

The Effect of Budget Deficit on Current Account Deficit in Ethiopia: Investigating the Twin Deficits Hypothesis

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Abstract

This study investigated the relationship between government budget deficit and current account deficit in Ethiopia using annual data spanning the period 1976-2015. The analysis is based on a vector error correction model. The methodology of the study begins with Augmented Dickey-Fuller stationary tests of the data and the Johansen co-integration rank test that revealed current account, budget deficit, real gross domestic product and real effective exchange rate to be co-integrated with two co-integrated relationship and thus share long-run equilibrium relationships. Empirical result from the vector error correction model (VECM) suggests that budget deficit is negatively related with the current account deficit, though statistically insignificant. Despite the VECM result, the outcome of the Granger causality test reveals the existence of bi-directional causality between current account deficit and government budget deficit at 5% level. Consequently, the major policy implication of this study is adoption of sound economic policies which plays a pivotal role at boosting the internal government revenue and the export sector by taking the macroeconomic realities of the country into account.

Keywords: Twin deficit hypothesis; Current account deficit; Budget deficit; Co-Integration; Vector error correction model

Background of the Study

The twin deficit hypothesis suggests that fiscal shocks which cause a deterioration of the government's budget also worsen a country's current account balance. Theoretical work on the relationship between fiscal balance and the current account balance has been based upon two types of models. In the Mundell Flemming model based on the conventional Keynesian "twin deficit hypothesis", budget deficits generate current account deficits. In this twin deficits framework, increases in budget deficits in an open economy tend to increase domestic interest rate, which in turn induce a capital inflow and consequently cause a real exchange rate appreciation. The real appreciation of the domestic currency, in turn, deteriorates the current account balance, and therefore budget deficit causes current account deficit. On the other hand, under the Ricardian Equivalence Hypothesis (REH), there is no relationship between current account deficit and budget deficit [1]. According to this hypothesis, an inter-temporal shift between taxes and budget deficits does not matter for the real interest rate, the quantity of investment or the current account balance. Even though the twin deficits hypothesis arose during the "Reagan fiscal experiment" in the 1980s, when a significant deterioration in the U.S. current account balance go together with a quick rise in the federal budget deficit, in recent times the hypothesis has returned to the forefront of the policy debate [2]. Historically, Ethiopia, one of the less developed countries, has experienced both current account and budget deficits since the 1960s. Since long-term current account and government budget deficits have undesirable effects on a nation's long run development prospects, the rising government budget deficits along with steady current account deficits have to be an essential and urgent issue for policy-makers in the country. The deficits could hold back economic activities and cause a decline in output growth and thereby reducing the well-being of a nation. Furthermore, the relationship between budget and current account deficits has important policy implications for a number of reasons; first, persistent large deficits cause indebtedness by borrowing internally and externally, second, it imposes burden on future generations.

Accordingly, this study aims at exploring the causal relationship

between government budget deficit and current account deficit.

Review of Related Literature

The matter of the twin-deficits hypothesis has been raised for the first time some three decades ago. From the time of 1980's, the budget deficit-current account deficit issue attracted attention of many economists, policy makers and central government officials and becomes one major area of research in the science of economics. Though they end up with diverse results and conclusions, several intellectuals have undertaken various studies on national and regional scale by using different econometric techniques to examine whether government budget deficit results in current account deficit.

Khalid and Guan analyzed the causal relationship between the budget deficit and the current account deficit in five developed countries (USA, UK, France, Canada, Australia) and in five developing countries (India, Indonesia, Pakistan, Egypt, Mexico) in the period 1950-1994 using the co-integration method [3]. The results confirmed the existence of a causal link between the budget deficit and current account deficit in four of the five developing countries.

Olubenga and Oluwole employed co-integration and vector error-correction techniques, Granger-causality tests and, generalized impulse response analysis to test the twin deficits hypothesis in Nigeria [4]. The results revealed that there is evidence of positive relationship between trade and budget deficits in both the short- and long-run. This finding is in line with the Keynesian twin deficits supposition.

Mosayeb and Ali studied the validity of the Keynesian proposition

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and the Ricardian equivalence hypothesis in the case of the Philippines [5]. Accordingly, a bi-directional causality between budget deficits and current account deficits was found.

