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Dynamics of Budget Deficit and Macroeconomic Fundamentals: Further Evidence from Nigeria

God's time Osekhebhen Eigbiremolen¹

Department of Economics, University of Nigeria, Nsukka, Nigeria

Email: eigbiremolen@gmail.com

Nchege Johnson Ezema

Department of Economics, University of Nigeria, Nsukka, Nigeria

Email: ezemajohnson@gmail.com

Anthony Orji

Department of Economics, University of Nigeria, Nsukka, Nigeria

Email: tonyorjiuss@yahoo.com

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Abstract

Using quarterly time-series data from 1970-2012, this paper examines the responses of budget deficits to selected macroeconomic fundamentals in Nigeria. Although budget deficit responds with a positive movement for every one standard deviation positive shock to real gross domestic product at the early stage, subsequent positive shocks or variations in real gross domestic product elicit a negative response from budget balance right from the 10th period down to the 172nd period. Budget deficit shows signs of decline at the initial stage in response to a positive innovation in real interest rate. However, this response normalized to a positive one as from the 11th period and remains so all through the periods under review. As more money is released into the economy, budget deficit responds to this positive shock in money supply with a continuous decline all through the periods under review. Implicit, but central to these responses by budget deficit is that private sector investment remains the key to an economic growth that will not mortgage a country's future for today's survival.

Keywords: Budget deficit, Macroeconomic Fundamentals, Dynamic stability, Vector Autoregressive, Nigeria

JEL Classification: C22; C32; E17; E60; E62;

1. Introduction

Throughout the world, the processes for determining how to raise, allocate and spend public resources constitute one of the foundations of government (Overseas Development Institute,

¹ Corresponding author

2004). These processes can be summarized as budgeting, implying that budgeting is one of the principal functions of government. In fact, it is adjudged the single most important function of government (Organization for Economic Cooperation and Development (OECD), (2002); National Democratic Institute (NDI), 2003). This assertion is supported by the conceptual consideration of budgeting as one of the most rational and acceptable means through which governments allocate resources to provide the goods and services needed to improve the well-being of people (Osanyintuyi, 2007). In other words, budget provides the instrument and basis for resource mobilization and allocation to government strategic areas and national priorities in order to meet macroeconomic objectives (Omolehinwa, 2001; Olomola, 2006). It is the extent to which these objectives are achieved that provides the opportunity to make the citizens of a community better off.

Unfortunately, the budgetary process in Nigeria is said to be fraught with imperfections and abuses. Such abuses manifest in the forms of unsustainable and unjustifiable extra budgetary expenditure actuated by obvious disregards to budgetary rules and procedures, lack of budget integrity, budget indiscipline among others (Aruwa, 2004; Olomola, 2006; Olaoye, 2010). Budget discipline connotes the extent to which an institution or nation stays within the budget or better still, the ability of government to confine itself to the limit of expenditure in the approved budget or supplementary budget (Aruwa, 2004). It is measured as the ratio of budgetary expenditure to actual expenditure. According to Oshisami (1992) and Omolehinwa (2001), there are three principal areas or dimensions of budget discipline. These include; adherence to stated budgeting policies without wavering; adherence to budget calendar in the development, approval, implementation and monitoring as well as adherence to approved estimates in the appropriation act. These three levels of discipline (summarized as policy discipline, timing discipline and numerical discipline respectively) are crucial for the effective working of the budget, as a breach in any level constitutes indiscipline. According to Ben-Caleb and Agbude (2011), indiscipline in the management of resources is iniquitous to the economic progress of any nation. A budget deficit for instance (especially unplanned deficit) is a manifestation of budget indiscipline, and have been found to have a strong positive association with corruption (Kaufman, 2010). This implies that the more disciplined a nation is, the less the tendencies to be corrupt. In other words, budget discipline is one of the antidotes of corruption.

The Nigerian experience shows the lack of transparency, accountability and discipline. The absence of all these virtues that span across good budgeting and good governance explains the reason behind the perennial crisis of development in the country. The status of underdevelopment in the country is indeed alarming despite the fact that Nigeria is reputed to range between the 6th and the 8th largest oil producing countries in the world. How best can this crisis of development be resolved in this country? In 1970, Nigerian's budget deficit was -455.1, i.e. -8.8% of GDP. But in 1971, Nigeria recorded a surplus of 171.6, i.e. 2.6% of GDP. Therefore the deficits grew at the rate of -138%. In 1972, however, a deficit of -58.8 resulted and subsequently at a growth rate of -134%. But in 1973, a surplus of 166.1 resulted at a growth rate of -382%. In 1974 also, the fiscal operation resulted in another surplus of 1796.4 at a growth rate of 982%. But in 1975, the deficit of -427.9 re-occurred at a growth rate of -124%.

