



Twin Deficits : Empirical investigation for Togo

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Abstract

Many are these economic debates about the twin deficits hypothesis which indicate a positive relationship between the current account deficit and the fiscal deficit resulting from changes in tax revenues or government expenditures. Investigations about this hypothesis are rarely carried out in the case of developing countries like Togo. To this end, this paper examines the link between the two (2) deficits in Togo, based on time series from the period 1975-2015. The econometric analysis through the use of an autoregressive vector (VAR) model highlights an unidirectional causality from the fiscal deficit to the external deficit and thus reveals the fact that for Togo, there are twin deficits and therefore a conformity with the Keynesian approach (conventional vision).

Keywords: Twin Deficits; Fiscal Deficit; Current Account Deficit; Granger Causality test in a VAR model.

1. Introduction

Today, opening to foreign trade through international trade and transfers between residents of different countries is already a real fact for any economy in the world. But this does not stop there, since the economic analysis with its sharp elements and decortication of the balance of payments¹ revealed that the various balances in the macroeconomic accounts are all characterized by interrelationships. Thus, no government can afford to believe in a simple, discretionary exercise of its budget without, however, considering the link (the nature of its balance) with the economy as a whole. All accounts are, nevertheless, not in reality in line with theoretical predictions. This is the case of the current account and the fiscal balance which involve to the concept of *twin deficits*². The external deficit characterizes the negative sign of the current account. It indicates that the country is a net borrower. Concerning the fiscal deficit, it illustrates the fact of excess in government expenditures over the government revenues.

Several studies on twin deficits have emerged in the developed countries since the early 1980s, when globalization was truly emerging and expanding in the global economy. But although these studies are numerous in the examination of the links between the two deficits, there is no consensus in reality to resolve any ambiguity about the existence and exact nature of this relationship between the two Aggregates. Results support the Keynesian hypothesis (the classic version) (Salvatore, 2006) and show that the current account balance and the budget are closely linked. From another point of view, Enders & Lee in 1990, Kim in 1995, Kaufmann et al. in 2002 found consistent evidence with the assumption of Ricardian equivalence, ie no systematic relationship between the two deficits. Contrary to this, Kouassi, Mougoue & Kymn in 2004 confirm the hypothesis of targeting the current account by finding a sense of causality from the current account to the fiscal deficit. This plurality and diversity of results accentuate the undisputed interest in seeking out what about any economy.

This interest lies in the fact that it brings new and relevant elements in the redefinition of trade and fiscal policies. Moreover, the determination of any causality between the two deficits puts at the heart of the decision-making, which of the two deficits must be exploited to obtain satisfactory results on the other

¹Tool of the national accounts allowing to have an overview of the relations between an economy and the rest of the world

²The term "twin deficits" 1st used in the 1980s in the U.S. during the Reagan mandate, when both current account and fiscal deficits increased significantly. The deterioration of the external balance was attributed to the emergence of enormous fiscal deficits. This relationship from cause to effect is therefore known as the hypothesis of twin deficits (Salvatore, 2006)

and vice versa. Finally, the interest of investigating in the causality between deficits is the possibility of establishing economic integrated policies, that incorporate simultaneously fiscal and trade policies instead of defining them separately and distinctly

While it is true that studies of twin deficits are becoming more numerous in the economic literature, it is even more true that there is no such research focused on the countries of the West African Economic and Monetary Union (WAEMU), particularly on Togo. The latter thus enjoys the privilege of being treated first in a framework guided by econometric modeling adapted to empirical facts. The main question that arises with regard to the aforementioned elements is whether there is a relationship between the two deficits and if so, can we talk about *twin deficits in Togo*?

This paper, subdivided into three main sections, proposes to answer this question based on a vectorial autoregressive (VAR) approach. The first section reviews the literature on the causality of twin deficits. The second defines and presents the methodology adopted by the study. The last section examines the results obtained and deduces the implications concerning the nature of the links between the two deficits.

