



The twin deficits hypothesis: Evidence from Ghana

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Abstract

Purpose – This paper investigates the twin deficit hypothesis for Ghana in view of the persistent co-movement between the budget deficit (BD) and current account deficit (CAD) over the past three decades.

Design/methodology/approach – The paper uses annual data for the period 1980-2014 and ascertains whether there is long-run association between the budget and current account deficits using the Johansen Cointegration test. The Error Correction Model is estimated to check stability of the long-run association between the two deficits. A Granger causality test is performed to determine the direction of causality between the two variables.

Findings – The results confirm the existence of long-run equilibrium relationship between the budget and current account balances. The error correction model finds an insignificant effect of the BD on the CAD both in the short and long runs. The ECM result was however significant for both the long run and short run regarding the effect of CAD on BD even as the adjustment parameter suggests that 33 percent of the disequilibrium in budget balance in the previous period is corrected in the current period. Granger causality results find support for the reverse causality argument, thereby rejecting the twin-deficits hypothesis for Ghana.

Research limitations/implications – For lack of consistent data variables such as exchange rate and interest rate were not included in the study.

Originality/value – The findings lend support to the reverse causality argument that says that causality runs from the current account deficit to the budget deficit.

Keywords: Twin deficits hypothesis, budget deficit, current account deficit, Granger causality, Ghana

JEL Classification: F3, F41, H6

1. Introduction

The twin-deficit hypothesis (TDH) postulates that fiscal deficits cause current account deficits. According to the twin-deficits hypothesis, when government increases its fiscal deficits, for instance, by spending in excess of its tax revenue, then the decline in national saving calls for the country to borrow funds from abroad to finance the excess expenditure in order not to crowd out domestic private investment.

While the TDH can be explained by the national income accounts framework showing the link between the current account and the budget balance, the discourse over the relationship between the fiscal and current account balances was ignited by the “Reagan fiscal experiment” during the 1980s when the United States economy faced periods of rising fiscal deficits and strong appreciation of the dollar plus worsening external balance. During the 1980s, the U.S. pursued expansionary fiscal policy mixed with tight monetary policy. The resultant high U.S. interest rates improved returns on dollar-denominated assets leading to dollar appreciation (both in real and nominal terms). The appreciation of the dollar made U.S. exports less competitive with adverse consequences on the current account balance. Similar patterns have been observed in countries such as Germany and Sweden, where rising budget deficits of the early 1990s were accompanied by a

real appreciation of the national currencies and a deterioration of the current account balance (Bagheri et al., 2012).

Sustained fiscal and current account deficits are major policy trepidations in both the developed and developing world. Large fiscal deficits tend to crowd-out private investment, engender increased borrowing, higher interest payments, inflation and ultimately stall economic growth. Large current account deficits give rise to currency crises, transfer of wealth to foreign nationals and depletion of international reserves (IMF, 2015).

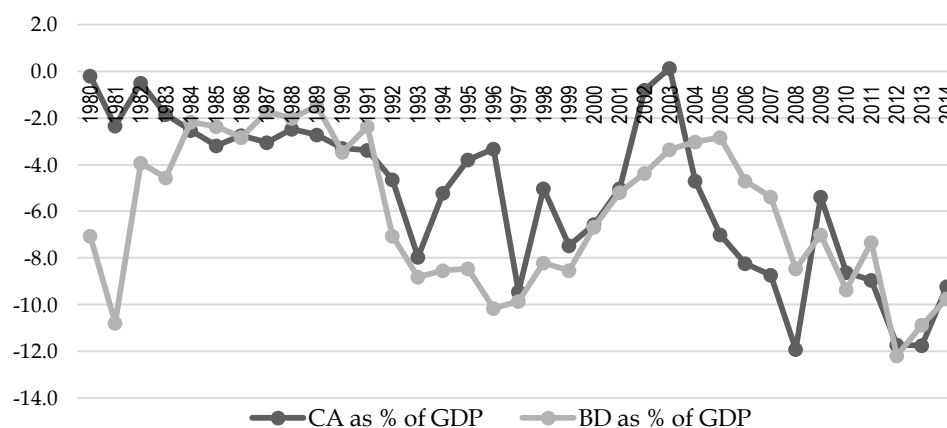
Ghana has experienced strong growth over the past three decades. Starting from a dismal growth rate of 0.5 percent in 1980, growth rates picked up after the country embarked on Economic Recovery and Structural Adjustment Programmes (ERP/SAP) in 1983 and have averaged more than 5 percent per annum over the last three decades. The growth rate peaked at an unprecedented 14.1 percent in 2011 owing largely to the discovery and production of oil in commercial quantities, before decelerating to 4.1 percent in 2014. The country has achieved laudable results in reducing poverty and in improving several social indicators. According to the UNDP (2013), Ghana’s Human Development Index (HDI) rose by 43 percent from 0.391 to 0.558 between 1980 and 2012 equivalent to an annual increase of 0.9 percent. Over the same period, life expectancy at birth, mean years of

