Empirical Analysis of Twins' Deficits in Nigeria

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Abstract

The study examined the effects of twins' deficits in Nigeria for the period 1970-2008. Secondary time-series data were used for the study and analysed using econometric techniques. The results showed there was a bidirectional causality relationship between budget deficits and trade deficits in Nigeria. The study concluded that an appropriate policy measures to reduce budget deficits could play an important role in reducing trade deficit and complement this with budget-cut policies via a coherent package that focus on policies for export promotion, productivity improvement and exchange rate, among others.

Keywords

Trade deficit, Budget Deficit, Co-Integration, Granger Causality, Unit-Root

I. Introduction

The relationship between budget deficit and trade deficit represent one of the most widely topic among economists and policy makers in both developed and developing countries. The twin hypothesis asserts that an increase in the budget deficit will cause a similar increase in the current account deficit. Although, large budget and trade deficits are not a new phenomenon, they also arose in Nigerian economy in the mid-1980s. At that time, the business press and many economists began referring to the situation as one of "twin deficits." With the current re-emergence of both deficits, there is a need to revisit the issue empirically and theoretically. The probable effects of the budget deficit on the trade deficit are still the subject of much debate and with controversy. Despite the increased use of more sophisticated time series techniques, economists have yet to arrive at a common empirical methodology on how to investigate the association between the two deficits. As a result, policy implications of research findings dealing with the subject remain basically ambiguous, time and space dependent and hence impracticable.

Theoretical examinations of this issue have resulted in many contrary views. An extensive literature [e.g. Flaming (1962); Mundell (1963); Volcker (1987); Kearney and Monadjemi (1990); Smyth et al. (1995) among others] has argued that government deficits may cause trade deficit through different channels. For example, in a Mundell-Fleming framework, it is argued that an increase in the budget deficit would induce upward pressure on interest rates, causing capital inflows and an appreciation of the exchange rate that will increase the current account deficit.

The Keynesian absorption theory suggests that an increase in the budget deficit would induce domestic absorption and thus, import expansion, causing a current account deficit. Conversely, suppose that expansionary fiscal policy resulted in a rise in budget deficits only if this expansion were totally financed by borrowing from foreigners, domestic interest rates would not change much, and domestic investment and private saving might not either. In this scenario, there could be a simultaneous dollar-per-dollar change in budget and trade deficits--the classic twin-deficit scenario. Such a situation is most likely to occur in small economies fully open to international trade and capital flows, economies in which domestic interest rates are determined by world capital markets and are independent of domestic economic variables. But if domestic interest rates do change, as they likely would in either a closed economy or a large open economy, private investment and saving would also likely change, and any strict link between budget and trade deficits would be broken. One could spin any number of scenarios, but these are enough to make the basic point because of the underlying relationship between saving and investment, budget and trade deficits could be strictly linked. But in a large open economy like the Nigeria, it is easy to imagine plenty of scenarios in which they are imperfectly linked, and even some scenarios in which they move in opposite directions.

Four possible causation linkages may be present between the budget deficit and the trade deficit. The first linkage is the Keynesian (conventional) proposition often associated with the Mundell-Fleming model. It argues that there exists a positive relationship between the two deficits and that causality is from the budget deficit to the trade deficit. In the context of this model, an increase in budget deficit would cause an increase in domestic interest rate above the world rate, with capital inflows and appreciation of the domestic currency as effects. These effects, in turn, result in an increase in trade (current account) deficit. As discussed in Kearney and Monadjami (1990), reverse causation from trade to budget deficits can come about if there is a change in the expectations of inflation. A decrease in expected inflation would lead to currency appreciation and thus decrease net exports and increase the trade deficit. This in turn will have the usual multiplier-type decrease in output and consequently in tax revenues. Thus, by this approach, decreased inflationary expectations would lead trade deficits to cause budget deficits. Also, reverse causation from trade to budget deficits can occur if excessive trade deficits plunge an economy into a recession and subsequently lead to a financial or solvency crisis in which a large injection of public funds may be needed to rehabilitate the struggling financial sector or to minimize the severity of a recession for more discussion of this, see Kim and Kim (2006). In other words, the large inflow of capital or debt accumulations affects the budgetary stance of a country and ultimately leads to budget deficit. Summers (1988) have referred to this reverse causality as current account targeting and suggest that external adjustments may be sought through budget (fiscal) policy. Examples of studies that support reverse causation are Kearney and Monadjami (1990), Anoruo and Ramchander (1998), Khalid and Teo (1999) and Alkswani (2005). These studies indicated that bi-directional causality may exist between trade and budget deficits and this implies that budget deficits may cause trade deficits; hence, the existence of significant feedback may cause causality between the two variables to run in both directions.