In 1976 also, the budget deficit increased to -1090.8 at a growth rate of 155%. In 1977 however, the deficit was reduced to -781.4 at a growth rate of -28%. But in 1978, budget deficit soared to -2821.9 at a growth rate of 261%. In 1979, a surplus of 1461.7 occurred at a growth rate of -152%. In 1980, a deficit of -1975.2 was recorded at a growth rate of -235%. In 1981, the deficit increased to -3902.1 at a growth rate of 98%. In 1982, the deficit further increased to -6104.1 at a growth rate of 56%. In 1983, the deficit reduced to -3364.5 at a growth rate of -45%. In 1984, it further reduced to -2660.4 at a growth rate of -21%. But in 1985, it increased to -3039.7 at a growth rate of 14%. In 1986, it further increased to -8254.3 at a growth rate of 172%. In 1987, it reduced to -5889.7 at a growth rate of -29%. In 1988, it increased again to -12160.9 at a growth rate of 107%. In 1989, it further rose to -15134.7 at a growth rate of 25%.

In 1990, budget deficit steadily increased to -22116.1 at a growth rate of 46%. In 1991, it further increased to -35755.2 at a growth rate of 62%. In 1992, it rose to -39632.5 at a growth rate of 11%. In 1993, it had risen to -107735.5 and a growth rate of 173%. Its percentage to the GDP (9.5%) was the highest in this period, 1993. And in 1994, the deficit was decreased to -70271.6 at a growth rate of -35%. However, in 1995, a surplus of 1000 resulted, therefore the growth rate was -101% and in 1996 too, the surplus was increased to 32049.4 at a growth rate was 3105%. These surpluses occurred because of the guided deregulation policy of the federal government, and afterwards, the deficits continued. In 1997, the deficit was increased to -5000 at a growth rate of -116%. In 1998, it rose sharply to -133389.3 at a growth rate of 2568%. In 1999, the deficit rose continuously to -285104.7 at a growth rate of 114%. In 2000, the deficit was reduced to -103777.3 at a growth rate of -64%. But in 2001, the deficit was increased to -221048.9 at a growth rate of 113%. In 2002, the deficit was further increased to -301401.6 at a growth rate of 36%. But in 2003, the deficit was reduced to -202724.7 at a growth rate of -33%. In 2004, the deficit was further reduced to -172601.3 at a growth rate of -15%. In 2005, the deficit was further decreased to -161406.3 at a growth rate of -7%. And finally, in 2006, the deficit further decreased to -101397 and a growth rate of -37% was realized.

This study therefore becomes necessary in order to better understand the inter-relationship between budget deficit and macroeconomic fundamentals in Nigeria since much has not been done in this respect. Hence, the purpose of this study is to empirically determine the responses of budget deficit to shocks or variations emanating from specific macroeconomic fundamentals in Nigeria over the years. Quarterly time series data from 1970-2012 will be employed in this study.

2. Review of Literature

2.1 Theoretical Review

Theories of budget deficits run in two general directions. Some theories look on the effect of fiscal deficits on economic variables. Others look on the reverse direction, that is, what macroeconomic and fiscal variables (including budget rules and institutions) affect and determine fiscal deficits.

Generally speaking, there are three schools of thought concerning the economic effects of budget deficits: Neoclassical, Keynesian, and Ricardian. Before proceeding further, it is useful to

review the basic structure and implications of each paradigm. Bernheim (1989) provides a brief summary of the three paradigms.

The Neoclassical Paradigm

The Neoclassical school proposes an adverse relationship between budget deficits and macroeconomic variables. They argue that budget deficits lead to higher interest rates, discourages the issue of private bonds, private investments, and private spending, increases inflation level, and cause a similar increase in the current account deficits and finally slows the growth of the economy through resources crowding out. The standard neoclassical model has three central features. First, the consumption of each individual is determined as the solution to an inter-temporal optimization problem, where both borrowing and lending are permitted at the market rate of interest. Second, individuals have finite lifespans. Each consumer belongs to a specific cohort or generation, and the lifespans of successive generations overlap. Third, market clearing is generally assumed in all periods.