Idil employed the bounds testing autoregressive distributed lag (ARDL) approach to co-integration, supported the presence of twin deficit phenomenon in Turkey, but the relation is slightly weaker than expected [6]. Conversely, Erdoğan and Yıldırım studied the relationship between budget deficit and current account deficit in Turkey is for 2001 Q2-2012 Q2 period [7]. According to the result obtained, budget deficit has negative and statistically meaningful effect on current account balance both in the short and long runs.

Ebrahim examined the twin deficits hypothesis for Kuwait for the quarterly period (1993:4 - 2010:4) by applying the VAR model [8]. The Granger causality test result showed a uni-direction causality runs from current account to budget balance. The study also found a negative long-run relationship between current account and budget balance.

Misztal analyzed the causal relationship between the budget balance and the current account balance in the Baltic countries (Latvia, Lithuania and Estonia) in the period 1999-2010 by employing the VAR model [8]. The empirical results indicated an inverse relationship between fiscal and current account balances. Further, stronger impact of the current account balance on the government budget balance was found than the other way round.

Asrafuzzaman investigated the causal relationship between budget deficit and trade deficit for the period 1972/73 to 2011/12 [9]. Applying the VAR and Granger Causality, the outcome revealed a bi-directional causality between the budget deficit and trade deficit only in the short run.

Tarawalie studied the short and long run relationships between budget and current account deficits in Sierra Leone within the framework of the bounds test approach [10]. The results revealed that budget deficit has positive impact on current account deficit in the long run and the short run. In addition, the granger causality test testified one-directional causality runs from budget deficit to current account balance.

El-Namrouty and Saidam examined the effects of public budget deficit on current account in the Palestinian Territories [11]. Statistical analysis approach is used to illustrate the impact of public budget deficit on current account. The study findings confirm the positive relationship between public budget deficit and current account.

Banday and Aneja inspected theoretical and empirical analysis of the causal relationship between the budget deficit and the current account deficit in the Indian economy from the period 1990-2013 [12]. The co-integration test suggested that both the variables have a long run association between each other. The Granger causality test clearly found the existence of bidirectional relationship between the twin deficit variables.

Aloryito tested the twin deficits hypothesis for 41 countries of Sub Saharan Africa using data from 2000 to 2012 by employing the Generalized Method of Moments (GMM) estimation technique [13]. The results pointed out that fiscal deficit tend to improve the current account and vice versa, thus rejecting the twin deficits hypothesis.

Theoretical Framework for the Twin Deficits Hypothesis

In clarifying the relationship between the government budget and the current account, the national income identity expressed by the

following formula is used as a starting point.

$$Y = C + I + G + (X - M) \quad (1)$$

Where: Y: The national income (GDP); C: Private consumption; I: Investment expenditures; G: Government expenditure; X: Exports of goods and services; M: Imports of goods and services.

Current account balance can be represented by the following expression if the interest, dividends and the foreign transfers do not consider.

$$CA = (X - M) \quad (2)$$

If a country imports more than exports the current account deficit appears, which is financed by foreign, government and private borrowings. Referring to the equation of national income, national savings in an open economy can be expressed by the following formula:

$$S = Y - C - G + CA \quad (3)$$

Where: S: Savings.

Alternatively, the above equation can be written as:

$$S = I + CA \quad (4)$$

Where: I – investments that can be expressed by the formula:

$$I = Y - C - G \quad (5)$$

Analyzing the national savings, it must be distinguished savings generated by the private sector (S_p) and generated by the public sector (S_g).

$$S = S_p + S_g \quad (6)$$

Private savings are the part of personal disposable income (income after tax), which is not consumed. Therefore, private savings can be written as follows:

$$S_p = Y_d - C = (Y - T) - C \quad (7)$$

Where: Y_d : personal disposable income; T: taxes. In turn, public savings are the difference between the government revenue (taxes) and budget expenditures, which include government purchases (G) and government transfers (R), which can be written according to the formula:

$$S_g = T - (G + R) = T - G - R \quad (8)$$

Thus, referring to the expression (6) domestic savings can be presented in the form of expression:

