**Macroeconomic stability and the impact of foreign aid on economic growth in Nigeria**

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**Abstract**

This study investigates the impact of foreign aid on economic growth in Nigeria from the macroeconomic stability perspective. We estimated a VAR model to identify unanticipated shocks in foreign aid and evaluate its impact on economic growth considering macroeconomic challenges in the economy. These analyses enabled us to focus on examining the constraints of macroeconomic stability that hinders foreign aid to drive growth. The estimates of the innovations of foreign aid shocks to macroeconomic variables shocks disclose that it generates inconsistencies that distorts budget deficits, create uncertainties that weakens current account balances and transmit negative shocks that has strong constraining effects on economic growth. We detected that foreign aid negative impacts reduce the tendencies of the economy to growth and that macroeconomic strategies are inconsistent and lack the will to effectively utilize the gains of foreign aid. These findings have implication for institutions of macroeconomic management, donor agencies and organization interested in ‘scaling up’ the levels of foreign aids to developing countries.

Key words: budget deficit, current account balance, Foreign aid, Macroeconomic policy, vector auto-regression models.

JEL classification: C49, C51, E6, F52, H60

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**1. Introduction**

The perception of foreign aid as a measure of economic prosperity in developing countries spurs insights for effective management of foreign aid and its implication for macroeconomic stability (Isard, Lipschitz, Mourmouras and Yontcheva, 2006). Fundamentally, economic growth remains an important factor influencing poverty reduction strategies while macroeconomic stability is essential for increased and sustainable rates of economic growth (Hansen and Tarp, 2000; Burnside and Dollar, 2000; Iyoha, 2004). In situations where the macro-economy is unstable, the levels of economic growth and poverty reduction strategies may be severely obstructed by the levels of instability in the system (McGillivrary, 2004; Isard et al 2006; Spiegel 2007). Considering foreign aid in terms of development assistance, we evaluated it impact on growth with insights from its influence on macroeconomic stability. We viewed macroeconomic stability as a combination of both domestic and foreign policies designed to achieve macroeconomic stability and economic growth. We captured these views as short term uncertainties in budget deficits and current account balance (ODI 2006).

Subsequently, this study is different because it is focused on identify unanticipated shocks that flows from foreign aid and evaluates its impacts on economic growth and macroeconomic stability in the case of a specific developing country. Also, we aim at examining the constraints of macroeconomic stability to the efficiency of foreign aid, based on potential endogenous government actions due to economic changes that are likely to be correlated with policy changes.

We adopted the vector autoregression (VAR) approach, considering foreign aid in terms of aid inflows to the economy, while changes in the levels of the real gross domestic product were used to represent economic growth over the observation. To assess shocks from macro-economic stability, it was encapsulated in two forms; the first was through budget deficits in order to deduce the impact of macroeconomic management in accordance with domestic policies and examine its influences on foreign aid. Secondly, current account balance was considered to measure how macroeconomic stability relates with international policies in order to attract foreign aid.

Further, we test for the hypothesis of diagonal covariance and the symmetric covariance processes. Also, we examine the symmetry covariance process, the diagonal covariance process, test the adequacy of the specification and justify the residual covariances. This econometric technique was selected in order to ease the analysis of the related concepts of exogeneity and temporal precedence associated with the Granger causality. The impulse response was used to identify the dynamic shocks induced annual responses, the degree of ultimate response of each variable, determine the strength levels and dynamics of causal interrelationship among the variables in the model. The variance decomposition was used to assess the innovations of foreign aid shocks to the macroeconomic variables in the model.

The other parts of the paper is organised as follows; section two covered specific aspects of literature that relates to foreign aid efficiency, foreign aid and growth, and related policy issues. The third section dealt with the theoretical framework that analysed VAR and impulse responses. Section four extended these theories by interpret the estimates obtained after the VAR process and suggested some policy implications of the study. While section five concludes that foreign aid flows exhibits inconsistent shocks which destruct budget deficits, weaken and influence current account balance negatively. These inefficiencies in macroeconomic policies with regards to the negative impacts of foreign aid flows reduce the potency of aid to drive economic growth.

**2. Literature Review**

Foreign aids are development assistance and other forms of official flows granted by donor organisation and developed countries to developing and less developed countries to make provision for infrastructure and expenditure funding gaps due to inadequacies in revenue and weak taxes (McGillivray, 2004). Iyoha (2004) view foreign aid as, ‘a variety of economic, military, technical and humanitarian activities’. He insisted that in developing countries aid programmes are justified to fund, rehabilitation and reconstruction during disasters, support socio-economic and political stability, sustain agricultural and health programmes which in turn enhance economic growth.

Foreign aid could accelerate the attainment of economic growth in countries with limited resources and capital, improve economic fundamental and reduce the surge of poverty (Stiglitz 2002; McGillivray 2004; Sachs 2004; Radelet 2004). Most donor agencies are concerned about the efficiency of foreign aid and how it could be used to drive growth and instil macro economy stability. It was disclosed that foreign aid in form of loans could raise debt sustainability difficulties. Aid flows in form of budget support could are unpredictable and could influence inflation, exchange rate volatility, worsen the rate of interest, weak the macro-economy, drive wages up and hamper government’s efforts to achieve medium and long term objectives (ODI 2005).

Theoretically, it is widely agreed that an external positive shock to government expenditure raise the levels of domestic consumption and increase the expansionary effect of spending on output. Fundamentally, McKinnon (1964) demonstrated that aid necessarily spur economic growth, with a model that evaluated the saving and foreign exchange gaps that linked increased foreign aid flows to growth. But it has been disclosed empirically that in some instances, increases in government spending, though increase in revenue may increase negative wealth effect by decreasing consumption, wage and growth (Burnside and dollar 2000; Fatas and Mihov 2001; Collier and Dollar 2002; Roodman 2007; Gali, Lopez-Salido and Valles 2007; Mountford and Uhlig 2008).

