

An Empirical Investigation of the Twin Deficits Hypothesis in Sub Saharan Africa (A Dynamic Panel Approach)

Ekpenyong Udom Imoh*, Ogbuagu Matthew Ikechukwu

Department of Economics and Development Studies, Federal University Oye-Ekiti, Ekiti State, Nigeria

Abstract

Among the challenges confronting sub Saharan Africa (SSA) are maintaining favorable fiscal and trade balances. Based on historical data from these countries, both balances have simultaneously trended in the negative region. This suggests the presence of the twin deficits in SSA. To provide an empirical explanation for this relationship, we adopted a dynamic panel model. The model was estimated using the Generalised Method of Moments (GMM) estimation technique. This technique is suitable because it takes care of the serial correlation problem that may exist as a result of including the lagged value of the dependent variable as a regressor in the model. The result shows a positive and significant impact of the budget balance on the trade balance, confirming the presence of the twin deficits in SSA. Also, the long run impact of the budget balance on trade balance was discovered to be 0.6 or 60%. Based on the empirical findings, the study recommends that a necessary condition in reversing the negative trend in the trade balance in SSA is maintaining a favourable fiscal balance. That is, to reverse the downward trend in the trade balance in SSA, measures should be put in place first to reverse the fiscal deficits. Also, it was recommended that if SSA countries are to reap positive gains from trade agreements like the European Partnership Agreement (EPA), they should make efforts to add value to products they send to the international market.

Keywords

Budget Deficits, Trade Deficits, Dynamic Panel, Generalised Method of Moments

Received: March 30, 2015 / Accepted: May 2, 2015 / Published online: May 27, 2015

© 2015 The Authors. Published by American Institute of Science. This Open Access article is under the CC BY-NC license.

<http://creativecommons.org/licenses/by-nc/4.0/>

1. Introduction

Sub Saharan African countries are plagued with several economic challenges among which are maintaining a stable internal and external balances. The internal balance can be aptly captured by the fiscal balance while the external balance can be captured by the trade balance. Over the years, both balances have generally trended in the deficit region in SSA. This suggests the presence of the twin deficit phenomenon in SSA. Going by historical data, both balances (as percentages of GDP) have, on average, been in the negative in SSA as a whole (-2.53 and -7.19 on average respectively). In fact, the correlation coefficient between both

variables is about 13% in SSA using data from 1970-2013.

The simultaneous occurrence of these events (fiscal deficits and trade deficit) has given rise to a controversy on the causal link between the budget deficit and the trade deficit or the “twin deficits” hypothesis that neither theoretical nor empirical analysis had been able to resolve (Nickel and Vansteenkiste, 2008). The controversy has reflected two main opposite views. One is based on the traditional Keynesian view that budget deficit has an important effect on the economy (Salvatore, 2006). The other is based on the Ricardian view that budget deficit has no effect at all on economic variables (Enders and Lee 1990).

An understanding of the causal link between fiscal balance

* Corresponding author

E-mail address: imohtranspose@gmail.com (E. U. Imoh), matthew.ogbuagu@gmail.com (O. M. Ikechukwu)

and trade balance in SSA is required for proper policy coordination. A fundamental assumption of the theory is that fiscal deficits precedes trade deficit. Therefore, if it is established that there is a relationship between both, the attention of policy makers may be shifted to maintaining a stable fiscal balance as it is the cause of the deficit in the trade balance. In spite of the relevance of understanding the linkage between both deficits in SSA, the available literature is still scarce with studies that focused on SSA as a whole (Ekpenyong and Ogbuagu, 2014). Studies on the relationship between fiscal deficit and trade deficit in SSA have generally been country-specific (e.g. Egwaikhide (1997) and Korsu (2007)).

Hence, the research problem this study seeks to find answers to is the nature of the relationship between fiscal balance and trade balance in SSA. Also, we would be interested in affirming the direction of causality between both balances.