Diamond's (1965) seminal paper was the first effort to study formally the effects of budget deficits in the context of such models. Diamond argued that a permanent increase in the ratio of domestically held debt to national income depresses the steady state capital–labour ratio. At the original rate of interest, consumers are unwilling to hold the original volume of physical capital and bonds, plus the new bonds. Rising interest rates stimulate additional saving and reduce investment until market equilibrium is re–established. Thus, persistent government deficits crowd out private capital accumulation. Diamond's analysis focuses on permanent changes in deficits, and does not shed light on the effects of temporary changes. Auerbach and Kotlikoff (1986) conducted policy stimulation in a much more complex neoclassical model. Their analysis emphasizes that the immediate impact of a temporary budget deficit may be extremely small, and possibly perverse (a temporary deficit might stimulate saving in the short run).

The Keynesian Paradigm

The traditional Keynesian view differs from the standard neoclassical paradigm in two fundamental ways. First, it allows for the possibility that some economic resources are unemployed. Second, it presupposes the existence of a large number of myopic liquidity constrained individuals. This second assumption guarantees that aggregate consumption is very sensitive to changes in disposable income. The Keynesian economists propose a positive relationship between budget deficits and macroeconomic variables. They argue that usually budget deficits result in an increase in domestic production, increases aggregate demand, increases savings and private investment at any given level of interest rate. The Keynesian absorptive theory suggests that an increase in the budget deficits would induce domestic absorption and thus, import expansion, causing current account deficit. In the Mundell–Fleming framework, an increase in the budget deficit would induce an upward pressure on interest rate, causing capital inflows and an appreciation of the exchange rate that will increase the current account balance. The Keynesians provide a counter argument to the crowd–out effect, by making reference to the expansionary effects of budget deficits. They argue that usually budget deficits result in an increase in domestic production, which makes private investors more optimistic about the future course of the economy resulting in them investing more. This is known as the “crowding–in” effect.

The Ricardian Paradigm

The central Ricardian observation is that deficits merely postpone taxes. This contrary approach was advanced by Barro (1989) known as the Ricardian Equivalence Hypothesis (REH). Ricardian equivalence or the Barro – Ricardo Equivalence proposition, is an economic theory which suggests that government budget deficits do not affect the total level of demand in an economy. It was initially proposed by the 19th century economist David Ricardo. In simple terms, the theory can be described as follows. Governments may either finance their spending by taxing current taxpayers, or they may borrow money. However, they must eventually repay this borrowing by raising taxes above what they would otherwise have been in future. The choice is therefore between “tax now” and “tax later”. Suppose that the government finances some extra spending through deficits—i.e. tax later. Ricardo argued that although taxpayers would have more money now, they would realize that they would have to pay higher tax in future and therefore save the extra money in order to pay the future tax. The extra saving by consumers would exactly offset the extra spending by government, so overall demand would remain unchanged. More recently, economists such as Robert Barro have developed more sophisticated variations on the same idea, particularly using the theory of rational expectations. Ricardian Equivalence suggests that government attempts to influence demand using fiscal policy will prove fruitless. He argues that an increase in budget deficits, due to an increase in government spending, must be paid for either now or later, with total present value of receipts fixed by the total present value of spending. Thus, a cut in today’s taxes must be matched by an increase in future taxes, leaving real interest rates and thus private investment, and the current account balance, exchange rate and domestic production unchanged. Therefore, budget deficits do not crowd—in nor crowd—out macroeconomic variables i.e. no positive or negative relationship exists.

2.2 Empirical Review

Dwyer (1982) studied the relationship between budget deficits and macroeconomic performance of US using Vector Autoregressive Model (VAR) for the period 1952–1978. He found no evidence that larger government deficits increase prices, spending, interest rates, or the money stock. Karras (1994) studied the relationship between budget deficits and macroeconomic variables in a cross sectional study involving 32 countries for the period 1950–1980, using OLS and GLS. He found out that deficits do not lead to inflation, they are negatively correlated with the rate of growth of real output and increased deficits appear to retard investment. Nelson and Sing (1994) used data on a cross section of 70 developing countries during two time period, 1970–1979 and 1980–1989, to investigate the effects of budget deficits on GDP growth rates. They estimated the relationship between growth (GDP growth rate) and the public policy variables using Ordinary Least Square (OLS) method. Their study concluded that the budget deficits had no significant effect on the economic growth of those nations in the 1970s and 1980s.