2. Litterature review

2.1. Theroetical review

There are four theories concerning a potential link the deficit of current account (ca) and the budget deficit (bd). The first is consistent with standard Keynesian macroeconomic models through the Mundell-Fleming model approach and the Keynesian theory of absorption, and suppose that a high budget deficit leads to an increase of the current account deficit (Salvatore, 2006; Anoruo and Ramchander, 1998). Summers in 1988 postulates that the government can resort to fiscal policy by reducing the budget deficit to reduce current account imbalances - the case of a unidirectional causality from the current account to the budget balance called Current Account Targeting Hypothesis (CATH). The Ricardian Equivalence Hypothesis (REH) indicates the non-existence of interaction between the two deficits. According to the Puzzle of Feldstein & Horioka in 1980 (PFH), if there is high capital mobility, then the two deficits evolve jointly (Xie & Chen, 2014), implying a two-way causality between the two deficits.

2.2. Empirical review

To understand easily the present review, the table 1 summarizes some selected recent papers on the twin deficits.

Table 1: Selected papers for empirical review

authors	contry, years concerned	methodology	results
Kouassi, Mougoue and Kymn (2004)	20 developed & developing countries	Toda-Yamamoto test (1995)	uni/bi-directional causality for some developing (ed) countries
Salvatore (2006)	G7 countries, 1973-2005	linear regression	bd leads to cd with one or more years lag
Bagnai (2006)	22 OECD countries, 1960-2005	cointegration, Gregory and Hansen (1996)	bd is a long run determinant of current account deficit
Kim and Roubini (2008)	USA, 1973-2004	VAR	"twin divergence" i.e. when fiscal accounts worsen, the current account improves and vice versa
Holmes (2011)	USA, 1947-2009	Hansen and Seo (2002)	twin deficit with nonlinear trend
Kalou and Paleologou (2012)	Greece, 1960-2007	VEC	current account targeting hypothesis
Omoniyi, Olasunkanmi and Babatunde (2012)	Nigeria, 1970-2008	causality test	bidirectional causality relationship
atk, Gk and Akseki (2014)	Turkey, 1994-2012	ECM	
		Theshold VAR (TVAR)	twin deficits in upper regime
			twin divergence in lower regime
Khalifa (2015)	Bahrain, 2004-2014	Granger causality test	Ricardian Equivalence Hypothesis

Source : The author's work

3. Methodology and Data

3.1. Theoretical model

The relationship between the current account deficit and the budget deficit can be demonstrated using the identity of the national accounts:

$$y_t + m_t = c_t + i_t + g_t + x_t \quad (1)$$

where y_t is the GDP, c_t is the private consumption, i_t is the investment, g_t is the government expenditure (consumption), x_t is the exports and m_t the imports. The equation 1 can be rewritten in terms of the external sector ($x_t - m_t$) as follows:

$$x_t - m_t = y_t - c_t - i_t - g_t \quad (2)$$

The national saving s_t is equal to $y_t - c_t - g_t$ and consequently equation (2) can be written as follows:

$$x_t - m_t = s_t - i_t \quad (3)$$

National savings can be divided into public savings (s_g) and private savings (s_p). Public saving can be defined as $(t_t - g_t)$, where t_t is the tax and g_t is the public expenditure. When $(t_t - g_t)$ is positive, the government has a budget surplus and when it is negative, there is a budget deficit. The equation (3) can be written as follows:

$$x_t - m_t = s_p + t_t - g_t - i_t \quad (4)$$

$$x_t - m_t = s_p - i_t + sb_t \quad (5)$$

where sb_t is the budget balance. When $(x_t - m_t)$ is negative, it implies a deficit when it is positive, this can induce a surplus. When it is negative, a country can finance the external sector through borrowing abroad. In other terms, the country imports current consumption and exports future consumption. The $s_p - i_t$ is the balance of savings and private investment. If the saving and private investment are about the same or constant, then the external balance and the government equilibrium will evolve in the same direction. If a change in the budget deficit is offset by a change in savings, it is the case of REH, which postulates that the budget and the current account are unrelated (Algieri, 2013). An inter-temporal change between taxes and budget deficits does not matter for the real interest rate, the investment or the current account balance. This means that the fiscal deficits are neutral and the twin deficits occur only in coincidences. Kalou & Paleologou in 2012 mentioned that the factors influencing the current account are factors such as the response of consumption to various shocks to the economy.

