed that the pattern of government expenditure matters in bringing macroeconomic stability. In a cross-country study, they discovered that government expenditure on agriculture and health is good for growth in Africa, and in Asia, spending on education and agriculture can promote economic growth, but in Latin America, it is health spending that increases growth. However, study in Pakistan by Attari and Javed (2013) revealed that there is a negative relationship between government recurrent spending and economic growth. Hence, how government expenditure bring economic stability differs according to country.

In Nigeria, many studies have been done assessing the power of government expenditure to bring economic stability. They include Olayungbo (2013), Taiwo and Agbatogun (2011), Ayo et al. (2012), and Udoka and Anyingang (2015). We are more interested in the work of Udoka and Anyingang (2015) because of the detailed disaggregation of government expenditure in their work. The disaggregation is important in public finance policy in developing countries if source of instability of government spending is to be tackled effectively. However, their work was on consequences of government expenditure on output growth. We deviated and decided to concentrate on inflation, which is the greatest enemy to growth. We tried to find out how shock in any of the components of government expenditure will be responded to by domestic inflation.

### 4. DATA AND RESEARCH METHOD

The model for the study is the vector autoregressive (VAR) model because of the ability of impulse response function to trace the effect of any standard deviation shock to one of the innovations on current and future values of the endogenous variable. The study used quarterly data generated from Central Bank of Nigeria Statistical Bulletin between 1971 and 2010.

Generally the model is specified as:

$$y_t = A_1 y_{t-1} + \dots + A_p y_{t-p} + Bx_t + \epsilon_t$$

$$\begin{aligned} INF_t &= \alpha_0 + \sum_{i=0}^n \alpha_{1i} INF_{t-i} + \sum_{i=0}^n \alpha_{2i} RA_{t-i} \\ &+ \sum_{i=0}^n \alpha_{3i} RE_{t-i} + \sum_{i=0}^n \alpha_{4i} RS_{t-i} + \sum_{i=0}^n \alpha_{5i} CA_{t-i} \\ &+ \sum_{i=0}^n \alpha_{6i} CE_{t-i} + \sum_{i=0}^n \alpha_{7i} CS_{t-i} + \mu_{1i} \\ RA_t &= \delta_0 + \sum_{i=0}^n \delta_{1i} RA_{t-i} + \sum_{i=0}^n \delta_{2i} RE_{t-i} + \sum_{i=0}^n \delta_{3i} RS_{t-i} \\ &+ \sum_{i=0}^n \delta_{4i} CA_{t-i} + \sum_{i=0}^n \delta_{5i} CE_{t-i} \\ &+ \sum_{i=0}^n \delta_{6i} CS_{t-i} + \sum_{i=0}^n \delta_{7i} INF_{t-i} + \mu_{2i} \end{aligned}$$

## 5. EMPIRICAL RESULT

### 5.1. Granger Causality Tests

The result of the Granger causality test is presented in Table 1.

The causality test result presented in Table 1 suggests that inflation granger cause recurrent expenditure on general administration

$$RE_t = \lambda_0 + \sum_{i=0}^n \lambda_{1i} RA_{t-i} + \sum_{i=0}^n \lambda_{2i} RE_{t-i} + \sum_{i=0}^n \lambda_{3i} RS_{t-i} + \sum_{i=0}^n \lambda_{4i} CA_{t-i} + \sum_{i=0}^n \lambda_{5i} CE_{t-i} + \sum_{i=0}^n \lambda_{6i} CS_{t-i} + \sum_{i=0}^n \lambda_{7i} INF_{t-i} + \mu_{3i}$$

$$RS_t = \beta_0 + \sum_{i=0}^n \beta_{1i} RA_{t-i} + \sum_{i=0}^n \beta_{2i} RE_{t-i} + \sum_{i=0}^n \beta_{3i} RS_{t-i} + \sum_{i=0}^n \beta_{4i} CA_{t-i} + \sum_{i=0}^n \beta_{5i} CE_{t-i} + \sum_{i=0}^n \beta_{6i} CS_{t-i} + \sum_{i=0}^n \beta_{7i} INF_{t-i} + \mu_{4i}$$