The remainder of this paper is divided into five different

sections. The second section covers the background to the study. Here, the dynamics of fiscal balance and trade balance in each sub region of SSA are discussed. Section 3 and section 4 present a brief review of related literature and methodology of the study respectively. Section 5 discusses the empirical findings of the study. Finally, section 6 provides conclusion and recommendations of the study.

2. Background to the Study

As stated above, the average values of both the fiscal and trade balances have generally been in the negative region and they tend to move in the same direction (as reflected on the correlation coefficient). Behind this general overview are very large sub regional differences. As shown in figures below, only West Africa and Central Africa sub regions posted surpluses in trade balance in the review period.

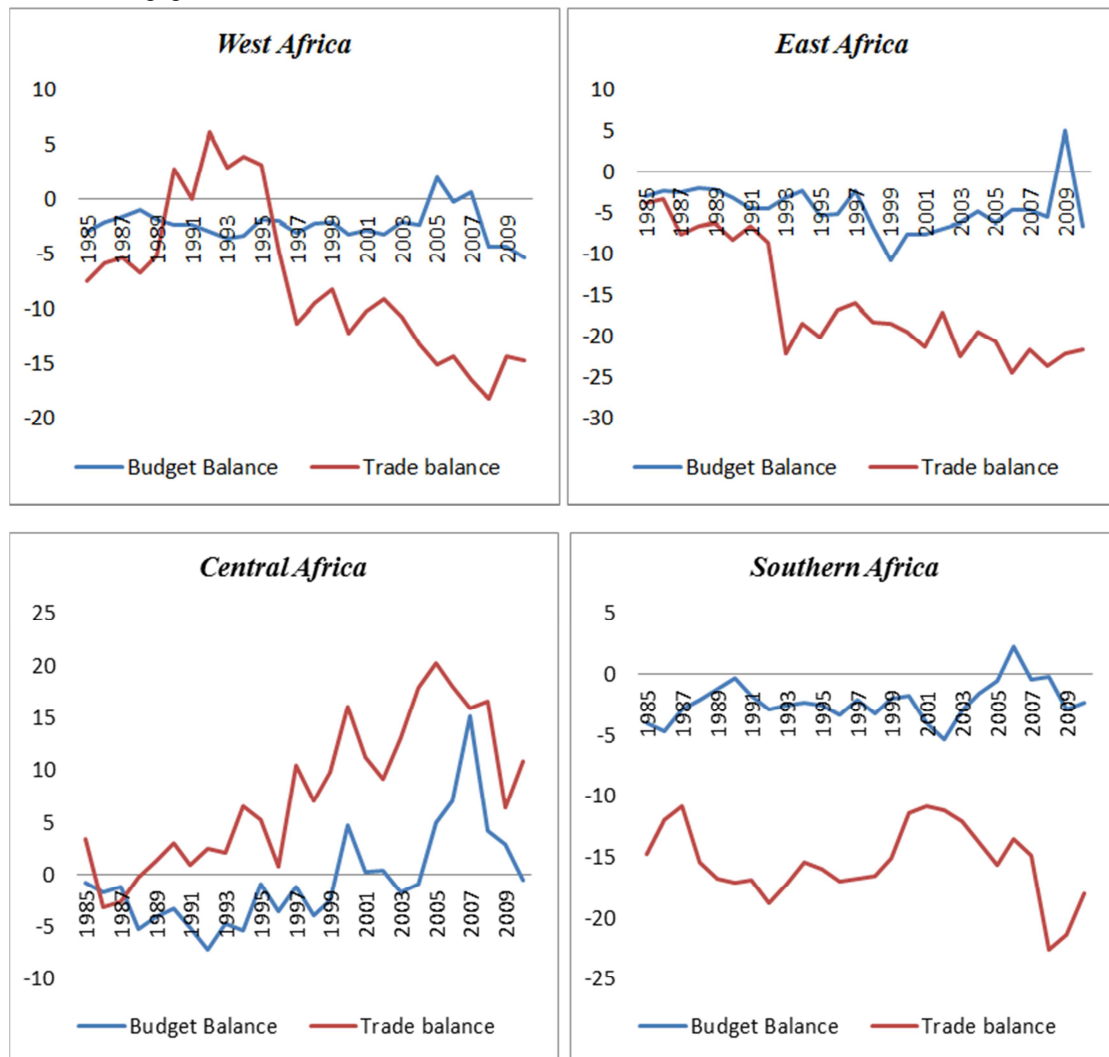


Figure 1. Trend in the Trade Balance and Budget Balance across Region in sub Saharan Africa.

Sources: World Economic Outlook online database and World Development Indicators online database

The trade balance in the Central Africa sub region has largely been in the surplus due to positive contributions of crude oil exports. A large percentage of SSA's crude oil deposits can be found in the sub region (Gabon, Central Africa Republic Cameroon and Angola are among the region's largest oil exporters). For West Africa, the trade balance had largely been determined by Nigeria's crude oil exports and Cote d'Ivoire's export of cotton and cocoa. However, the sub region's poor trade performance had been largely due to negative contributions from Benin, Gambia, Guinea Bissau, Niger, Mali and Senegal; with average trade balances of -14.30, -19.33, -8.18, -6.16, -10.95 and -12.68 respectively.

The Eastern and Southern sub regions posted consistent trade deficits from 1985 to 2010. The poor trade performance of Eastern Africa can be explained by observing that most countries in the sub region are heavy importers of consumer and producer goods. Hence developments in the international community (for instance, a rise in crude oil price) are easily transmitted in the form of deteriorating trade balance in these countries.