Based on cross–country regressions of a large developing countries, Aizenman and Marion (1993) present empirical evidence that suggests that to varying degrees, there is a significant and negative correlation between growth and uncertainty in a number of fiscal variables, such as levels of revenue, public expenditure, and budget deficits. The uncertainty in a variable is

measured in the model employed by the standard deviation of the residuals from a first order autoregressive process of that variable. Al-khedir (1996) studied the relationship between budget deficits and macroeconomic performance of the G-7 countries for the period of 1964–1993 using VAR. He found out that budget deficit led to higher short term interest rates in the 7 countries. However, the deficits did not manifest any impact on the long term interest rates. Guess and Koford (1984) used the Granger Causality test to find the causal relationship between budget deficits and inflation, GNP and private investment using annual data for seventeen OECD countries for the period 1949 to 1981. They concluded that budget deficits do not cause changes in these variables. Easterly and Schmidt–Hebbel (1994) estimated the relationship between inflation and fiscal deficits. Across countries, the decision to print money to finance deficits (i.e. Seignorage) would depend on the extent to which other means of financing are available. In their cross section estimation, they found no simple relationship between fiscal deficits leading to inflation. The level of development of the financial market would have more readily available forms of money to buy goods and services without incurring costs.

Woo (2001) examined the effect of financial depth on consolidated public sector deficit in developing countries. He found that an increase in financial depth is negatively associated with fiscal stance. He explained that a more liquid banking system can more easily finance fiscal deficits by using bonds without having to resort to inflationary finance. Aizenman and Noy (2003) found similar evidence that a budget surplus has a negative impact on financial openness for developing countries. That is, a bigger budget deficit will increase de facto financial openness. This was explained by evidence that developing economy engages in procyclical, rather than counter–cyclical policy. Easterly and Schmidt–Hebbel (1994) found robust relationships between the fiscal deficit, the trade deficit, and the real exchange rate. The fiscal deficit and the real exchange rate have a two–step relationship: the fiscal deficit and other determinants of investment and saving behavior determine the external deficit, which then determines the real exchange rate consistent with clearing of the domestic goods market.

3.0 Methodology

In order to establish how budget deficit respond to shocks resulting from specific macroeconomic fundamentals over the years, this study will employ the Vector Autoregressive (VAR) model pioneered by Sims (1990) and more specially, the impulse response function (IRF) analysis which is a component of the VAR model. A VAR model of order in k-variables is presented below.

$$y_{1,t} = \alpha_{10} + \sum_{i=1}^p \alpha_{11,i} y_{1,t-i} + \sum_{i=1}^p \alpha_{12,i} y_{2,t-i} + \dots + \sum_{i=1}^p \alpha_{1k,i} y_{k,t-i} + \mu_{1t}$$

$$\begin{aligned}
 y_{2,t} &= \alpha_{20} + \sum_{i=1}^p \alpha_{21,i} y_{1,t-i} + \sum_{i=1}^p \alpha_{22,i} y_{2,t-i} + \dots + \sum_{i=1}^p \alpha_{2k,i} y_{k,t-i} + \mu_{2t} \\
 &\vdots \\
 y_{k,t} &= \alpha_{k0} + \sum_{i=1}^p \alpha_{k1,i} y_{1,t-i} + \sum_{i=1}^p \alpha_{k2,i} y_{2,t-i} + \dots + \sum_{i=1}^p \alpha_{kk,i} y_{k,t-i} + \mu_{kt}
 \end{aligned} \quad (1)$$

A parsimonious form of model (1) is stated as follows:

$$y_t = \alpha + \sum_{j=1}^p \Pi_j y_{t-j} + \mu_t \quad (2)$$

Where $y_t' = (y_{1t}, y_{2t}, \dots, y_{kt})$, $\mu_t' = (\mu_{1t}, \mu_{2t}, \dots, \mu_{kt})$, $\Pi_j = \begin{bmatrix} \alpha_{11,j} & \alpha_{12,j} & \dots & \alpha_{1k,j} \\ \alpha_{21,j} & \alpha_{22,j} & \dots & \alpha_{2k,j} \\ \vdots & \vdots & \dots & \vdots \\ \alpha_{k1,j} & \alpha_{k2,j} & \dots & \alpha_{kk,j} \end{bmatrix}$

and y_{kt} represents list of variables of interest. For this study, y_{kt} includes BD (budget deficit), RGDP (real gross domestic product), INTR (interest rate) and MS (money supply). The selection of the aforementioned variables is hinged on theory and data availability.