$$CA_t = \tau_0 + \sum_{i=0}^n \tau_{1i} INF_{t-i} + \sum_{i=0}^n \tau_{2i} CA_{t-i} + \sum_{i=0}^n \tau_{3i} CE_{t-i} + \sum_{i=0}^n \tau_{4i} CS_{t-i} + \sum_{i=0}^n \tau_{5i} RA_{t-i} + \sum_{i=0}^n \tau_{6i} RE_{t-i} + \sum_{i=0}^n \tau_{7i} RS_{t-i} + \mu_{5i}$$

$$CE_t = \rho_0 + \sum_{i=0}^n \rho_{1i} INF_{t-i} + \sum_{i=0}^n \rho_{2i} CA_{t-i} + \sum_{i=0}^n \rho_{3i} CE_{t-i} + \sum_{i=0}^n \rho_{4i} CS_{t-i} + \sum_{i=0}^n \rho_{5i} RA_{t-i} + \sum_{i=0}^n \rho_{6i} RE_{t-i} + \sum_{i=0}^n \rho_{7i} RS_{t-i} + \mu_{6i}$$

$$CS_t = \psi_0 + \sum_{i=0}^n \psi_{1i} INF_{t-i} + \sum_{i=0}^n \psi_{2i} CA_{t-i} + \sum_{i=0}^n \psi_{3i} CE_{t-i} + \sum_{i=0}^n \psi_{4i} CS_{t-i} + \sum_{i=0}^n \psi_{5i} RA_{t-i} + \sum_{i=0}^n \psi_{6i} RE_{t-i} + \sum_{i=0}^n \psi_{7i} RS_{t-i} + \mu_{7i}$$

Where,

*INF* = Inflation - Domestic inflation as measure of macroeconomic stability,

*RA* = Recurrent expenditure on administration - Percentage of government recurrent expenditure on general administration,

*RE* = Recurrent expenditure on economic services - Percentage of government recurrent expenditure on economic services,

*RS* = Recurrent expenditure on social services - Percentage of government recurrent expenditure on social and community services,

*CA* = Capital expenditure on administration - Percentage of government capital expenditure on general administration,

*CE* = Capital expenditure on economic services - Percentage of government capital expenditure on economic services,

*CS* = Capital expenditure on social services - Percentage of government capital expenditure on social services,

*t* = Time horizon to show time series,

$\alpha, \delta, \lambda, \beta, \tau, \rho$  and  $\Psi$  = Parameters to be estimated.

Where,  $y_t$  is a  $k$  vector of endogenous variables,  $x_t$  is a  $d$  vector of exogenous variables, and  $A_1, \dots, A_p$  and  $B$  are matrices of coefficients to be estimated, and  $\epsilon_t$  is a vector of innovations. In a decomposition of (1), the variables of interest are clearer in (2).