One common feature of the diagrams above is that the fiscal balance displays a common pattern in all the sub regions. Each sub region recorded improvements in fiscal balance starting from 2003. This development can be explained if we consider that most countries in the region were heavy beneficiaries of debt relief programs like the Heavily Indebted Poor Countries (HIPC) Initiative and Official Development Assistance (ODAs). In addition, this period witnessed increases in commodity prices, which translated into additional foreign exchange earnings in most countries in the region.

3. Literature Review

A considerable level of understanding on the issues surrounding the relationship between budget deficit and the trade balance requires a review of previous studies that had been undertaking on it. There are generally three macroeconomic theories that have been adopted in deriving the relationship between budget deficit and current account balance. They are: the Keynesian national income identity, the Mundell-Fleming model and variants of the intertemporal model.

Studies that have adopted the Keynesian model started with the basic assumption that the current account balance is the difference between national savings and national investment. This relationship is derived from the basic national income accounting identity:

$$y = c + i + g + nx \quad (1)$$

From the equation above, y represents national or total income of the economy, c is domestic consumption, i is investment, g is government expenditure and nx net export.

From the identity above, it can be shown that

$$nx = (s - i) + (t - g) \quad (2)$$

Equation (2) reveals an important identity in open-economy macroeconomics; that is the trade balance is the sum of net private savings and net public savings. It also shows that any reduction in net public savings (budget deficit) holding net private savings constant will reduce the current account balance (current account deficit).

From equation two, the implication of the Ricardian theorem can be seen. If private savings (S) increase to offset the decline in net public savings, the trade balance might not be affected. One key feature of the equivalence theorem is that economic agents behave rationally; that is they are able to anticipate future increase in tax obligation perfectly well. Some studies that have adopted this framework include: Holmes (2011), Palhavani and Saleh (2009), Nickel and Vansteenkiste (2008), Marinheiro (2007), Zakaria and Ahmed (2007), Bartolini and Lahiri (2006), Corseti and Muller (2006), Hashemzadeh and Wilson (2006), Onofowora and Owoye (2006), Papadogonas and Stournaras (2006), Salvatore (2006), Alkswani (2001), Egwaikhide (1997) and Bernheim (1987).