$$S = S_p + S_g = (Y - T - C) + (T - G - R) = I + CA \quad (9)$$

Thus, finally, current account balance can be presented in the following form:

$$CA = S_p - I - (G + R - T) \quad (10)$$

The above formula shows that, if it is assumed a constant difference between private savings and investments, then the changes in the government budget balance are reflected in the changes in the current account balance, which in turn means the occurrence of twin deficits hypothesis. Therefore, in one hand, there is the Keynesian twin deficits hypothesis which claims, in situation when the economy is in a state of full employment, an increase in budget deficit leads to current account deficit as a result of an increase in aggregate demand for both domestic and imported goods and services. Alternatively, the Ricardian Equivalence Hypothesis (REH) asserts that there is no relationship between budget and current account deficits. The proponents of the

REH explained that if there is no constant relationship between saving and investments, then the change in the fiscal balance is fully offset by changes in the size of savings. This situation results from the fact that the increase in budget deficit leads to an increase in national savings due to the expected increase in taxes in the future (to reduce the public deficit).

Current Account Deficit and Government Budget Deficit in Ethiopian context

Current account deficit

The current account consists of the goods balance, the service balance, net income receipts, and net international transfers. A current account can be positive or negative. A current account can be positive (surplus) if the monetary value of a country's export is greater than its imports and negative (deficit) if the monetary value of its imports greater than its exports. Ethiopia's current account balance has generally been in deficit. This means that Ethiopian imports exceed its exports or unable to cover its import bills. The reasons to such a deficit current account might be the level of development, policies and strategies of the country.

The deficit becomes widened between 2009 and 2015 and basically reflecting a faster growth in imports of goods and services into the country relative to exports. The imports have been largely in machinery and transport equipment, manufactured goods and oil products for industrial purposes. These are essential goods whose demand is not responsive to price changes. Growth in exports has been slow moving with little diversification away from the traditional exports of coffee, tea and horticulture. International trade in services, which form part of the current account balance, has been in a surplus over the years, mainly due to improved earnings in export of transportation services, tourism services, among others. Net current transfers also increased, supported largely by rising emigrant remittances. However, the growth in the services account and net current transfers was not sufficient to offset the deficit in the merchandise or goods account (Figure 1).

Government budget deficit

Like that of the current account, Ethiopia is known for its consistent government budget deficit. The country underwent a deficit in its government budget in the study period. Two main reasons can be identified for the consistent government budget deficit in the

country. The first is related with the huge government expenditure in the country. It's obvious that the issue of satisfying a society is up to the government. More than ever, since the last two decades, the Ethiopian government has exposed to a sky-scraping disbursement on road construction, health and education sectors. The government gives a great deal of attention and allocated an enormous budget to satisfy the continuing infrastructural demand of the nation. The second reason is rather associated with extremely low government revenue from taxes. The government tax collection performance is too low compared to its spending. This is partly due to the so-called tax evasion and lack of awareness among the citizens that income from taxes is finally used up for public development and partly owing to the low level of development of the nation which in turn influences the tax revenue negatively. The long lasting government budget deficit of the country can be illustrated in the following Figure 2.

Methodology of the Study

In this study, annual data for the period 1976-2015 were employed. The data were collected from the National Bank of Ethiopia (NBE). The country underwent both current account and government budget deficits during the study period. After the author have changed the data for current account and budget deficit into positive, current account (CA), budget deficit (BD), real gross domestic product (RGDP) and real effective exchange rate index (REERI) have been transformed into natural logarithms, just for the purpose of removing possible heteroscedasticity and capturing non-linear properties. The vector error correction model estimation technique was employed for this study. The data analysis was undertaken using the STATA 12. Based on theoretical and empirical evidences, there are a number of key variables that have significant effects on current account. This study was estimated the following functional relationship.

$$CA=f(BD, RGDP, REERI) \tag{11}$$

The multiple linear regression equation of the functional form of the model expressed in natural logarithm is of the form.

$$LCA= \beta_0 + \beta_1 LBD + \beta_2 LRGDP + \beta_3 LREERI + u_t \tag{12}$$

Where, L: the natural logarithm; CA: Current Account; BD: Budget Deficit; RGDP: Real Gross Domestic Product; REERI: Real Effective Exchange Rate Index; u_t : Stochastic error term; β_0, \dots, β_3 : Regression coefficients of the parameters.