**Table 1: Granger causality result**

| Granger causality tests             | F-statistics | Lag | P value |
|-------------------------------------|--------------|-----|---------|
| CS does not granger cause RA        | 4.071        | 3   | 0.254   |
| INFLATION does not granger cause RA | 24.078       | 3   | 0.000   |
| CA does not granger cause RA        | 22.73        | 3   | 0.000   |
| RS does not granger cause RA        | 41.437       | 3   | 0.000   |
| RE does not granger cause RA        | 16.767       | 3   | 0.000   |
| CE does not granger cause RA        | 22.862       | 3   | 0.000   |
| CS does not granger cause CE        | 3.1991       | 3   | 0.362   |
| INFLATION does not granger cause CE | 8.0743       | 3   | 0.045   |
| CA does not granger cause CE        | 8.5712       | 3   | 0.036   |
| RA does not granger cause CE        | 6.5357       | 3   | 0.088   |
| RS does not granger cause CE        | 0.8935       | 3   | 0.827   |
| RE does not granger cause CE        | 3.3865       | 3   | 0.336   |
| RA does not granger cause CS        | 8.6732       | 3   | 0.010   |
| CE does not granger cause CS        | 11.326       | 3   | 0.010   |
| INFLATION does not granger cause CS | 3.7293       | 3   | 0.292   |
| CA does not granger cause CS        | 5.7841       | 3   | 0.123   |
| RS does not granger cause CS        | 22.716       | 3   | 0.000   |
| RE does not granger cause CS        | 11.358       | 3   | 0.000   |
| RA does not granger cause INFLATION | 4.2295       | 3   | 0.238   |
| CE does not granger cause INFLATION | 11.015       | 3   | 0.012   |
| CS does not granger cause INFLATION | 4.0992       | 3   | 0.251   |
| CA does not granger cause INFLATION | 5.542        | 3   | 0.136   |
| RS does not granger cause INFLATION | 2.5359       | 3   | 0.469   |
| RE does not granger cause INFLATION | 2.0652       | 3   | 0.559   |
| RA does not granger cause CA        | 16.809       | 3   | 0.001   |
| CE does not granger cause CA        | 14.825       | 3   | 0.008   |
| CS does not granger cause CA        | 13.571       | 3   | 0.004   |
| INFLATION does not granger cause CA | 0.4857       | 3   | 0.922   |
| RS does not granger cause CA        | 5.4292       | 3   | 0.143   |
| RE does not granger cause CA        | 1.2107       | 3   | 0.750   |
| RA does not granger cause RS        | 4.1343       | 3   | 0.247   |
| CE does not granger cause RS        | 16.554       | 3   | 0.001   |
| CS does not granger cause RS        | 8.3902       | 3   | 0.039   |
| INFLATION does not granger cause RS | 9.6006       | 3   | 0.022   |
| CA does not granger cause RS        | 9.6401       | 3   | 0.000   |
| RE does not granger cause RS        | 9.56         | 3   | 0.023   |
| RA does not granger cause RE        | 15.712       | 3   | 0.001   |
| CE does not granger cause RE        | 17.332       | 3   | 0.001   |
| CS does not granger cause RE        | 15.566       | 3   | 0.001   |
| INFLATION does not granger cause RE | 24.357       | 3   | 0.000   |
| CA does not granger cause RE        | 16.359       | 3   | 0.001   |
| RS does not granger cause RE        | 34.769       | 3   | 0.000   |

(RA), capital and recurrent expenditures on economic services (CE, RE) and recurrent expenditure on social and community services (RS).

On the other hand, the component of government expenditure which granger cause inflation and posed serious threat to macroeconomic stability since 1971 was government capital expenditure on economic services (CE). Among the six components of government expenditure, it is highly significant at 1% level, with a probability of 0.012. Against the backdrop of Table 1, causality runs from government capital expenditure on economic services (CE) to inflation.

### 5.2. Stability Test

The reliability of the result and the study in itself depends on how the variables in the models can be identified overtime. The forecasting ability of the variables is only strong when they are predictable. Estimating unstable models poses great difficulty and challenges. Stability condition is satisfied in VAR if and only if all the characteristic roots lie within the unit circle. The result of the VAR stability test is presented in Figure 1.

From Figure 1, all the Eigen values lie within the unit circle, there by satisfying the VAR stability condition. Hence, any forecasting done with the VAR model can be relied on for policy purposes.