In contrast, proponents of the Ricardian Equivalence Hypothesis (REH) suggest the absence of any relationship between the trade deficit and the budget deficit Barro (1989), while a tax cut (hence a deficit) has the effect of reducing public revenues and public savings and enlarging the budget deficit, it increases private saving by an amount equal to the expected increase in the tax burden in future years. That is, savings will respond positively to the changes in budget deficits, leaving the trade deficit unaltered. Similarly, if government runs a deficit by borrowing, the economic agents expected that government will raise future taxes to finance the

budget deficit and so they increase their savings to meet the future tax burden. In sum, alterations in the composition of public financing (i.e., debt versus taxes) have no impact on real interest rate, aggregate demand, private spending, the exchange rate or current account balance. In other words, the absence of any Granger causality relationship between the two deficits would support REH. Budget and trade deficits should be viewed as linked, but not as twins. This notwithstanding, there will be needs to consider the issue of causality in Nigeria as to know the school of thought Nigeria belongs to.

An important contribution of this study is that it investigates the relationship between the trade deficit and the budget deficit in the context of causality using pairwise granger causality test. Understanding the adjustment process (i.e. knowing which of this variable causes the other and to what magnitude and direction it occurs), this will improve predictions that can benefit both market participants and policymakers. For instance, knowledge of the primary variable that adjusts its level in order to restore equilibrium when the system has been subjected to shock can guide authorities in Nigeria in deciding the appropriate exchange rate, export promotion, productivity improvement, fiscal and monetary policies to be implemented in adjusting macroeconomic variables such as the trade balance. Understanding the nature of the causal process for budget/trade deficits can also be useful in evaluating the future effects that may occur as a result of policy changes and can provide useful guidance in drawing conclusions regarding any general hypotheses. In sum, this article differs from the existing literature, not only in its data set, but also in its empirical method and its new evidence identifying budget deficit causality to be the key engine governing the speed of budget-trade deficit convergence in Nigeria. Although, the economic implications and reactions of budget deficits and trade deficits differ, both are deficits and have impact on Nigerian economy.

II. Theoretical Considerations/Model

A positive association between the government budget and trade balance can be shown in the context of a simple Keynesian open-economy model. In an open economy,

$$Y = C + I + G + (X - M) \qquad (1)$$
$$S + (T - G) = I + (X - M) \qquad (2)$$

where Y is the national income; C is private consumption; I is investment; G is government expenditures on final goods and services; (X-M) is net exports of goods and services; S is national savings (private sector savings; and T is government tax revenues.

After substituting, equation (1) becomes

$$(X - M) = (S - I) + (T - G) \qquad (3)$$
$$TD = BD + SI \qquad (4)$$

In this case, net exports simply equal the private saving-investment gap plus the budget balance. Thus, assuming a stable saving - investment gap, an increase in public sector deficit will directly increase the trade deficit. While the identity does not provide any behavioral or temporary relationships between the deficits, or even the direction of causality, it provides a basis for expecting a positive long-run equilibrium relationship between the two deficits.

In an open economy, portfolio crowding out can arise through the exchange rate affecting the current account. This view stresses the importance of international capital movements in response to debt disturbances and the linkage between budget deficit and exchange rates (Bundt and Solocha, 1988).