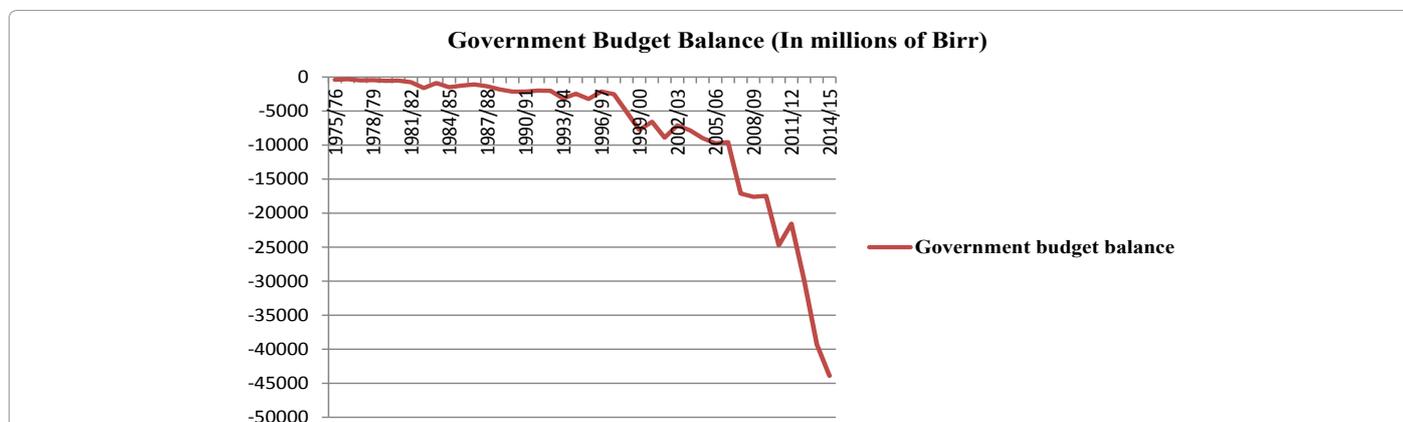


Figure 1: Trend of Current account deficit in Ethiopian (in millions of Birr). Source: Author's computation using the National Bank of Ethiopia data.

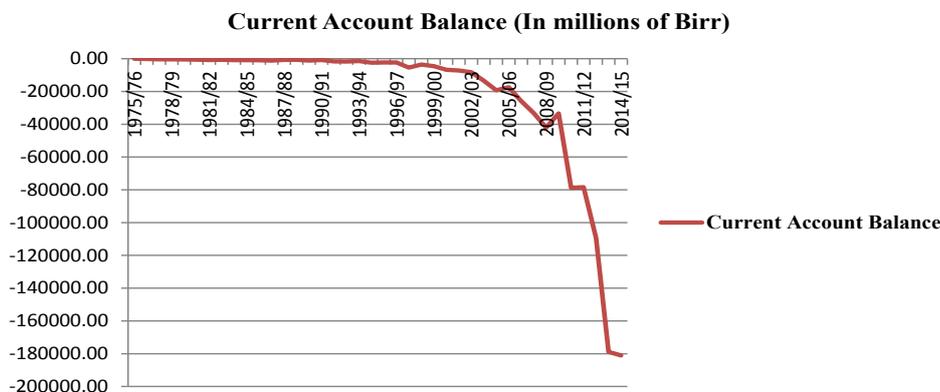


Figure 2: Government budget deficit in Ethiopian (in millions of Birr). Source: Author's computation using the National Bank of Ethiopia data.

Results and Discussions

A unit root stationary test

Since this study employs a time series data, it is mandatory to test stationary of data. A unit root test is conducted employing the standard augmented version of the Dickey Fuller (ADF) test to prove whether the variables in the model are stationary or not. The test statistics values are compared with the critical values at determined level of significance. If the test statistics value is greater than any of the critical values, then we reject the null hypothesis, which actually means the variables are stationary. Otherwise, we do not reject the null hypothesis meaning that there is a unit root implying the variable is non-stationary.