3.2. Estimation model

Since private savings and investment depend on the interest rate (ir_t), The exchange rate (tc) and the stock return (sr_t), the equation 5 can be rewritten as follows (Kalou & Paleologou, 2012, p 232.):

$$x_t - m_t = s_p(ir_t, tc_t, sr_t) - i_t(ir_t, tc_t, sr_t) + sb_t \quad (6)$$

Since Togo is part of WAEMU and therefore uses the common currency CFA³ Franc, it can only be integrated as exogenous in the relation 6. Moreover, as regards the interest rate, it is also due to being of discretionary origin on the part of the Central Bank of West African States (CBWAS) and therefore as this rate is the main determinant of the investment, it will be replaced by the rate of investment considered exogenous in the present work. It should be added that according to the literature and considering economic theory, one realizes that the relation that binds the two main balances can be in the two (2), or in the other direction. In this logic, it seems appropriate to specify a VAR model in which the explained vector is composed of the two (2) balances of interest ca and sb .

We have the VAR system in level, following:

$$\begin{cases} ca_t = \sum_{i=1}^p a_{1i} * ca_{t-i} + \sum_{i=1}^p a_{2i} * sb_{t-i} + a_3 * inv_t + a_4 * tc + a_5 * dum + \mu_t \\ sb_t = \sum_{i=1}^p b_{1i} * ca_{t-i} + \sum_{i=1}^p b_{2i} * sb_{t-i} + b_3 * inv_t + b_4 * tc + b_5 * dum + \nu_t \end{cases}$$

However, the variables of interest will be considered in the difference where its are not both stationary. If at least one of the two variables is not stationary, we will have the cointegration test between its either by considering a Johansen approach (if they are both I(1)) or by an approach of Pesaran et al. cointegration (the case of a mix of I(0) and I(1)).

3.3. Data sources, variables presentation-description

The data used in this study are annual and cover the period from 1975 to 2015 and come from the CBWAS database and logically refer only to Togo. There are five study variables defined in the following lines:

ca: is the current account balance divided by the Gross Domestic Product GDP. Its nature (surplus or deficit) expresses the ability of the economy to cover its domestic demand to the point of availing itself from outside.

sb: is the budget balance divided by the GDP. It expresses the importance of the government expenditure in relation to its revenues.

inv: is the investment rate (investment on GDP). It replaces the interest rate in this study.

tc: is the exchange rate and is a determinant of saving and private investment.

dum is the dummy variable that characterizes the devaluation of the CFA Franc in 1994.

³African Financial Community

4. Results

4.1. Stationary tests

The appropriate specification to be adopted in this study depends largely on the nature of the variables used. Indeed, depending on whether the variables are all stationary or one $I(0)$ and the other $I(1)$, or both of them are integrated at order 1, a certain specification is accepted. For this reason, the first step in the present modeling concerns the tests of stationarity of the variables. The table below shows that the variables used are both stationary because the tests of Augmented Dikey Fuller (ADF), Kwiatkowski-Phillips-Schmidt-Shin (KPSS) and Phillips Perron (PP) reveal the absence of unit roots within the series. So there is no cointegration relation to test. The model to be adopted for the rest of the estimation is that of the system mentioned in the methodological section.