Studies of the twin-deficits relationship generally proceed from

one of the two theoretical bases. The hypothesis that increases in the government's budget deficit leads to an increase in the trade deficit follows directly from the Mundell-Fleming model Flaming (1962); Mundell (1963). It is worth noting here that the Mundell-Fleming model is an open economy extension of the IS-LM model. As such, it is not fully "rational"; the assumptions made regarding expectations formation are static. In the Mundell-Fleming framework, an increase in the government's budget deficit can generate an accompanying increase in the trade deficit through increased consumer spending. By increasing the disposable incomes and the financial wealth of consumers, the budget deficit encourages an increase in imports. To the extent that increased demand for foreign goods leads to depreciation in exchange rate, the effect on net exports mitigated. However the larger budget deficit also pushes up the interest rate (in a large open economy like Nigeria) because this appreciates the exchange rate, which encourages a net capital inflow and a large decline in net exports.

III. Methodology

This study attempts to explore empirical relationship of the twin deficit hypothesis by applying pairwise causality test and Error Correction Model (ECM) technique on annual budget deficit and current account deficit in Nigeria. The study attempts to reveal if there exists a consistent causal relationship between the two deficits. Also gross domestic product(GDP) and exchange rate was add as explanatory variable the inclusion of lagged values of these variables is intended to eliminate estimation bias associated with simultaneity and serial correlation, the lag length is chosen using various criteria including the Akaike Information Criteria (AIC) as well as Sims (1980) and Blanchard (1993) procedures. The raw data was obtained from the sources complied by the Statistical Bulletin (CBN 2009).

The Granger Causality test assumes that the information relevant to the production of the respective variables, Trade and budget deficit is contained solely in the time series data on these variables. The test involved estimating of the following pain of regressions:

$$Ct = \sum_{i-1}^{n} \alpha i Q_{t-i} + \sum_{i=1}^{n} \beta_1 C_{t-i} + U_{it} \qquad (5)$$

$$Qt = \sum_{i=1}^{n} \lambda i Q_{t-i} + \sum_{i=1}^{n} \delta i C_{t-i} + U_{2t} \qquad (6)$$

Where it assumed that the disturbance U1t and U2t are uncorrelated, and Q(b,x,g)

IV. Data Analysis and Results

A. Time Series Properties of the Data

Table 1, presents the estimates of the results Augmented Dickey Fuller (ADF). Evidence from the results from the table confirmed that all the variables (trade deficit, budget deficit, exchange rate and gross domestic product) were not stationary at level. However they became stationary after first difference indicating that they were integrated of order one i.e. I (1). Consequently, the presence of significant co-integration relationship among the variables could be determined.

B. Johansen's Maximum Likelihood Co-integration Test

The results of the unit root test show that all the variables were random walk processes. It does not however imply that in the long-

run the variables could not express long-run convergence i.e. long run equilibrium. Hence the need to subject the residuals generated from their long run static regression to Dickey – Fuller test or Augmented Dickey – Fuller test to see if they are stationary. The stationarity of the residuals is potent evidence that there is evidence of convergence to long-run equilibrium among the integrated variables. To be able to ascertain whether there is cointegration among variables of interest, it deems fit to initially determine the optimal lag length of variables to be used.

To this end, Table 2 shows the Akaike Criteria (AC) and Schwarz Bayesian Criteria (SBC) indicated that the optimal lag structure for the VAR upon which the cointegration analysis is to be based is two.

Having determined the optimal lag structure, the cointegration test was carried out using Johansen cointegration test which is a superior test that lies on asymptotic property (like this study) and therefore sensitive to error in small sample. It is also robust to many departures from normality as it gives room for the normalization with respect to any variable in the model that automatically becomes a dependent variable. It also allows cointegration test to be carried out when the variables are of different orders of integration; and also gives room for the application of Error Correction Mechanism (ECM). The result of the Johansen cointegration is presented in Table 3.

The results of the co-integration in Table 3, confirmed that there is one co-integration relationship among the macro economic variables included in the model specifically, the result of the co-integration test suggests that trade deficit has equilibrium condition with budget deficit, GDP and exchange rate, which keep them in proportion to each other in the long run. This evidence of co-integration among the variables rules out spurious correlations and applies that one direction of influence can be established among the variables.

It is important to note that the existence of co-integration vectors among a group of variables may not imply that there is causal influence between pairs of variables in the model of co-integration test.

C. Bivariate Causality

Although regression analysis deals with the dependence of one variable on the other, it does not necessarily imply causality in other words, the existence of a relationship between variables does not prove causality or direction of influence. But in regression including time series data, the situation may be somehow different. Because, time does not run backward, that is, if event A happens before event B, then it is possible that A is causing B. however; it is possible that B is causing A. in other words; events in the past can cause events to happen today. Future events cannot.