Internationally, reports expose the fact that aid has made it more difficult for the ministries of finance in most developing countries to balance their budgets amidst the realities of macroeconomic shocks impact on balance of payments, monetary policies instruments and fiscal policy management strategies (Isard et al 2006, ODI 2006). Consequent to this fact, the Nigerian governments incorrectly assume that a temporary increase in revenues will be sustained. For this reason, government establishments and private firms catch in such ‘organised planning’, and increase deliberately increase consumption which in turn make them accumulate long-term unplanned spending obligations that are costly to exit from (ODI 2006).

To improve the coordination and minimise the negative effects of fragmented and unpredictable aid flows, governments are advised to improve government and adopt sound policies for growth (Azam, Devarajan and O’Connell, 1999; ODI 2005). With emphasises on the fact that foreign aid is associated with interrelated sets of routines, they expressed the view that foreign aid will be effective at the macro level of aid flow and at the micro level of individual aid projects where the stakeholders and end users are accountable (McGillivrar, Feeny, Hermes and Lensink 2005, ODI 2006).

**2.2 Empirical Literature**

In this subsection, we concentrate on empirical studies that used the VAR methodology to analyze the shock effect of macroeconomic policy on aid, government expenditure and how this influenced other macroeconomic variables in their analyses. This is because; Fragetta and Melina (2010) stated that VAR analysis is a standard tool to understand what happens in actual economies and to evaluate competing theoretical economic models. Hansen and Tarp (2001); Brumm (2003); Rajan and Subramaninan (2008) obtained robust results in the foreign aid and growth relations, accepting the fact that aid increase growth through investments despite policy defects. With a sign-restriction VAR approach, Mountfold and Uhilg (2008) detected that macroeconomic policy influences investment expansion negatively. Burnside and Dollar (2004); Roodman (2004) gave evidences that the quality of domestic policies is essential for aid to drive growth. But Burhop (2005) estimated a Wald tests on VAR coefficient of foreign aid, income per capita and investment of fourth five countries and discovered that there are no causal relationships between aid and economic performance. Blanchard and Quah (1989) advised that the identification of macroeconomic shocks is robust, provided that the effect of fiscal policy on long-term output is negligible relative to other shocks.

Iyoha, Kouassi and Adamu (2009) used a cointegrating vector autoregressive model to estimate the shock responses of capital inflows, exchange rate volatility and government policies represented by macroeconomic policy in Nigeria. The results illuminates the dynamic functions of the levels of capital inflows in order to find out the reaction times with which capital flows begin to react to a shock in exchange volatility and macroeconomic stability, identify the patterns of shock-induced annual responses, notice the degree of ultimate response of each respondent variable and find the strength levels and dynamics of casual interrelationship among the variables in the model; in order to proffer better policies that will cushion the effects of such shocks on key macroeconomic variables in the Nigeria economy. Consequently, we associate current account shocks as a consequence of international policy fluctuations due to bilateral exchange rate volatility, assuming that in the long-run the impact of fiscal policy on output is negligible and not appreciably different from zero. More sophisticated VAR models may be justified (Felices and Orskaug, 2005).

**2.2 Macroeconomic policy and foreign aid flows**

Institutional reports on the impact of macroeconomic shocks on balance of payment, monetary and fiscal management, affirmed that the most exclusive challenge of government was it ability to spend extra resources wisely (ODI 2006, Burnside and Dollar 2000).

Dollar and Pritchett (1997) suggested that for foreign aid flows to be effective, macroeconomic policies should be geared towards; curtailing the ranges of volatility in the levels of transactions in the domestic economy since it most likely has serious impacts on the business cycles and in most cases the public account suffers more. Secondly, he stated that the capacities to manage deficits are limited, given the levels of uncertainties in the international capital market and its influence on domestic capital market. Government is incapacitated to compensate for the lag financing as a result of such uncertainties. Often, these challenge leads to economic distortions associated with both internal and external shocks linked to finance flows and the terms of trade. Consequently, government should avoid large spending over the widening of the current account deficit because such spending makes inflation several through monetary expansion (Aiyar, Berg and Hussain 2005). Commission for Africa (2005); Burnside and Dollar (1998) emphasized that for developing countries to optimize foreign aid flows, breakout of poverty traps and achieve economic growth, they must put in place conditions necessary for self substance and the foreign aid needs to be tailored to specific country circumstances.

Also, fiscal policy should combine discipline, transparency and macroeconomic management. Further, macroeconomic strategic plans should create avenues that will give stability to public expenditure funding and introduce ‘windows of discretion’, policies that make allocation which allow for an unprecedented expansive reaction to any form of distortion within the macro-economy in the context of fiscal sustainability (Burnside and Dollar 2000; Dollar and Pritchett 1997).

Therefore, we deduce that macroeconomic strategic plans should basically follow a defined set of guiding principles in order to efficiently control macroeconomic fluctuations in economic activities, prices and the exchange rate determination in order to achieve short-run growth and focus on long-run development.

**3. Econometric approach**

The data set analyzed in the study was obtained from the Central Bank of Nigeria Statistical Bulletin 2007 and the Fiftieth Anniversary Edition 2008. The series is made up of annual data over the period 1970 to 2009.

**3.1 Structural VAR model: Based shock measures**

**3.1.1 Basic frameworks**

This part of the study evaluates the shock impacts and responses of aid flow no macroeconomic variable fundamental shocks. With insights from Iyoha et al (2009) we estimate a structural VAR model to an autoregressive system composed of four variables in four lags. Since the variables in the model follow a stationary stochastic process that responds to two types of non-autocorrelated orthogonal shocks:

1. Demand shocks which are due to transitory structural error and
2. Self induced shocks which are most likely due to parameter disturbances.

 The structural model can be given a moving average representation as follows:

 

Where;

  and 

Are identification procedures that follows Blanchard and Quah (1989) and Hoffmaister and Roldos (1997), further it is assumed that the change in the variables in the model are stationary, and that the parameter disturbance and transitory structural errors, respectively, are uncorrelated white noise disturbance. The variance of the structural shocks is normalized so that

 

This can be viewed as the identity matrix.