### 5.3. Impulse Response Function Test

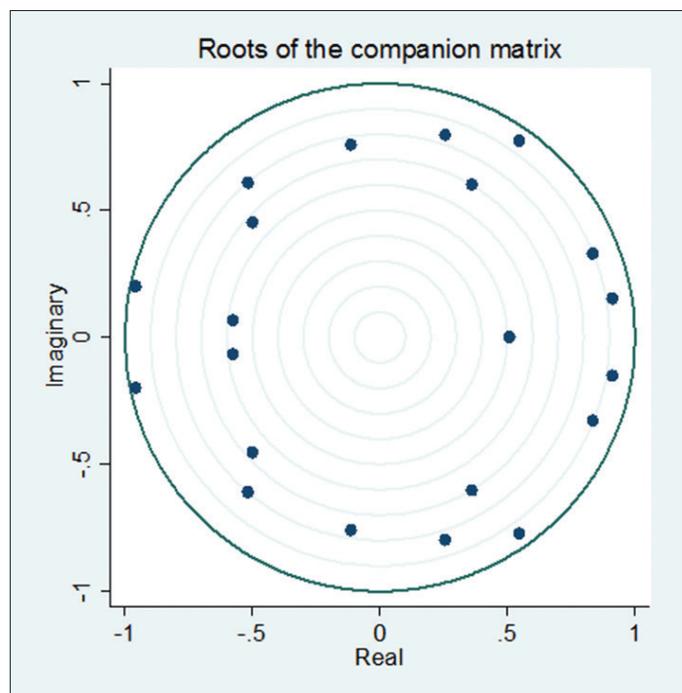
Knowledge of the response of the dependent variable to an innovation or shock in the independent variables matters and plays significant role in policy formulation. Since the research is undertaken to aid policy making, impulse response is more important than causality because it helps us to know the pattern of response to shocks, that is, whether the response is an upward or downward movement. Because shock from exogenous variable can transmit to the endogenous, impulse response provides information on the period to period response of the endogenous variable to the innovation/shocks in the exogenous. The result of the is presented in Figures 2-7.

Figure 2 shows that a onetime shock/innovation in government capital expenditure on social and community services will exert an upward movement on inflation. The important message it is sending to policy makers is that once government capital spending on social and community services gets a boost, inflation will respond positively until a certain stage when it will start to fall, but not an indefinite fall.

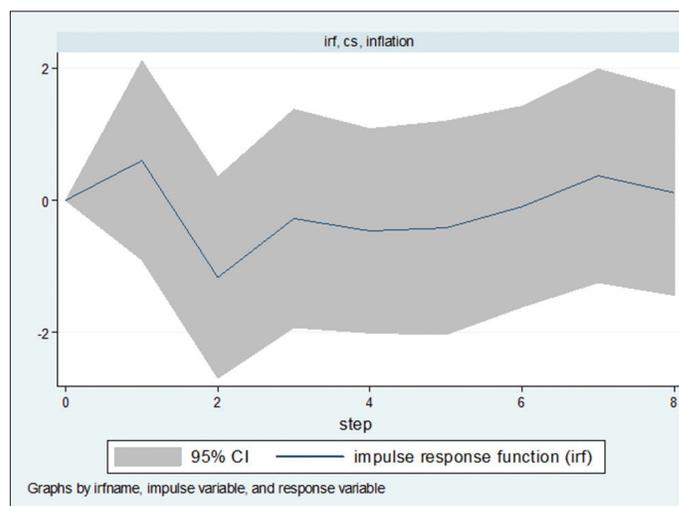
In Figure 3 as presented, any shock in the form of increase in government capital expenditure on general administration will bring a fall in inflation immediately. However, inflation will start to rise from period two. It does not suggest effective government spending, rather, it is a sign that all may not be well. Recent row in the Federal Parliament is an eye opener that over 40% of the administrative capital votes are for none existing projects and the money goes into personal pocket.