From Table 1, it can be observed that all variables are not stationary at level. However, they all become stationary after differencing once implying that they are integrated of order one I(1).

We will use one lag for this model because the Final Prediction Error [FPE], the Akaike information criterion, the Hannan–Quinn information criterion (HQIC) method and the Schwarz Bayesian information criterion (SBIC) method all suggest an optimal lag of one, all at a 5% level of significance, as indicated by the “*” in Table 2.

The ADF stationary test results can be further strengthened by the Johansen Co-integration test. Thus, the presence and the number of such co-integrating relationships are evaluated with the trace and the maximum eigenvalue. In the output below, we strongly reject the null hypothesis of no co-integration and fail to reject the alternative hypothesis of at most two co-integrating equations. Thus we accept the alternative hypothesis that there is one co-integrating equation in the model. Both the trace and the maximum eigenvalue results reject the null hypothesis of no co-integration at the 0.05 level (Table 3) [14].

The study applied Granger causality test among the variables in order see if one variable is Granger-causal for another, that is, if it contains useful information for predicting the latter set of variables. The outcome of the Granger causality test is shown in Table 4. The result of the test shows that at 5% level, the existence of bi-directional causality between current account deficit and government budget deficit. This result shows that current account deficit can be used to forecast budget deficit and vice-versa. On the other hand, there is one directional relationship. Real GDP and real effective exchange rate Granger causes current account deficit at 1% and 5% levels of significance respectively. Moreover, the strong exogenous (i.e. the overall causality in the system)

Variable	At lag 0	Level of significance	At level	At first difference
LCA	Test critical value	1%	-3.655	-3.662
		5%	-2.961	-2.964
		10%	-2.613	-2.614
	Test statistics		-1.933	-9.629*
LBD	Test critical value	1%	-3.655	-3.662
		5%	-2.961	-2.964
		10%	-2.613	-2.614
	Test statistics		-0.278	-9.471*
LGDP	Test critical value	1%	-3.655	-3.662
		5%	-2.961	-2.964
		10%	-2.613	-2.614
	Test statistics		3.551	-4.448*
LREERI	Test critical value	1%	-3.655	-3.662
		5%	-2.961	-2.964
		10%	-2.613	-2.614
	Test statistics		-1.503	-4.985*

Note: MacKinnon (1996) one-sided critical values for rejection of a unit root are used here
 *shows significance at 1%.
 Source: Author's Computation, 2018.

Table 1: Augmented Dickey-Fuller stationarity test result.

shows that the null hypothesis that all the variables in the system do not Granger cause current account deficit and government budget deficit is rejected at 1% level of significance.

As can be depicted in Table 5, though statistically insignificant, budget deficit is found to be negatively related with the current account deficit. This result is contrary to the theoretical expectations of the Ricardian Equivalence Hypothesis (REH) that says that the budget deficit does not affect current account deficit and the Keynesian Proposition Hypothesis (KPH) that states that these twin deficits (budget and current account) are directly and closely linked and the budget deficit causes the current account deficit. The error correction coefficient shows the speed of adjustment of variables return to equilibrium and it should have a statistically significant coefficient with negative sign. As can be seen in Table 6, the error correction term, which measures the speed of adjustment to restore equilibrium in the dynamic model, appears with negative sign and it is statistically significant at a 1% level, ensuring that the long-run equilibrium can be attained. This guarantees that although the actual current account balance may temporarily deviate from its long-run equilibrium value, it

lag	Log-Likelihood	LR	FPE	AIC	HQIC	SBIC
0	-59.4463		0.000363	3.42953	3.49093	3.60368
1	82.5168	283.93	4.0e-07*	-3.37929*	-3.0723*	-2.50852*
2	97.4078	29.782	4.40E-07	-3.31934	-2.76677	-1.75196
3	114.323	33.831*	4.60E-07	-3.36882	-2.57065	-1.10482

*indicates lag order selected by the criterion.
Source: Author's Computation, 2018.

Table 2: Optimal lag order selection criteria.