To identify this structural model, the autoregressive reduced-form vector autoregression of the model is first estimated:

 

Where;

= vector of estimated residuals

q= the number of lags

We note that. Given that the stochastic process is stationary, equation 3.2 may be written as an infinite moving-averge process, (or the moving-average representation of the reduced-form of the model is):

 

Where;

= vector of estimated reduced-form residuals with variance  and the matrices

= represent the impulse response functions of shocks to change in the dependent and independent (explanatory) variables in the model.

The residual of the model’s reduced form are thus, related to the structural residual in the following way:

 

This implies that



Since  and thus,

 

In order to identify the structural shocks from the information obtained by estimating the vector autoregressive equation (equation 3.2), which means, from the reduced-form shocks and their variance, we need to provide sufficient identifying restrictions to evaluate the elements in.

In this multivariable system,  have about sixteen elements. Since the estimated variance-covariance matrix  is symmetric, equation (3.6) provide about twelve independent identifying restrictions. Thus, about six additional restrictions must be imposed.

We note that the matrix of long-run effects of reduced-form shocks is related to the equivalent matrix of structural shocks, through the relation below:

 

Where,

The matrix is calculated from the estimated vector autoregressions and is the polynomial value for L=1.

If the multivariable in this model cointegrates, it implies certain long-run restrictions (King, Plosser, Stock and Watson, 1991).

Therefore, the foreign aid decomposition below can be obtained:

Where,

A\*(L) =the transitory components of the permanent shocks on the parameters.

The first five terms on the right-hand side represents the measures of the first difference of the potential foreign aid flow in Nigeria while the other parameters represents likely parameter disturbances by other variables in the model. This is the standard bootstrap approach (Runkel, 1987; Jeong and Maddala, 1993) which presents the confidence intervals around the estimated potential foreign aid.

Following the multivariate method as stated by Beveridge-Nelson (Watson, 1986), where parameter and cyclical components are perfectly correlated, the decomposition can be expressed as:

 

Here, the first difference of potential foreign aid is simply the first two terms on the right-hand side of the equation. This implies that potential foreign aid is perfectly correlated with the cyclical components in the model.

**3.1.2 Impulse responses**

This aspect of the VAR study made VAR econometrics useful in applied work. The impulse response function simulates, over time, the effect of a one-time shock in one of the equation series on itself and on other equation series in the entire equation system. Also, this response function uses a method that converts the VAR model into its moving average representation (Hamilton, 1994).

Therefore, the researcher imposes a one-time exogenous shock on one of the VAR variable on the system, in other to examine the annual impulse responses of the other respondent endogenous variables. This enable the researcher to discern what the sample’s long-run and historical trends would generate as answers to the research questions.

Subsequently, it is important to note that the impulse response effect is an elasticity-like multiplier that reveals the long-run average percentage change in the shocked variable. Consequently, signs are important. A positive (negative) sign suggests that the respondent variables reaction is in the same (opposing) direction as the shock.

Considering the VAR model in equation (3.8), the generalized impulse response function for a system-wide shock, Uo t, is defined by;

  - - (3.9)

Where;

 = The conditional mathematical expectation taken with respect to the VAR model in equation (3.8).

 = A particular historical realization of the process at time t-1

With a view of its moving average, the above equation will like become;

  - - (3.10)

This equation is independent of the ‘history’ of the process. Therefore, it is specific to linear systems and does not carry over to non-linear dynamic models. Practically, the choice of the vector of shocks, Uot, is arbitrary. To improve this situation, the empirical distribution function of ANUot for all these shocks, in the case were Uot is drawn from the same distribution as Ut, a multivariate normal distribution with zero means and a constant covariance matrix ∑ we have the analytical result that;

  ~  - - (3.11)

The elements AN∑A1N, if appropriately scaled are the ‘persistence profiles’ that analyses the speed of convergence to equilibrium (Lee and Pasaran, 1993; Pasaran and Shin, 1996). Also, note that when the VAR model in equation (3.8) is stable, the limit of the ‘persistence profile’ as N 🡪 ∞ tends to the spectral density function of Rt (without the Wts) at zero frequency (apart from a multiple of Л) (Sims, 1981; 1986).

To find the effect of the variable specific shocks on the evolution of the R’s and that for a given Ut, the VAR model in equation (3.8) is hit by the shock of size  to the ith equation at time t. This will change the Impulse Respond equation to;

  - - (3.12)

Expressing the equation above in a moving average, we have;

  ~  - - (3.13)

This equation is ‘history invariant’, that is, it does not depend on. To compute (the conditional expectations), depends on the nature of the multivariate distribution assumed for the disturbances, Ut. Then, as ~ , we have;

  =  - - (3.14)

From above, the unit shock is defined as, . Therefore, the impulse responds will be:

  i,j, = 1, 2, ..., m (3.15)

Where,

et = selection vector.

This is close to a cholesky impulse response function of a unit shock to the ith equation in the VAR model.

**4. Empirical Results**

In this section we estimated the descriptive statistics of the variables in the model to examine their mean, standard deviation (std. Dev.), Skewness, Kurtosis and Jarque-Bara statistics in order to justify the null hypothesis that the variable in the model follow a normal distribution process. To examine the unit root test of the variables in the model, we introduced the Augmented Dick Fuller to ascertain the order of integration and provide adequate proof to verify the null hypothesis that the variables in the model have a unit root. Also, the vector auto-regression (VAR) Lag Order selection criteria test was carried out to determine the most appropriate lag length for the model. The results of these tests are fundamental for the structure of our selected VAR process and the desired outcomes obtained.

**4.1 Descriptive statistics**

In Table 4.1, we display the descriptive statistics of the variables in the model. The stated result revealed positive skewness for the budget deficit (DBUDGDEF) variable and the real gross domestic product growth rate (DRGDPG) variable. The results also showed that the foreign aid (DAID) variable and the current account (DCURRACC) variable demonstrated negative skewness.