4. Data Analysis and Estimation

4.1 Pre-Test (Dynamic Stability)

Since we have a model that possesses an autoregressive structure, we must ensure that the model is dynamically stable. That is, we have to ensure that the model as a whole is stationary.

If the stationarity condition is not satisfied, then any shock to the y_{kt} series will lead to a subsequent time-path that has an unbounded mean and variance. On the other hand, if the process is stationary, then following such a shock, the time-path for y_{kt} will eventually settle down to what it was previously. In other words, the shock will be absorbed (Giles, 2013). According to Patterson (2006), the condition of stability of a multivariate VAR model is that all the eigenvalues have modulus less than 1. The eigenvalues stability conditions estimates are presented in table 1 (see appendix). The results reveal that all the eigenvalues lies inside the unit circle. In other words, all the eigenvalues have modulus less than 1. Therefore, our VAR model satisfies the dynamic stability condition.

Having established that our VAR model is dynamically stable, IRF analysis of the VAR model can therefore be estimated.

4.2 Impulse Response Function (IRF)

Impulse response functions are very useful in analyzing the interactions between or among variables in a VAR model. The impulses represent the reactions of the variables to shocks hitting the system (Durlauf and Blume, 2008) as cited in Eigbiremolen (2013). The responses of budget deficit (BD) to selected macroeconomic fundamentals – real gross domestic product (RGDP), interest rate (INTR) and money supply (MS) 172 periods or quarters (i.e., 42 years) are presented in figures 1-3 (see appendix). As shown in figure 1, budget deficit

responds positively to a one standard deviation positive shock or change to real gross domestic product within the first 9 periods under review. From the 10th period down to the last period, budget deficit decreases for every positive shock exhibited by real gross domestic product. This clearly shows that initial or early effort to grow the economy under the period reviewed pushes the budget deficit upward, indicating heavy government presence in pursuance of economic growth. However, as the economy continues to grow, allowing and encouraging private domestic investment as well as foreign direct investment, budget deficit continue to decrease in relation to the growth in the economy.

Figure 2 reveals that a one standard deviation positive shock or innovation to real interest rate caused budget deficit to decrease up till the 10th period. Beyond this period, reality sets in and for every other positive shock emanating from real interest rate, budget deficit responded positively. This is expected since continuous increase in real interest rate crowds out private investment, paving the way for government to borrow exclusively, especially at the domestic level to finance government expenditure thereby raising the budget deficit. On the other hand, Figure 3 shows that as more money is released into circulation, budget balance responds to this positive shock in money supply with a continuous decline all through the periods under review. This is so because as a result of the increase in money supply, interest rate will inevitably drop, causing more private investment and less of government spending in shoring up economic growth. This in turn causes the budget deficit to be on a relative decline.

5.0 Conclusion/Policy Implication of the Study

This study, using the impulse response analysis, critically examines how budget deficit reacts or responds to shocks or variations in selected macroeconomic fundamentals. Although budget deficit initially responds with a positive movement for every one standard deviation positive shock in real gross domestic product, subsequent positive shocks or variations in real gross domestic product elicits a negative response from budget balance right from the 10th period down to the 172nd period. Budget deficit shows signs of decline at the early stage in response to a positive innovation in real interest rate. However, this response normalized to a positive one as from the 11th period and remains so all through the periods under review. As more money is released into the economy, budget deficit responds to this positive shock in money supply with a continuous decline all through the periods under review. These responses clearly show the sensitivity of budget balance to shocks or variations in macroeconomic fundamentals, no matter how small such shocks may be. Also, it can be seen that a continuous growth in the economy, driven by the private sector, can greatly reduce huge budget deficits. In addition, the study confirms that high interest rate will always crowd-out private investment, giving room for government to “run the show”, thereby pushing up budget deficits. Furthermore, as more money is made available in the economy, the resulting low interest rate will act as incentive for the private investment to thrive, thereby keeping budget deficit on the low. Central in all these is that private sector investment remains the key to an economic growth that will not mortgage a country’s future for today’s survival.