Maximum rank	LL	Eigen value	Trace statistic	Critical value 5%
0	42.828445	.	89.1867	47.21
1	71.969954	0.77562	30.9037	29.68
2	81.021681	0.37136	12.80027	15.41
3	87.227476	0.27258	0.3886	3.76
4	87.421798	0.00992		

Maximum rank	LL	Eigen value	Max statistic	Critical value5%
0	42.828445	.	58.283	27.07
1	71.969954	0.77562	18.1035	20.97
2	81.021681	0.37136	12.4116	14.07
3	87.227476	0.27258	0.3886	3.76
4	87.421798	0.00992		

According to Johansen, the ' indicates that this estimator has selected the number of co-integrating equations corresponding to this row of the table.
Source: Author's Computation, 2018.

Table 3: Johansen tests for cointegration.

Equation	LCA	LBD	LRGDP	LREER
Excluded LCA		10.428	1.6064	1.0862
		-0.001	-0.205	-0.297
LBD	3.958		0.01652	0.98094
	-0.047		-0.898	-0.322
LRGDP	43.431	0.91393		4.4888
	0	-0.339		-0.034
LREER	4.3525	0.85043	0.0274	
	-0.037	-0.356	-0.869	
All	82.529	18.911	2.4395	4.5129
	0	0	-0.486	-0.211

NB: The numbers in parenthesis show the P-values for the corresponding Chi-square statistics.
Source: Author's Computation, 2018.

Table 4: Granger causality test.

Variable	Coefficient	Standard error	z- statistic	P> z
CoIntEq1	-0.7083292	0.1525941	-4.64	0
D(LCA(-1))	-0.0969967	0.0959937	-1.01	0.312
D(LBD(-1))	-0.2370896	0.1519223	-1.56	0.119
D(LGD(-1))	-0.1591908	0.7860826	-0.2	0.84
D(LREER(-1))	0.4214752	0.3190231	1.32	0.186
CONS	0.0627595	0.0751088	0.84	0.403

Source: Author's Computation, 2018.

Table 5: The vector error correction model when D(LCA) is a dependent variable.

would gradually converge to its equilibrium. The error correction term of -0.7083292 shows that 70.83% of the deviation of the actual current account balance from its equilibrium value is eliminated every year; hence, full adjustment would require a period of less than two years.

Diagnostic tests of VECM

The adequacy of the model was checked by applying the following tests to the residuals such as the vector residual serial correlation LM test and vector residual normality. The results of these diagnostic tests,

Test	Statistic		Prob.
	Lags	Chi-sq	
Vector Residual Serial Correlation LM Test	1	14.0531	0.59475
	2	22.7951	0.11932
	3	17.7342	0.33969
Vector Residual Normality Test (Jarque-Bera)	Joint	9.934	0.2697

Source: Author's Computation, 2018.

Table 6: Model adequacy test results.

together with the results of the other pre, suggest the validity and robustness of the estimated results.

Concluding Remarks

The central purpose of this study was to investigate the effect of real effective exchange rate on balance of payment in Ethiopia during the period 1976-2015. To determine this long run and short run relationship among the dependent and independent variables the vector error correction model (VECM) was applied. The paper used budget deficit, real GDP and real effective exchange rate as determinant variables.

Before applying the VECM model, all the variables were tested for their time series properties (stationary properties) using the Augmented Dickey Fuller (ADF) tests. As a result, all variables are stationary at first difference or they are integrated of order one. The presence of stable long run equilibrium relationship is further strengthened by the Johansen Co-integration test. Accordingly, both the trace and the maximum Eigen value tests identified two co-integrating relationship between the dependent and independent variables at a 5% level of significance.

Further, the Granger causality test was performed in order to observe if one variable is Granger-causal for another. The outcome of the Granger causality test shows that at 5% level, the existence of bi-directional causality between current account deficit and government budget deficit. This result shows that current account deficit can be

used to forecast budget deficit and vice-versa. On the other hand, there is one directional relationship. Real GDP and real effective exchange rate Granger causes current account deficit at 1% and 5% levels of significance respectively. The overall causality in the system shows that the null hypothesis that all the variables in the system do not Granger cause CA is rejected at 1% level of significance. Moreover, the adequacy of the model was checked by applying the vector residual serial correlation LM test and vector residual normality test. The results of these diagnostic tests, together with the results of the other pre and post estimation tests, suggests the validity and robustness of the estimated results.

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