Table 2: Summary of stationary tests

<i>Variables</i>	ADF		In level KPSS		PP	
<i>ca</i>	-4,2687 *	(-3, 50)	0.2882 *	(0, 463)	-3,9578 *	(-2, 936)
<i>sb</i>	-4,1298 *	(-3, 50)	0,3855 *	(0, 463)	-3,2577 *	(-2, 936)

* Significant at 5% | () critical value

Source : The author's work

4.2. Optimum number of delays

We have determined the optimal number of delays that it seems to retain in the specification of the VAR. This selection involves through the use of information criteria calculated from the likelihood. We use the Akaike Information Criterion (AIC), Schwartz Criterion (SC), Hannan-Quinn Criterion (HQ), Forecast Prediction Error (FPE). The model, which tends to minimize the majority of the four (4) criteria, is retained, here is lag **2**.

Table 3: Optimal choice

<i>Lags</i>	LogL	LR	df	p	FPE	AIC	HQ	SC
<i>0</i>	-201,959				146,854	10,6646	10,7564	10,9205*
<i>1</i>	-195,525	12,869	4	0,012	129,908	10,5397	10,6928	10,9663
<i>2</i>	-188,804	13,442*	4	0,009	113,557*	10,4002*	10,6145*	10,9974

Source : The author's work

4.3. Model validation

We check if the residues follow a white noise, by testing the nullity of the autocorrelation coefficients intervening in their AutoRegressive (AR) representation - the principle of the Lagrange Multiplier (LM) test⁴. The results of this test, summarized in the table below, indicate that it is accepted at the 5% significance level that the residues follow a white noise and are therefore **not autocorrelated**.

Table 4: Lagrange Multiplier Test

<i>Lags</i>	chi2	df	p-value
<i>1</i>	1,4496	4	0,8355
<i>2</i>	4,1897	4	0,3809

Source : The author's work

We check (**VAR stability**) if all the eigenvalues from the VAR representation are all modules **bellow 1**. This ensures good predictive properties of VAR through his invertibility character. We found that the eigenvalues have modules 0.61, 0.55, 0.55, 0.18.

4.4. VAR model estimation

The table 5 reveals that the VAR model implemented has been well specified and is globally significant. Its explanatory character is high since the R^2 of the two (2) equations are greater than 75%.

Concerning the first equation (explaining the current balance), the current balance delayed by a period is not significant but it is for the delay 2 with a negative sign. This means a certain persistence of the previous balance but sanctioned by the delays in the establishment of the Government Financial Operations Table. However, in order to define new trade policies for the coming year, the latest full information available to the Togolese State is only about the previous year and not the current one, which explains why the deficit of the latter is significant in determining the values of the next fiscal year. The same is true for the determination of the budget balance in the second equation.

⁴null hypothesis "non-autocorrelation of residues"

Table 5: Summary of VAR (2)

	current account balance ca	fiscal balance sb
<i>ca(-1)</i>	-0,0023916 (0, 984)	0,0303733 (0, 800)
<i>ca(-2)</i>	-0,3819815 ** (0, 000)	-0,2000243 * (0, 049)
<i>sb(-1)</i>	0,4747084 * (0, 016)	0,5558141 ** (0, 005)
<i>sb(-2)</i>	0,0561381 (0, 729)	0,1186636 (0, 466)
<i>inv</i>	-0,4125611 ** (0, 000)	-0,1348724 ** (0, 009)
<i>tc</i>	-0,0054621 ** (0, 006)	0,000466 (0, 815)
<i>dum_94</i>	4,352559 (0, 234)	-1,306491 (0, 722)
<i>R²</i>	0,9369	0,7656
<i>chi2</i>	579,4147	127,3736
<i>p-value</i>	0,0000	0,0000

* (resp. **) Significant at 5% (resp. 1%) | () critical value

Source : The author's work

The fiscal deficit positively influences the trade deficit. This shows that **deficits are twin in Togo**. Indeed, on the basis of the coefficients of the budgetary balance, it is deduced that a rise in the budget deficit by one point degrades the external deficit by about half a point. This shows that the Togolese state can reduce the external deficit by trying to reduce the fiscal deficit.