The observation in Figure 4 shows that the response of inflation to any innovation/shock in capital investment in economic sector

**Figure 1:** Vector autoregressive stability test result



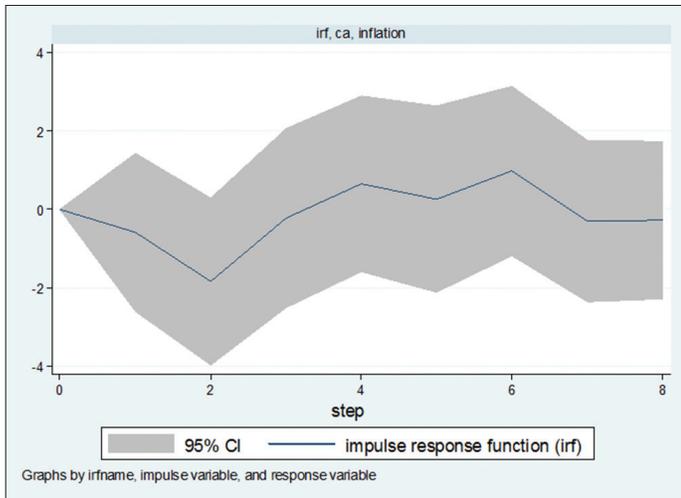
**Figure 2:** Response of inflation to capital expenditure on social and community services



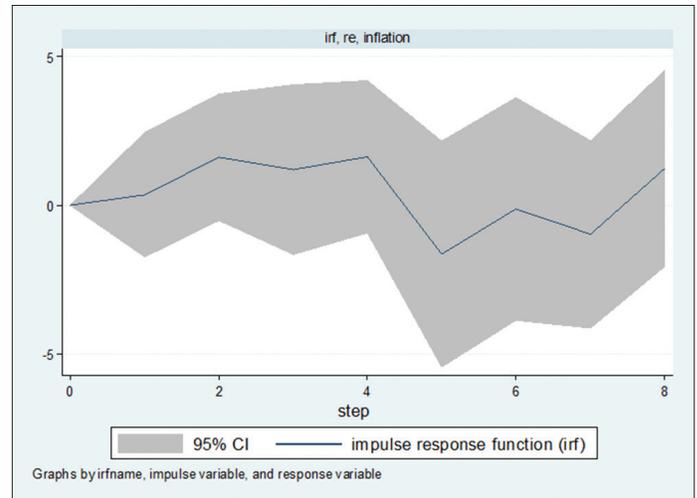
is positive. This makes sense in Nigeria and other developing countries where government activities in economic sector have been sizable. A shock/innovation in capital spending in economic sector will generate sharp and positive response from inflation immediately. It reinforces the result of the causality in Table 1 indicating significant causality of government capital expenditure in economic services on inflation.

Inflation responded negatively to shock in government recurrent expenditure on general administration as shown in Figure 5. The result is contrary to expectation in Nigeria where the wage and overhead cost of running the executives and national assembly is very high. From Figure 5, wage and overhead cost of running the administrative government is only a problem after the fourth period when inflation starts to rise.

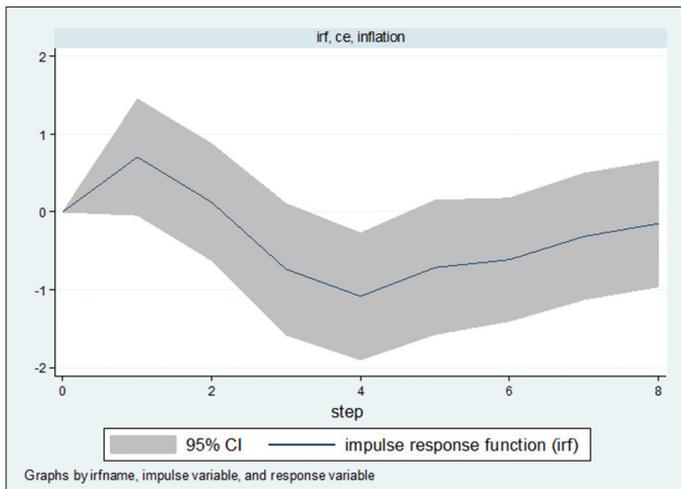
**Figure 3:** Response of inflation to capital expenditure on general administration