The Mundell and Fleming model captures the effects of interest rates and exchange rate. Under a flexible exchange rate regime, a fiscal expansion will lead to a rise in both domestic interest rate and domestic output. Depending on the sensitivity of domestic investment to interest rates, domestic investment may actually fall. Portfolio investors will find increase in interest rate as an incentive to invest in domestic assets; resulting in an increase in demand for domestic currency which eventually results in exchange rate appreciation. The appreciation of the domestic currency, coupled with the increase in income, will tend to increase demand for import and reduce export. The overall effect is a deterioration of the trade balance. Studies that have adopted this framework include: Kalou and Paleologou (2012), Endegenew (2012), Kim and Roubini (2007), Chen (2006), Baharumshah et al (2006), Salvatore (2006), Basu and Datta (2005), Anoruo and Ramchander (1998) and Vinals (1986)

Empirical results on the twin deficits had shown mixed results. These results can be divided into three broad categories: those that confirm the twin deficits hypothesis (e.g. Chihi and Normandin, 2012., Holmes, 2011., Egwaikhide, 1997., etc), those that confirm the Ricardian theorem (e.g., Kim and Roubini, 2008., etc) and those that

established reversed causation between both deficits (e.g. Onafowora and Owoye, 2006., Marinheiro, 2008., etc).

Hence, our model will have the trade balance (*td*) as the dependent variable and the fiscal balance (*bd*) as one of the explanatory variables. In addition, we assume that past values of the fiscal balance have effect on the current value of the trade balance (Salvatore, 2006). Hence, our model will be of the form:

4. Theoretical Framework and Methodology

This paper adopts the Keynesian theory of the twin deficits.

$$td_{it} = \alpha_0 + \alpha_1 bd_{it} + \alpha_2 bd_{it-1} + \alpha_3 bd_{it-2} + \alpha_4 bd_{it-3} + \dots + u_{it} \tag{3}$$

Equation (3) above is an example of an infinite distributed lag model. To aid estimation, we adopt the technique proposed by Koyck (1954). Koyck proposed a geometric distributed lag where each successive coefficients of *bd* decays by $\alpha_1 \lambda^i$. Note that the value of λ lies between 0 and 1. Therefore, we can rewrite our equation as

$$td_{it} = \alpha_0 + \alpha_1 bd_{it} + \alpha_1 \lambda^1 bd_{it-1} + \alpha_1 \lambda^2 bd_{it-2} + \alpha_1 \lambda^3 bd_{it-3} + \dots + u_{it} \tag{4}$$

Where u_{it} is assumed to be well-behaved. That is, it follows the normality assumption of $u_{it} \sim (0, \sigma^2)$

Multiplying each term in (4) by λ and lag it by one period

$$\lambda td_{it-1} = \lambda \alpha_0 + \alpha_1 \lambda bd_{it-1} + \alpha_1 \lambda^2 bd_{it-2} + \alpha_1 \lambda^3 bd_{it-3} + \alpha_1 \lambda^4 bd_{it-4} + \dots + \lambda u_{it-1} \tag{5}$$

Subtract (5) from (4) result in

$$td_{it} = \alpha_0 - \lambda \alpha_0 + \lambda td_{it-1} + \alpha_1 bd_{it} + u_{it} - \lambda u_{it-1}$$

The above equation can simply be rewritten as:

$$td_{it} = \beta_0 + \lambda td_{it-1} + \alpha_1 bd_{it} + v_{it}$$

Introducing other variables into the model results in

$$td_{it} = \delta_0 + \lambda td_{it-1} + \alpha_1 bd_{it} + \beta_1 tod_{it} + \beta_2 dop_{it} + \beta_3 fg_{it} + \beta_4 gr_{it} + c_i + v_{it} \tag{6}$$

td and *bd* are as previously defined. *tod*, *dop*, *fg*, and *gr* stand for term of trade, degree of openness, OECD countries growth rate and growth rate of SSA countries. c_i captures individual fixed heterogeneity.