**Table 4.1: Descriptive statistics of variables in the model**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Statistics | AID | BUDGDEF | CURRACC | RGDPG |
| Mean | 810191.5 | 8917.84 | 131133.9 | 9.2811 |
| Median | 269504.1 | 3518.00 | 3028.30 | 5.6670 |
| Maximum | 4890270 | 53000.36 | 2056326 | 84.628 |
| Minimum | 175.00 | 156.58 | 13.65 | -7.9000 |
| Std. Dev. | 1347419 | 13996.96 | 357430.7 | 17.5234 |
| Skewness | 1.8578 | 2.2311 | 4.2580 | 3.0602 |
| Kurtosis | 5.1238 | 6.6593 | 16.0683 | 12.3894 |
| Jarque-Bera(Pobability) | 30.2576(0.0001) | 55.5026(0.0001) | 22.5144(0.0001) | 209.365(0.0001) |
| Sum | 32407660 | 356713.4 | 356713.4 | 371.2420 |
| Sum Sq. Dev. | 7.08(E+13) | 7.64(E+08) | 7.64(E+12) | 11975.69 |
| Observations | 40 | 40 | 40 | 40 |

Source: Authors estimation, Eview 7, September 2011.

We observed that these variables exhibited reasonable levels of standard deviations and their kurtosis obtained were all positive relatively normal. To establish the null hypothesis of normality, we made use of the Jarque-Bera (1980) test and detected that all the variables in the model had positive values, such that AID, BUDGDEF, CURRACC and RGDPG estimated Jarque-Bera statistics values were 30.26, 55.50, 22.51 and 209.37 respectively and they were all statistically significant at the one percent level. Therefore, we fail to accept the null hypothesis of normality and accept the alternative hypothesis that the statistical distribution of these variables follows a normal process.

**4.2 Unit Root Test for the variables**

To test for the presence of the co-integrating relationship among the variables specified in the model, we begin by considering the characteristics of the time series data employed in the study. This was achieved by using the unit root test to determine the order of integration of each series using the Augmented Dick Fuller (ADF) set of the unit root test.

 **Table 4.2: Result of the unit root test at levels**

|  |  |  |  |
| --- | --- | --- | --- |
| Variables | ADF Test | Critical Values | Order of Integration |
| AID | 2.2179(0.9999) | -3.6537 | (Reject) |
| BUDGDFF | -3.0507(0.0392) | -3.6156 | (Reject) |
| CURRACC | -3.4750(0.0159) | -3.6702 | (Reject) |
| RGDPG | -5.3568(0.0001) | -3.6105 | (Accept) |

Source: Authors estimation, Eview 7, September 2011.

Note: \*The figures in parenthesis are the p-values of the ADF test. \*The stated

 critical values are at one percent level.

From the result of the unit root test in Table 4.1 above, we noticed that all the variables in the model were virtually non-stationary at levels. This means that they were basically of the 1(1) series with the exception of the RGDPG variable which is stationary and of the 1(0) series. This mixed result indicates that the model specified will most likely yield spurious estimates (Admans, 1992). Therefore, we fail to reject the null hypothesis that the series has a unit root. For this reason, we difference the variables once in an attempt to obtain a stable result.

 **Table 4.3: Result of the unit root test at first difference**

|  |  |  |  |
| --- | --- | --- | --- |
| Variables | ADF Test | Critical Values | Order of Integration |
| D(AID) | -5.5006(0.0001) | -3.6463 | (Accept) |
| D(BUDGDFF) | -4.2532(0.0022) | -3.6537 | (Accept) |
| D(CURRACC) | -7.3321(0.0001) | -3.6702 | (Accept) |
| D(RGDPG) | -4.6446(0.0009) | -3.6793 | (Accept) |

Source: Authors estimation, Eview 7, September 2011.

Note: \*The figures in parenthesis are the p-values of the ADF test. \*The stated critical

 values are at one percent level.

The result of the unit root test at first difference in table 4.2 above; states ADF statistic values of -5.50, -4.25, -7.33 and -4.65, the associated one-sided p-value for a test with 40 observations are .001, .002, .001 and .001 respectively. We noticed that the ADF statistics value pass the test of statistical significant at one and five percent. Also, the stated ADF values were noticed to be greater than there observed critical values. In this case, we reject the null hypothesis and accept the fact that the series is stationary (Andrews, 1991; Newey-west 1994).

**4.3 Lag length selection criteria**

**Table 4.4: The VAR Lag Order Selection Criteria Test**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Lag | LogL | LR | FPE | AIC | SC | HQ |
| 0 | -1512.52 | NA | 5.07(E+32) | 86.66 | 86.84\* | 86.72 |
| 1 | -1491.83 | 35.47 | 3.91(E+32) | 86.39 | 87.28 | 86.70 |
| 2 | -1470.74 | 31.34\* | 3.04(E+32) | 86.10 | 87.70 | 86.65\* |
| 3 | -1453.85 | 21.23 | 3.20(E+32) | 86.04 | 88.35 | 86.85 |
| 4 | -1432.33 | 22.13 | 2.88(E+32)\* | 85.73\* | 88.76 | 86.78 |

Source: Authors estimation, Eview 7, September 2011.

Note: \*Indicate lag order selected by the Criterion, LogL: Log Likelihood Ratio test, LR: Sequential modified LR test statistics, FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion and the HQ: Hannan-Quinn information criterion

To select the most appropriate VAR lag length, we considered the based automatic bandwidth parameter methods as recommended by (Newey-West, 1994; Andrews, 1991). The result obtained indicated that the Schwarz information criterion (SC) assigned the zero lag length, while the likelihood ratio (LR) test and the Hannan-Quinn information criterion (HQ) specified the second lag length as most desirable for the VAR. We narrowed down on the estimates and choice the final prediction error (FPE) and the Akaike information criterion (AIC) as the most appropriate lag length order for the VAR process. This is because four lag lengths is enough time to ascertain the effectiveness of policies over the observation studied.