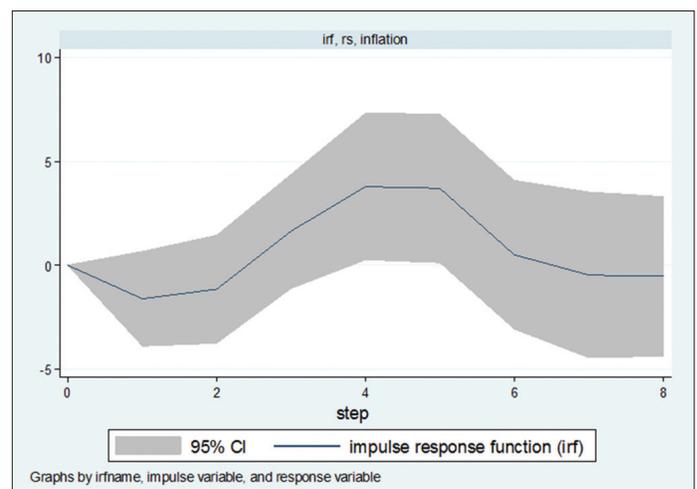
**Figure 6:** Response of inflation to recurrent expenditure on economic services



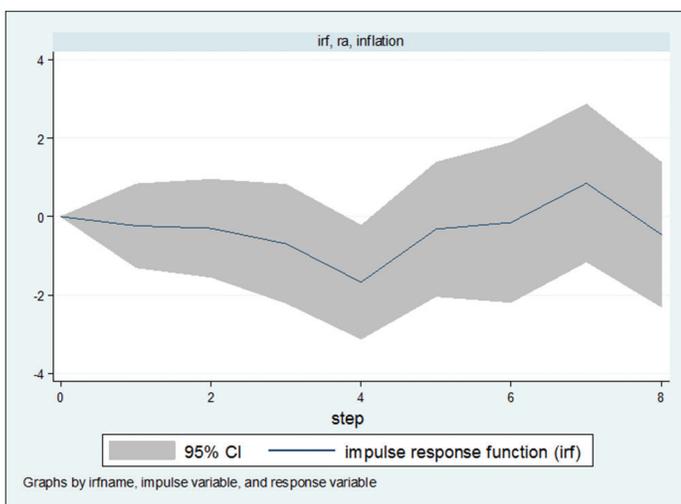
**Figure 4:** Response of inflation to capital expenditure on economic services



**Figure 7:** Response of inflation to recurrent expenditure on social and community services



**Figure 5:** Response of inflation to recurrent expenditure on administration



to a gradual increase in inflation up to a point before it will rise sharply.

Social and community services are in the areas of water, environmental protection and education which are provided by the government to improve the quality of life of the people. The response of inflation to the initial shock in recurrent expenditure on social and community services is negative up to a certain point, but, it will pose serious problem and rises sharply afterward as shown in Figure 7.

## 6. CONCLUSION

A rigorous process has been followed in this study to reconcile other works in public spending and macroeconomic stability in Nigeria. The finding falls in line with the argument of Miron (2010) that not all government expenditures are good for economic stability. If Nigerian government wants to achieve macroeconomic stability (inflation control), she must reconsider her expenditure programmes in economic sector. This is not to say that government

From Figure 6, any government activity that leads to sudden increase in recurrent expenditure on economic services will lead

should hands-off entirely but it is important that activities that are profit oriented should be left in hands of the private entrepreneurs.

Experience has shown that in developing countries, government use the public sector to compensate political loyalists. Rather than the political appointees use the resources to provide services to the people, they divert it to their private use. It accounts for the poor service delivery by the public sector agency and organizations. Even if government must invest in that sector, proper monitoring is needed to ensure good result. Previous studies in inflation in Nigeria only used aggregate government spending (Olayungbo, 2013) or broke it into capital and recurrent only (Ojarikre et al., 2015). Such studies provide limited information for good public finance policy.

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