The task at hand will be to estimate the dynamic panel model specified above. The model will be estimated using the Generalised Method of Moment (GMM) technique of estimating dynamic panel models developed by Arellano and Bond (1991). This approach is suitable because it takes care of the serial correlation problem that may arise as a result of the correlation between td_{it-1} and v_{it} . To resolve this correlation problem, we select two instruments that are highly correlated with td_{it-1} , but not correlated with the error term v_{it} . The choice instruments in this case are td_{it-2} and bd_{it-1} .

Data for this study will be sourced from the World Bank Development Indicator (WDI) database and the International Financial Statistics (IFS) CD-ROM. Where applicable, data will also be sourced from individual countries statistical bulletins.

5. Data Analysis and Discussions

This section presents the result of the estimated model specified above and discusses same.

Table 1. Generalised Method of Moments Estimation Result.

Variables	Coefficients	t-Values	p- Values
Trade Balance(-1)	0.551*	23.42	0.000
Budget Balance	0.269*	3.40	0.0007
Foreign Growth	0.424	1.43	0.1508
Degree of Openness	-0.777*	-11.24	0.000
GDP Growth Rate	-0.518*	-5.14	0.000
Terms of Trade	0.072*	3.28	0.0011

* implies significant at 1% level

The table above presents the result of estimated model using Generalised Method of Moments. The coefficient of the lagged value of trade balance is positive and significant. This implies that past values of budget balance have a positive impact on the current value of the trade balance. The coefficient of the trade balance is also positive and significant.

This coefficient is the impact propensity of the budget balance on the trade balance. A 100% increase in the value of the budget balance in the current period will result in a 26.9% increase in the trade balance. The long run impact of the budget balance on trade balance therefore is 0.6 or alternatively, a 100% increase in the value in the current period will have a 60% positive impact on the trade balance in the long run. This result also suggests the presence of the twin deficits in SSA.

The coefficients of growth rates of OECD countries and terms of trade are positive. However, the former is not significant at the standard 10% level. The coefficient of term of trade, on the other hand is significant. This implies that SSA enjoys a favourable terms of trade. An increase in the terms of trade will on the average, increase the trade balances of SSA.

The coefficients of the degree of openness and GDP growth rates are negative and significant. The more open SSA is to international trade, the more its trade balance worsens. This might be due to the way production and exports are structured in most countries in SSA. Most of these countries are engaged in the production and exportation of primary products. It has been shown that countries that still specialize in the production and exportation of primary products do not reap the full benefits associated with international trade. The negative coefficient of the growth rate of GDP suggests that as the economies of SSA countries are expanding, their trade balances deteriorate on average. A 100% increase in growth will lead to a decline in the trade balance by 51.8%. This also suggests the presence of the Absorption theory in SSA.

6. Conclusion and Recommendations

This study examines the presence of the twin deficits hypothesis in SSA. Data from 1970 to 2013 were used in testing this hypothesis. The Generalised Method of Moments (GMM) estimation technique was used to estimate a dynamic a dynamic panel model with lagged trade balance. The result showed the presence of the twin deficits in SSA. The coefficients of other important macroeconomic variables were also included in the model.

Based on our findings, we recommend that a necessary condition for reversing the downward trend in the trade balance in SSA is a favourable fiscal balance. That is, SSA countries should make effort in reducing their expanding fiscal deficits. This is important because decisions on the fiscal balance today, have significant implication on the trade balance in the future. Also, if SSA countries are to reap positive gains from trade agreements like the European

Partnership Agreement (EPA), they should make efforts to add value to products they send to the international market.

Finally, since an increase in the growth rate of GDP deteriorates the trade balance, policy makers in SSA should try to pursue policies that lay more emphasis on savings over consumption. Alternatively, domestic production of imported goods should be encouraged. Each of these policies or a mixture of both will significantly reduce the over reliance of SSA countries on importation of goods from abroad. This has the effect of increasing the trade balance.