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APPENDIX

Table

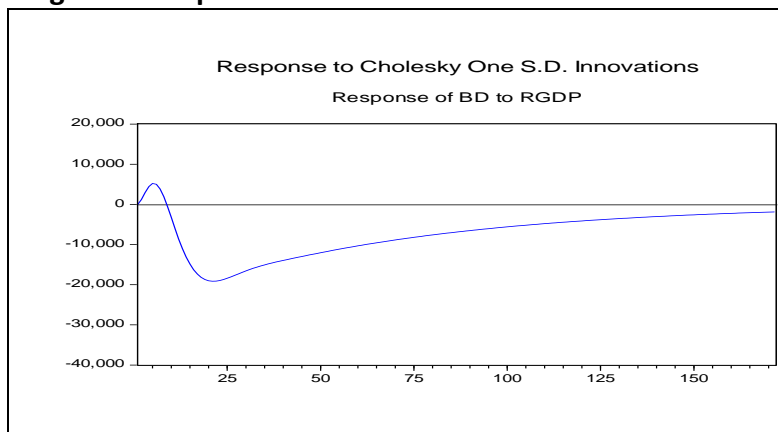
Table 1: Eigenvalue Stability Condition Estimates

Eigenvalue	Modulus
-----	-----
0.9848022	0.984802
0.8230136 + 0.1799969i	0.842467
0.8230136 - 0.1799969i	0.842467
0.7890329	0.789033
0.6885349 + 0.2820145i	0.744051
0.6885349 - 0.2820145i	0.744051
0.6171071 + 0.2584085i	0.669026
0.6171071 - 0.2584085i	0.669026

Source: Authors estimation using Stata 12.

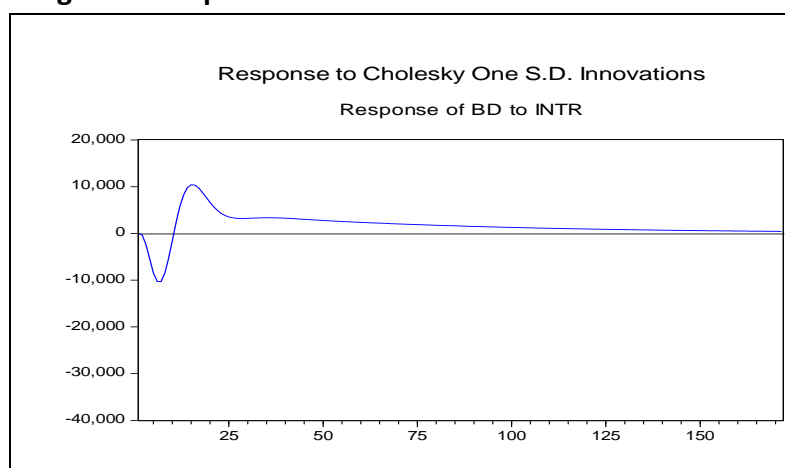
Figures

Figure 1: Response of BD to One Positive RGDP shock or Innovation



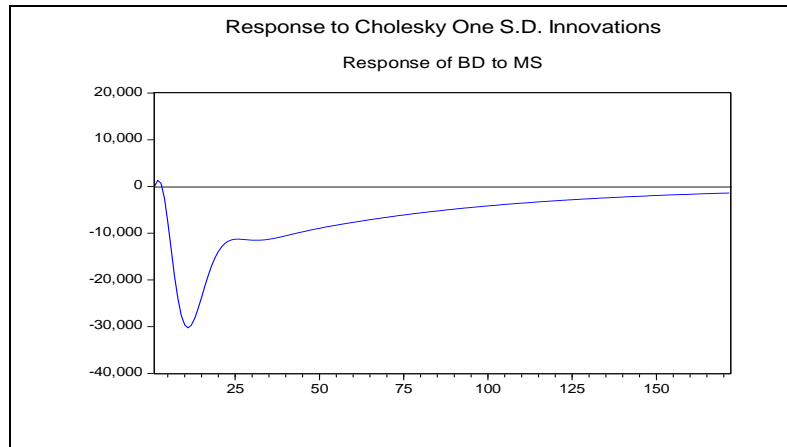
Source: Authors estimation using E-views 7.2

Figure 2: Response of BD to One Positive INTR shock or Innovation



Source: Authors estimation using E-views 7.2

Figure 3: Response of BD to One Positive MS shock or Innovation



Source:

Authors estimation using E-views 7.2