**4.4 Testing causal links between foreign aid and macroeconomic variables**

 **in Nigeria**

Considering the estimate derived from the VAR process, we will report the parameter estimates for the full model specified by the equation in section three of the study.

**4.4.1 Specification tests**

In this section, we consider tests on the levels of adequacy of the specification and the residual covariance. It was noticed that there is significant conditional heteroskedesticity in the data set. This is due to the fact the estimated value of the determinant residual co-variance is approximately 4.13. The high outcomes of the AIC and the estimated value of the SC which are over 85.73 and 88.76 respectively confirm that the estimated coefficients are jointly and individually significant. The fundamental axioms of the hypothesis of a diagonal co-variance process demands that the off diagonal elements of the estimated coefficient should be jointly insignificant. Insights from the estimation process reveals that these estimated coefficients are jointly significant in most cases at the one percent, five percent and ten percent levels. Also, the insignificance of the non diagonal estimates may increase the persistence of the conditional variance as observed by the estimates of the residual covariance with a reasonable degree of adjustment of approximately 5.90, which is slightly higher than the results obtained from the determinant residual covariance process. Essentially, this implies that the significance of the analogous coefficients obtained at their various lags in each series may likely have similar degree of change in impact on the conditional variance of the other series.

Relatively, the hypothesis of a symmetric covariance process anticipates that the coefficient of the estimates may be insignificant from the results obtained. The results obtained shows that most of the elements are individually statistically significant and the basic model indicates a high R-square value and their associated F-test value were reasonably fair.

**4.4.2 Result of the VAR process**

Apparently, the estimates of the VAR test at the fourth lag selected by the AIC and FPE criteria revealed that foreign aid exhibits own variance asymmetry. This implies that, ceteris paribus, a positive shock in one period lag foreign aid led to a slow but consistently significant increase in the subsequent levels of foreign aid. We also, noticed that the effect of the impact of this shock gives raise to weak inconsistent values for the levels of budget deficits, and inconsistently increasing values for the levels of economic growth. These shock impacts indicate that positive changes in budget deficits generate some weak shock that reduce the impact of foreign aid in the economy. The estimates of current account balance in the light of foreign aid shows that positive changes in current account balance have been instrumental to attracting more foreign aid. Subsequently, changes in economic growth levels shows unclear indications of foreign aid shocks. This suggests that government macroeconomic stabilization strategies inhibit the effect of foreign aid in the economy. It also clearly indicates that foreign aid is used as a traditional balancing mechanism to rebalance the economic from external shocks. Further, this shows that policies put in place to control the impact of shocks on the macro economy as a result of the acceptance of foreign aid are not potent.

Further, we considered the shock impacts of macroeconomic stability measures on foreign aid and detected that shocks exhibited by the budget deficit variable reveals cross variance asymmetry and that changes in foreign aid have delirious influence on the levels of budget deficit in the economy. This implies that a positive shock in one period lag foreign aid yielded serious levels of positive and negative inconsistencies in the level of budget deficits in the economy. This result also disclosed that due to these levels of uncertainties, the shock impact on current account balances, weakens and intensively reduces its values. For the levels of economic growth, these shock impacts are low and mixed but it established fallible increasing influences on the level of economic growth. This suggest that the domestic macroeconomic strategies put in place by policy makers are inconsistent and lack the will to effectively utilize the gains of increased foreign aid in the economy.

Secondly, the levels of current account balance depicts own variance asymmetry, with negative shock impacts. This implies that a positive shock in one period lag foreign aid will influence the levels of current account balances in the economy negatively; also these changes in foreign aid flows induce a range of persistent weakness in the prevailing levels of current account balance in the economy. These impacts were identified to be endemic since the empirical estimates revealed that the negative impacts generated by such changes, worsen with each succeeding lag. It was also detected that these levels of negative endemic shocks increase the levels of budget deficits and inflates the deduced levels of negative shocks on economic growth. This suggest that the foreign policies put in place by government to check the levels of uncertainties generated by the absorption of accepted foreign aid are complex and equivocal, as such, they have negative implications for their potentials to succeed and as a result it inhibits the effectiveness of domestic policies in these regards.

Finally, the economic growth variable display own variance asymmetry, with negative shocks impacts that lead to consist reductions in the levels of economy growth with each succeeding lag values. This implies that a positive change in one period lag foreign aid will consistently lead to reductions in the levels of growth in the economy. The spill over effect of this impediment has consequences for current account balance and budget deficits. While it was noticed to cause partial consistencies in the way it influences current account balance, the empirical estimates disclosed that these forms of negative shocks were replicated with stronger consistent impacts on the levels of budget deficits in the economy. This is because; the impact of these shocks degenerated negatively as the lag increased. These suggest that the inefficient absorption of foreign aid reduce the potency of aid to drive the levels of growth, it weakens and distorts progress in both domestic and foreign policies implementation. Because these perceived negative shocks restrict increase in current account balance, making it inconsistent, and it seriously reduced the levels of budget deficits.

**4.5 Results of the impulse responses**

In this subsection, we present the empirical results of macroeconomic stability, foreign aid shocks and economic growth by analyzing the impulse responses obtained from the VAR process. To ascertain the impact of the stated shocked obtained from the VAR process, we performed an impulse response analysis of the specified model, by calibrating the unrestricted VAR (4) model with common lag lengths as specified by the lag order selection criteria which were justified by the final prediction error (FPE) criterion and the Akaike information criterion (AIC). The Cholesky adjusted degree of freedom, one standard deviation innovation impulse response, report the responses for 40 annual horizons with 95 percent confidence intervals. This analysis was used to capture the impacts of the stated shocks by dividing the original impulse responses by the standard deviation of the respective macroeconomic shocks. This process made it possible for the researchers to deal with the sizes of the levels of shocks, in the other variables in the model, in percentage-point changes subsequent to a foreign aid shock of a similar magnitude.