This is roughly the idea behind the so called Granger Causality test, but it should be noted clearly that the question of causality is deeply philosophical with all kinds of controversies. At one extreme are people who believe that everything causes everything". And at the other extreme are the people who deny the existence of causality whatsoever. The econometrical Edward Learner Prefers the term precedence over causality. Francis diebold prefers the term predictive causality

The result of the causality test shown that a strong unidirectional causality was found between fiscal deficits and trade deficit with the causality running from fiscal deficit to trade deficit at 5 percent level of significant. Also exchange rate was found to granger cause trade deficit at a very weak rate at 5 percent significant level, while fiscal and exchange rate has a unidirectional causality that

is very strong running from fiscal deficit to exchange rate at 5 percent significant level.

From the result, it was reported that there exists a unidirectional causality between GDP and fiscal deficit, this runs from GDP to fiscal deficit at 10% significant level. Also a unidirectional causality was found between GDP and inflation rate, which runs from GDP to inflation at 10 percent significant level.

V. Conclusion and Policy Recommendation

This study examines the causal relationship between the budget deficit and trade deficits in Nigeria using time series data for the periods of 1970 to 2008. Pairwise granger causality test procedure was used in order to determine the direction of causality between budget deficits and trade deficits. Also ADF and co-integration tests were conducted to test if the variables have a long-run relationship. The advantage of this procedure is to guide us from spurious result, i.e. reducing the problems associated with wrong identification of orders of integration of the series or the existence of potential co-integration between the series.

The findings from the study give further support to the Keynesian view that there was a strong link between budget deficits and trade deficits in the Nigerian economy. The result supported the existence of bidirectional causality between budget deficits and trade deficits in Nigeria. Therefore, appropriate policy measures to reduce budget deficits could play an important role in reducing trade deficit since causality runs from budget deficits to trade deficits as shown by our result. However, it is not enough to cut the budget deficit in order to eliminate trade deficits. It is necessary as well to complement budget-cut policies with a coherent package focusing on policies for export promotion, productivity improvement and exchange rate, among others.

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Table 1: Results Unit Root Test using ADF

Variables	Series	At Levels	At First differences
Fiscal deficit	FCDT	-2.55	-4.33
Gross domestic product	GDP	-1.44	-3.78
Trade deficit	TRDT	-2.69	-4.02
Exchange rate	EXRT	0.15	-3.53
Critical Value	1% 5%	-3.63 -2.95	-3.64 -2.95

Table 2: Determination of Optimal Lag-length

Information Criteria IC ρ	Akaike Criteria (AC)	Schwarz Bayesian Criteria (SBC)
1	41.78	42.86
2	42.58	43.02
3	44.01	45.44
ρ =	1	1

Note: ρ indicates the lag length to use for Cointegration test

Table 3: Results of Co-integration Test

Eigen value	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)	
0.833332	61.32338	47.21	54.46	None **	
0.558643	23.69654	29.68	35.65	At most 1	
0.196367	6.520596	15.41	20.04	At most 2	
0.087796	1.929722	3.76	6.65	At most 3	

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 1 cointegrating equation(s) at 5% significance level

Table 4: Pairwise Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Probability
FCDT does not Granger Cause TRDT	33	3.64899	0.00356
TRDT does not Granger Cause FCDT		0.92743	0.40738
GEXRT does not Granger Cause TRDT	33	3.24015	0.05423
TRDT does not Granger Cause GEXRT		1.84051	0.17743
GGDP does not Granger Cause TRDT	33	2.76817	0.05598
TRDT does not Granger Cause GGDP		0.08689	0.91703
GEXRT does not Granger Cause FCDT	33	1.24736	0.30274
FCDT does not Granger Cause GEXRT		6.53083	0.00470
GGDP does not Granger Cause FCDT	33	2.83586	0.07560
FCDT does not Granger Cause GGDP		0.00273	0.99727
GGDP does not Granger Cause GEXRT	33	0.14987	0.86150
GEXRT does not Granger Cause GGDP		0.04738	0.95380