References

- [1] Alkswani, M.A. 2000 "The Twin Deficits Phenomenon in Petroleum Economy: Evidence from Saudi Arabia" *Department of Economics, King Saud University*.
- [2] Anoruo, E. and S. Ramchander. 1998. "Current Accounts and Fiscal Deficits: Evidence of Five Developing Economies in Asia" *Journal of Asian Economics*, Vol. 9, No. 3, 487-501
- [3] Balakrishman, P. 1990. "Budget Deficit and Current Account Balance". *Economic and Political Weekly*, Vol. 25, No 11, pp 522
- [4] Baharumshah, A. Z. et al. 2006. "Testing Twin Deficits Hypothesis using VAR and Variance Decomposition" *Journal of the Asia Pacific Economy*, 11(3), 331-354
- [5] Bartolini, L and A. Lahiri. 2006. "Twin Deficits, Twenty Years Later" *Federal Reserve Bank of England*, Volume 12, Number 7
- [6] Basu, S. and D. Daffa. 2005 "Does Fiscal Deficit Influence Trade Deficit? An Econometric Enquiry" *Economic and Political Weekly*, Vol. 40, No. 30, pp. 3311-3318
- [7] Beng, G.W. and S.L. Ying. 2003. "Current Account Reversal During a Currency Crises: the Malaysian Experience" *ASEAN Economic Bulletin*, Vol. 20, No. 2, pp. 128-143
- [8] Bernheim, B.D. 1988. "Budget Deficits and Balance of Trade" *National Bureau of Economic Research*, vol. 2, pp. 1-32
- [9] Bussiere, M. et al. 2010. "Productivity Shocks, Budget Deficits and the Current Account" *Journal Homepage: www.elsevier.com/locate/jimf*
- [10] Carsetti and Miller. 2006. "Budget Deficits and Current Accounts" *Economic Policy*, pp.597-638, Printed in Great Britain
- [11] Chang, J. and Z. Hsu. 2009. "Causality relationships Between Twin Deficits in the Regional Economy". *Department of Economics, National Chi Nan University*
- [12] Chen, D.Y. 2006 "Effect of Monetary Policy on the Twin Deficits" *The Quarterly Review of Economics and Finance*, Vol. 47, pp. 279-292