From the estimated graph in Appendix A2, figure 1, we noted that the impulse responses for the same variable in the model were represented differently in accordance with its shock related variable, which differs with a multiplicative constant corresponding to the ratio of the standard deviations of the shocks in the variables captured in the impulse response analysis. Also, the confidence bounds are different for these sets of variables, especially for the economic growth shock relationships with other variables in the model.

**4.5.1 Response of foreign aid shocks to macroeconomic variable shocks**

Foreign aid reacts strongly and persistently to variations in its own shock. It declines steeply in the first four periods, to the baseline and lost over 200, 000 units in just one period, although it gained about 150, 000 in the subsequent period. This persisted over two subsequent periods and from the eight period, it increased dramatically above base line to over 200, 000 unit at the ninth period which witnessed a steep decline to over 100, 000 units at the tenth period.

The response of foreign aid to budget deficit decreased on impact with over 300, 000 units between the first and second period, it was noticed to increase slightly with about 100, 000 units. Subsequently, it rose above base line with about 100, 000 units and it was steady for a period after which it declined sharply losing well over 120, 000 units this period also witnessed subsequent levels of increase of about 100, 000 units. Consequently a decline of the same magnitude was noticed in the seventh period, which reached the base line at the eight periods and it lost about 100, 000 units this remain steady up until the tenth period.

The response of foreign aid to current account shows high levels of uncertainties, it exhibited decreasing impact of over 100, 000 units between the first and second period, and a steep accelerated decline of over 300, 000 units was notices in the subsequent period. The fourth and fifth periods witnessed consistent increases that shoot the levels of current account balance above the base line with over 100, 000 units. Between the fifth and the sixth periods, the current account balance witness a sharp decline, although in the seventh period we noticed a recovery of over 200, 000 units. This level of increase steeply declined and hit the baseline in the eight period and at the ninth period it has lost over 100, 000 units while at the tenth period, approximately 50 percent of this was recovered.

The response of foreign aid to economic growth consistently remain on the baseline, with little variations of about 100 000 units in the second period. This range of variation on the baseline persisted up until the fifth period which also witnessed 100 000 unit declines. Although an increase of 100 000 units was noticed in the sixth period, it declined quickly in the between the sixth and seventh periods, cutting through the baseline with about 150 000 units. This process reoccurred, and it was noticed that economic growth regain stability, with a consistent amount of increase that reached the baseline in the eight period and this process continued and it gained approximately 15 000 units which latter reached the baseline at the tenth period.

**4.5.2 Response of macroeconomic variables shocks to foreign aid shocks**

Considering budget deficits impact on foreign aid we noticed a trajectory of about 50 000 units between the first and second period, from a decline of over 150 000 units. This increase persist with over 120 000 units at the third period where the accelerating trajectory become slow at the fifth period and reached its peak at the sixth period where it added 20 unit which was lost after a shock impact at the sixth period. It touched the baseline at the seventh period and it lost over 50 000 units at the eight periods where it encountered a shock that accelerated it steadily and it gained about 50 000 units and reached the baseline at the ninth period. At the tenth period, it gained about 20 000 units above the baseline.

The impact of current account to foreign aid reveal a steady increase from the baseline in the first period with about 70 000 units and this gradually rose with over 30 000 units. Between the second and third periods at we noticed a steep decline that hit the baseline after three and half periods and at the fourth period, reached a low of approximately 100, 000 units. This process had a quick recovery and it was at the baseline after the fifth period. Considerably, this interaction gained a 10 000 units at the sixth period and between the seventh and eighth periods, it was identified to loss 20 000 units. At the eight period it slowly climbed to the baseline, where it increased and reached a 50 000 unit high at the ninth period, this height could not sustained, and at the tenth period, it lost could only hold 30 000 units.

The result of the response of economic growth to foreign aid reveals a decreasing impact of five units in the growth-aid relationship. This depreciates rapidly at the second period and reached a low of five points. The third period witnessed a recovery that lead to a slow but steady raise in the responses of economic growth to aid shocks. This was sustained between the third, fourth and fifth periods at about five units. The sixth period witnessed a decline, as a result of the reducing impacts of shocks at the fifth period. This level of decline was on the baseline and it remained neutral up until the eighth period where visible signs of reducing impacts were noticed. This persisted and was at its low at the ninth period. This reduced impacts of shocks flows were notice to recover slightly between the ninth and tenth period and was only five points above the expected baseline at the end of the tenth periods.

**4.6 Results of the Variance Decomposition**

The variance decomposition with AIC criteria was used in this study, its output are shown in appendix A3, represented has figure 1. It is necessary to note that by choosing a Cholesky type of decomposition of the covariance metrics disturbances, it follows that there is no instantaneous effect of foreign aid, budget deficit, current account balance and economic growth in the Nigeria economy. This implies that the levels of foreign aid are not instantaneously affected by any of the other variables in the model. Considering the graphical representation of the variance decomposition analysis in appendix A3, figure 1, we noted that the variance decomposition for the same variable in the different modes differs with a multiplicative constant corresponding to the ratio of the variation exhibited by the variables implied variance shocks for the different individual variables.

**4.6.1 Percentage responses of foreign aid variance innovation to**

 **macroeconomic variables**

The impact of the past variance of foreign aid was noticed to depress the present variance innovations of foreign aid consistently over time. A steep drop was identified between the first and third periods. Although a similar magnitude of variance innovation was noticed between the third and fourth periods, the fifth to sixth periods witnessed low consistent foreign aid at approximately 50 and 60 percent variations. This drop moved more closed to over 45 percent decline in foreign aid at the seventh to tenth periods. Further, foreign aid variance innovation impact on the values of budget deficits witnessed a decline of over 20 percent in the first and third periods and had a slow and steady increase from the third to the sixth periods, recovering at 15 percent of its lost variations. At the ninth and tenth periods, it lost 30 percent of its value as a result of foreign aid variance innovations and did not recover its initial levels before the shock impacts. Moreover, current account balance variance innovation reacts positively on impact to foreign aid innovation; it was identified to be rising at approximately 5 percent every period for the first four periods where it peaked at 20 percent. This variation persisted though the fourth to the ninth period after which it witnessed a 0.3 percent loss. Subsequently, the reaction of the levels of economic growth to foreign aid variance innovation is unique. It was noticed to have a slight reduction effect of about 0.2 percent within the first two periods. This stance remain consistent over the periods observed up until the seventh and eight periods with witnessed a deep of 0.1 percent and targeted further at 0.2 percent after the period. This new trajectory persisted up until the tenth period.