We note that, according to economic theory, the exchange rate has a negative impact on the trade balance. This situation is justified by the fact that an increase in the exchange rate depreciates the currency and inflates the imports relatively to exports. The result is a widening of the external deficit.

4.5. Causality test

In order to consolidate the robustness of the results obtained, the Granger causality test is carried out. The latter allows to test whether the past values of a variable *X* determine the current value of another variable *Y*, and in this case it will be said that "X causes Y".

Table 6: Granger Causality test

Equation	chi2	df	p-value
<i>sb doesn't cause ca</i>	9,7165	2	0,008
<i>all variables don't cause ca</i>	9,7165	2	0,008
<i>ca doesn't cause sb</i>	3,8711	2	0,144
<i>all variables don't cause sb</i>	3,8711	2	0,144

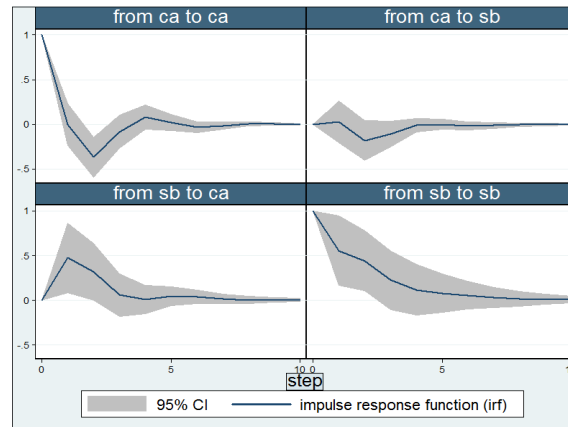
Source : The author's work

Table 6 shows that the causality between the two (2) deficits is unidirectional, from the budget deficit to the external deficit. The budget balance has a strong influence on the nature and volume of the current account balance. This confirms the result found in the preceding point. We are therefore in a situation of the Keynesian hypothesis (conventional point of view).

4.6. Shocks Analysis

Based on the impulse response functions shown in Figure 1, an analysis of reactions can be drawn from the shocks occurring in each of the deficits.

Figure 1: Impulse response



Source : The author's work

External choc Under a shock causing the external balance to fall drastically, this shock widens the deficit in the first two (2) years and is reabsorbed after 4 to 5 years. During the same periods, the downward shock increases the budgetary balance. This confirms the sign obtained for the estimate and suggests an underlying reaction of private investment sufficient to fill the external deficit created and therefore this investment being taxed by the government inflates the latter's coffers.

Budgetary choc This is the case of a negative shock on the budgetary balance, which continues, falling slightly two (2) years later to ease and disappear after six (6) years. In response to this fall, which may be due, for example, to a reduction in the level of taxation, companies will initially be encouraged in production and export, but in a second stage, if the budget deficit persists, government spending can stimulate economic activity to the point where companies are not able to cover domestic demand and this results in an increase in imports which widens the external deficit in the third period.

5. Conclusions

The analysis of the existence of twin deficits in economies is a subject of great interest to many economists and remains among the topical issues little handled in Africa, particularly in Togo. It is for this purpose that this paper proposes to analyze the influence of the budget deficit on the current one and inversely, over the period from 1975 to 2015. Through the tests on the stationarity of the variables we considered a Vectorial AutoRegressive - VAR (2) approach specified in the methodological section. The results obtained permit to highlight the positive influence of the budgetary balance on the current balance relatively more pronounced than the opposite direction. The analysis also reveals that the causality between the two (2) deficits is unidirectional, from budget deficit to external deficit.

The various elements mentioned above are used to determine the nature of the relationship between the two (2) deficits and to conclude that they are the **twin deficits respecting the Keynesian hypothesis**.

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