- [13] Chih, F. and M. Normandin. 2012. "External and Budget Deficits in Some Selected Developing Countries" *Journal of International Money and Finance*, JIMF 1165.
- [14] Cuddington, J.T. and J.M. Vinals. 1986. "Budget Deficits and the Current Account in the Presence of Classical Unemployment". *The Economic Journal*, Vol. 96, No. 381, pp. 101-119
- [15] Egwaikhide, F.O. 1997. "Effects of Budget Deficits on the Current Account Balance in Nigeria: A Simulation Exercise". *African Economic Research Consortium*, Paper 70
- [16] Eisner, R. 1987. "The Federal Deficit: How does it Matter?" *Science, New Series*, Vol. 237, No. 4822, pp. 1577-1582
- [17] Ekpenyong, U.I. and M.I. Ogbuagu (2014). "The Impact of Budget Deficits on the Trade Balance in Sub Saharan African Countries" *National Institute of Policy and Strategic Studies, Jos*
- [18] Endegnanew. *Et al.* 2012. "Fiscal Policy and the Current Account: Are Microstates Different?" International Monetary Fund Working Paper 12/51
- [19] Enders, W. and B. Lee. 1990. "Current Account Budget Deficits: Twins or Distant Cousins?" *The Review of Economics and Statistics*, Vol. 72, No. 3, pp. 373-381
- [20] Giancarlo, C. and G. J. Miller. 2006. "Budget Deficits and Current Account". European University Institute, University of Rome III and CEPR; Goethe University Frankfurt
- [21] Sturm, M. *et al.* 2009. "Fiscal Policy Challenges in Oil Exporting Countries" *European Central Bank*, Occasional Paper Series, Vol. 104
- [22] Hashemzadah, N. and L. Wilson. 2006. "The Dynamics of Current Account and Budget Deficits in Selected Countries in the Middle East and North Africa" *International Research Journal of Finance and Economics*, ISSN 1450-2887, issue 5
- [23] Herwartz, H. and F. Siedenburg. 2007: "Determinants of the Current Account Imbalances in 16 OECD Countries: an Out-of-Sample Perspective" *Review of World Economics*, Vol. 143, pp. 349-374
- [24] Holmes, M. J. 2011. "Threshold Cointegration and Short-run Dynamics of Twin Deficits Behaviour" Journal Homepage: www.elsevier.com/locate/rie
- [25] Kalou, S and S. Paleologou. 2012. "The Twin Deficits Hypothesis: Revisiting an EMU Country." *Journal of Policy Modeling* 34 (2012) 230-241
- [26] Kim, S and N. Roubini. 2008. "Twin Deficits or Twin Divergence? Fiscal Policy, Current Account and Real Exchange Rate in US" *Journal of International Economics* 74(2008) 362-383.
- [27] Korsu, R.D. 2007. "Fiscal Deficit and External Sector Performance of Sierra Leone: A Simulation Approach" *Journal of Economic and Monetary Integration* Vol. 9 No.1:
- [28] Lieberman, M. 1990. "How Budget Deficit Causes Trade Deficits". *The Journal of Economic Education*, Vol. 21, No.4, pp. 388-394
- [29] Gallardo J. L. 2000. "Budget Deficit and Full Employment" *Journal of Post Keynesian Economics*, Vol. 22, pp. 549-563
- [30] Marinheiro, C.F. 2008. "Ricardian Equivalence, Twin Deficits and the Feidstein-Horioka Puzzle in Egypt" *Journal of Policy Modeling* 20(2008) 1041-1056
- [31] Nikkel, C. and I. Vansteenkiste. 2008. "Fiscal Policies, the Current Account and the Ricardian Equivalence" *European Central Bank*, working Paper Series No. 935
- [32] Normandin, M. 1998. "Budget Deficit Persistence and the Twin Deficits Hypothesis" *Journal of International Economics*, 49 (1999), 171-193
- [33] Onafowora, O.A. and O. Owoye. 2006. "An Empirical Investigation of Budget and Trade Deficits: The Case of Nigeria" *The Journal of Developing Areas*, Vol.39, No. 2, pp. 153-174
- [34] Osakwe, P. and S. Verick. 2009. "Current Account Deficits in sub Saharan Africa: Do They Matter?" United Nations Economic Commission for Africa, /antiopa/Economica/002461G/Conference_2007_anglais/10-part II-3
- [35] Pahlavani, M. and A.S. Saleh. 2009. "Budget Deficits and Current Account Deficits in the Philippines: A Causal Relationship" *American Journal of Applied Sciences* 6(8) 1515-1520
- [36] Papadogonas, T. and Y. Stourmaras. 2006. "Twin Deficits and Financial Integration in EU Member-States" *Journal of Policy Modeling*, 28(2006) 595-602
- [37] Piersanti, G. 2000. "Current Account Dynamics and Expected Future Budget Deficits: Some International Evidence" *Journal of International Money and Finance*, 19 (2000), 255-271
- [38] Salvatore, D. 2006. "Twin Deficits in the G-7 Countries and Global Structural Imbalances" *Journal of Policy Modelling*, pp. 279-292
- [39] Vinal, J. *et al.* 1980 "Fiscal Policy and the Current Account" *Centre for Economic Policies Research*, Vol. 1, pp. 711-744
- [40] Winner, N. J. 1993. "The Relationship of the Current Account Balance and the Budget Balance" *The American Economist*, Vol.37, No. 2, pp 78-84
- [41] Zakaria, M. and M. Ahmed. 2007. "An Emprical Investigation for the Twin Deficits in Pakistan" *Journal of Economic Cooperation* 28, 4(2007), 63-80.