**4.6.2 Percentage responses of macroeconomic variables variance innovation to foreign aid flows**

The variance innovation reveals that budget deficit shocks instil rapidly increasing variations on foreign aid in the first and second period. Though this increase remains consistent over time, it witnessed some level of inconsistencies between the second and third periods and the seven and eight periods in the same magnitudes. Also, the variance of the shocks of current account balance increased the variation in foreign aid by approximately 15 percent to 10 percent every four periods. Further, the responses of the variance in economic growth as it relates to foreign aid are slightly positive on impact, as it rose by 0.3 to 0.5 percent. It persistently remains on the zero band limits though the innovation period observed.

Considering the test of hypothesis in this regard, although the percent variation in foreign aid due to changes in the variance of foreign aid exhibited decreasing own variance, the budget deficit and current account balance variables were very sensitive in subsequent trends from the second and third periods respectively. The economic growth variable was perceive to changes in percentage variances to foreign aid and it witnessed low variance responses and remain steady between 0.8 and 0.5 percent respectively. This means that the variance in innovations in budget deficits and current account balances appears to explain more of the variances in foreign aid than the innovations in economic growth. The large confidence intervals of the variables in the variance decompositions, regardless of the point estimates under consideration, in the analysis provides a reasonable support for drawing strong conclusions about the impacts of the innovations in the observation used for the study.

Also, it is important to note that we fail to reject, at the 95 percent level, the hypothesis that innovations to foreign aid-budget deficit, foreign aid-current account balance and foreign aid-economic growth are less than 5 percent of the variance in foreign aid. Secondly, the hypothesis that innovation to budget deficits-foreign aid, current account balance-foreign aid and economic growth-foreign aid explains less than 5 percent of the expected variance was also faulted. In all, the alternatives hypotheses were accepted.

**4.7 Policy implications**

From our analysis, to effectively justify the view that foreign aid has a significant impact on economic growth depends solely on the macroeconomic framework and foreign trade policies available to the economy. The macroeconomic policies could be structured to salvage the undue impacts of foreign aid and direct strategies to channel the spending of foreign aids to the appropriate sector and such projects should be effectively monitored to obtain the desired outcomes.

These points to the fact that the stated macroeconomic framework must make adequate provision for an effective means to manage structural difficulties due to uncertainties in foreign aid that distorts the levels of growth in the economy. For this reason, the use of deficit budget should be prohibited, at the extreme it should be target to a reasonably low percentage of GDP. From the outcomes of the empirical estimates, it is clear that the impact of foreign aid is not properly predicted and controlled by the present structure of the existing macroeconomic policies. Empirical evidences from the study point to the fact that government policies in this regards are myopic and expose the economy to potential lost in economic growth through the improper planning and implementation of investments that are financed by foreign aid. To find a lasting solution to this problem, the macroeconomic policy framework should initiate efficient sets of strategies that will effectively absorb foreign aid investment decisions optimally over the specified period. This will most likely improve infrastructure and other related aids investment which will invariably spur economic growth.

Results from the estimation process disclosed that increases in foreign aid impeded economic growth. For foreign aid to drive growth in Nigeria, the macroeconomic strategy designed to monitor and manage foreign aid investments should be able to predict the intensities of foreign aid and create avenues for inter-temporal smoothing, between the outcomes of such investments on economic growth. This is a focal point for the economy to adopt sound policies to sustain growth.

Empirically, we deduced negative shock replications with strong consistent impacts on economic growth due to positive shocks from foreign aid. Further, empirical test results exposed the fact that these negative replications persistently slowed down the levels of growth. This reveals that, inefficiencies in the absorption of foreign aid reduced the potency of the strategies in the growth process. This situation has induced implications for the quality of development assistance which is a key issue in the ‘scaling up’ foreign aid debate. This reinforces the need for adequate predictable and more effective foreign aid, which are critical to foster the establishment of timely and rapid economic growth in developing and less developed countries.

These specified macroeconomic-foreign aid-growth dynamics should be taken seriously by donor agencies, in order to monitor the effective transformation of macro-economic strategies, guiding foreign aid receiving countries to put such aids to work. For this to be effective, foreign aid receiving countries should put in place strategic macroeconomic frameworks with supportive, accountable domestic institutions that will track problems related to the behaviours of government that hinders the effective absorption of foreign aid and obstructs the capacities of foreign aid to facilitate growth.

**5. Conclusion**

This study analysed macroeconomic stability and the impact of foreign aid on economic growth in Nigeria. It focused on identifying unanticipated shocks that flows from foreign aid and evaluated its impact on economic growth, budget deficits and current account balance which were used to represent domestic and international macroeconomic policy dimensions for economic stability in order to disclose the efficacy of foreign aid. To achieve this task, we employed the vector auto-regression model and evaluated the test of the levels of adequacy of the specification. The residual co-variances were jointly and individually significant in accordance with the observed values of the AIC and SC criteria, this confirmed the diagonal co-variance process which demands that the off diagonal elements of the estimated coefficient should be jointly insignificant, and deduced the hypothesis of a symmetric covariance process. Also, the test process demanded that we use the impulse response analysis to measure the various levels of shocks in the model, while the variance decomposition model was used to test if the innovations of foreign aid shocks to macroeconomic variables in the model are not less than 5 percent. Consequently, we enquired; if such innovations are due to macroeconomic variable variance innovations on foreign aid.

To do this effectively, we computed the lag length selection criteria and selected the fourth lag length as the most appropriate in accordance with the final prediction error (FPE) and the Akaike information criterion (AIC).

Secondly, we considered the specification test by carrying out tests on the adequacy of the specification and the residual covariance and noticed that they were jointly and individually significant in accordance with the observed values of the Akaike information criterion and the Schwarz information criterion.

Thirdly, the fundamental axioms of the hypothesis of a diagonal co-variance process which demands that the off diagonal elements of the estimated coefficient should be jointly insignificant. Was tested and its estimates revealed that they are jointly statistically significant at the one percent, five percent and ten percent levels. The insignificance of the non diagonal estimates may increase the persistence of the conditional variance as observed by the estimates of the residual covariance with a reasonable degree of adjustment of approximately 5.90, which is slightly higher than the results obtained from the determinant residual covariance process.

Fourthly, the hypothesis of a symmetric covariance process anticipates that the coefficient of the estimates may be insignificant from the results obtained. The results obtained shows that most of the elements are individually statistically significant and the basic model indicates a high R-square value and their associated F-test value were reasonably fair.

The fifty test considered the VAR and disclosed that foreign aid own variance asymmetry caused positive changes in budget deficits generated weak shock that reduce the impact of foreign aid in the economy. The current account balance-foreign aid relationship shows that positive changes in current account balance will likely attract more foreign aid. Subsequently, changes in economic growth levels are a clear indication for foreign aid funds. This shows that government macroeconomic stabilization strategy measures inhibit the impact of foreign aid on the economy. This indicates that foreign aid is used to edge trade weaknesses and that policies directed to control the impact of shocks on the macro-economy as a result of the acceptance of foreign aid are not potent.

The macroeconomic stability and foreign aid exhibited positive shock in one period lag foreign aid that generated inconsistencies in the level of budget deficits. These levels of uncertainties disclosed unfavourable shock impact on current account balances; weaken and intensively reduce its values. But these shock impacts on economic growth are low and mixed but it established fallible increasing influences on the level of economic growth.

Further, it was noticed that foreign aid influenced current account balances in the economy negatively. The impact was endemic and it increased the levels of budget deficits while inflating the deduced levels of negative shocks in economic growth. The economic growth variable exhibited negative shocks that led to a consist reduction in the levels of economy growth. Consequently, a positive change in one period lag foreign aid impeded the levels of growth in the economy. The spill over effect caused partial consistencies in the way it influences current account balance. Empirically, we deduced that these forms of negative shocks were replicated in stronger consistent impacts on the levels of budget deficits in the economy.

In the sixth estimation process, we performed an evaluation of the impulse response of foreign aid to budget deficit impacts showed decreasing trends that were uncertain through the period. Also, foreign aid impact on current account balances negatively and its associated tend impacts were inconsistent. For economic growth the impact of foreign aid shocks made it consistent and kept it at low values such that subsequent variations were on the baseline. Besides these levels of observed variations, it took the levels of economic growth two to three periods to recover after a corresponding shock.

Also, it was discovered that budget deficits impact on foreign aid yielded positive increases which were consistent for six periods, and later became inconsistent over the trend observed in the study. Although it took it three periods to recover, it did not meet observed prior increase. The current account impacts increased steadily, although declines were steep, the rate of recovery after these three period shocks were quick. In this case, economic growth impact on foreign aid was decreasing and inconsistently low, even after four period of recovery, it could not measure up to previous observed levels.

In the final process we used the variance decomposition to ascertain the hypotheses that; the innovations of foreign aid shocks to the macroeconomic variables in the model are not less than 5 percent of the variance in foreign aid. Also, we used its results to ascertain, if the innovations of macroeconomic variables shocks to the foreign aid in the model are not less than 5 percent of the variance in macroeconomic variables. We disclosed that foreign aid innovation impact on budget deficits decline drastically, although recovery was slow and steady, it only got back 15 percent of its initial value. Current account balance impact positively on foreign aid innovations which was persistent through the periods observed in the study. Foreign aid innovation impact on economic growth disclosed a decreasing effect which led to a spontaneous steady state for over seven periods. Therefore, the expected variances explored by the hypotheses were faulted. These results disclosed weak macroeconomic policies-foreign aid gaps with interesting implications for macroeconomic management, donor agencies, policy makers and organizations interested in scaling up the levels of foreign aid to developing countries.

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Appendix A1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VAR Lag Order Selection Criteria |  |  |  |  |
| Endogenous variables: DAID DBUDGDEF DCURRACC DRGDPG  |  |  |
| Exogenous variables: C  |  |  |  |  |
| Date: 07/08/11 Time: 04:36 |  |  |  |  |
| Sample: 1 40 |  |  |  |  |  |
| Included observations: 35 |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  Lag | LogL | LR | FPE | AIC | SC | HQ |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| 0 | -1512.519 | NA  |  5.07e+32 |  86.65824 |   86.83600\* |  86.71960 |
| 1 | -1491.832 |  35.46472 |  3.91e+32 |  86.39037 |  87.27914 |  86.69718 |
| 2 | -1470.735 |   31.34401\* |  3.04e+32 |  86.09912 |  87.69891 |   86.65137\* |
| 3 | -1453.846 |  21.23147 |  3.20e+32 |  86.04834 |  88.35914 |  86.84603 |
| 4 | -1432.328 |  22.13242 |   2.88e+32\* |   85.73304\* |  88.75486 |  86.77618 |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  \* indicates lag order selected by the criterion |  |  |  |
|  LR: sequential modified LR test statistic (each test at 5% level) |  |  |
|  FPE: Final prediction error |  |  |  |  |
|  AIC: Akaike information criterion |  |  |  |  |
|  SC: Schwarz information criterion |  |  |  |  |
|  HQ: Hannan-Quinn information criterion |  |  |  |
|  |  |  |  |  |  |  |

Appendix B1

 Table 2: Impulse Response to Cholesky (d.f. adjusted) One S.D. Innovations Graph



Appendix C1

 Table 3: Variance decomposition (4th lag) AIC criteria Graph