schooling and expected years of schooling improved by 11.5 years, 3.4 years and 4.1 years, respectively, while GNI per capita increased by about 71 percent between 1980 and 2012. The country's democratic credentials and a highly rated business climate have collectively aided its graduation to lower-middle income status since 2007. Rapidly rising public debt in the 1990s, however, resulted in considerably higher interest payments and constrained social and development spending. Debt levels rose markedly from 31.97 percent of GDP in 1990 to 123.35 percent of GDP at the end of 2000. Consequently, the country sought debt relief under the Heavily Indebted Poor Countries (HIPC) initiative in 2002 which saw debt levels decline from 82.81 in 2002 to a low of 26.19 percent of GDP in 2006 before rising to 70.15 percent of GDP by end of 2014. Over the past three decades Ghana has experienced large fiscal and external imbalances and monetary financing of the budget which have been associated with high inflation, a decline in external buffers, a significant depreciation of the local currency, and high nominal

interest rates, weighing on growth and real incomes of most households.

Thus Ghana's economy, like most in Sub-Saharan Africa, has been characterized by persistent budget overruns. Between 1980 and 2014, fiscal deficits averaged 6.1 percent of GDP, reaching a peak of 12.2 percent of GDP in 2012 on account of election-year budget slippages and has remained in double digits in the following two years. Concomitantly, Ghana's current account deficit rose from a mean of 3.9 percent of GDP between 1980-2000 to 7.2 percent of GDP between 2001-2014 partly attributable to robust import demand and commodity price shocks. The current account however recorded a surplus of 0.1 percent of GDP in 2003 before deteriorating to -11.9 percent of GDP in 2008. So in the case of Ghana, the budget and current account balances as depicted in Figure 1 tend to exhibit co-movements over the last 35 years. The co-movements between the two variables require further scrutiny to ascertain any causal relationships between the budget and current account in view of the persistence of the two deficits.

Figure 1: Ghana's Budget and Current Account balance (1980-2014)



Source: Authors based on data from the IMF's World Economic Outlook Databases.

While many empirical studies have affirmed the TDH, several others confirm no such relationship. Yet, others have shown bidirectional causality (both balances affect each other) or reverse unidirectional causality (from current account to budget balance). Does the co-movement between the deficits imply the TDH in the case of Ghana? Or is it the current account deficit that is causing the budget deficit? Is there a possible feedback effect? There is a dearth of studies on the twin deficits hypothesis on Ghana. The country so far has featured in a cross-country study by Egwaikhide et al. (2002) for a number of Sub-Saharan African countries using data for the period 1970-1999. Employing ordinary least squares, they found evidence of twin-deficits for Ghana. Not only is new evidence needed for Ghana about the twin deficits given the dated nature of the data used by Egwaikhide et al. (2002) but also as observed by Corsetti and Muller (2006), the TDH holds in open economies. Ghana is relatively more open over the past three decades following the pursuit of more liberalized economic policies under the SAP compared to the 1970s and 1980s. The paper seeks to fill this gap by investigating the twin deficits hypothesis for Ghana, using annual data for the period 1980 - 2014. We test for unit root and

cointegration, perform causality tests and employ the Error Correction Model (ECM). The rest of the paper is organized as follows. The next section presents a review of the literature whilst the data and methodology are described in Section 3. Section 4 presents and discusses the empirical results. Conclusions and policy implications are outlined in Section 5.

2. Literature Review

The much suggested connection between an economy's budget balance and current account balance has ignited extensive debate both in the theoretical and empirical literature for quite some time now, albeit inconclusive (Bartolini and Lahiri, 2006). This review analyzes the propositions by the main schools of thought (Keynesian and Ricardian views) as well as the unidirectional reverse causality from the current account deficit to budget deficit and the bi-directional causality arguments. The traditional argument (referred to as the Keynesian absorption theory) in the main suggests that an increase in the budget deficit represents an increase in domestic absorption or demand for goods and services over and above an increase in output. According to the absorption theory, fiscal

expansion, be it in the form of a tax cut or rise in government expenditure, reduces national savings, raises private disposable income and increases consumption demand for goods and services including imports. Since government often accounts for a greater proportion of domestic demand, this should translate into a deterioration of the current account balance, *ceteris paribus*.

A number of empirical studies support the Keynesian proposition (TDH). For instance, Tang (2013), reports that cointegration tests show U.S. fiscal balance, current account balance, real GDP and interest rates (short- and long-run) are co-moved over the periods 1970Q₂ - 2011Q₄, and provides evidence to validate the twin deficits hypothesis for the U.S. Tarawalie (2014) found evidence in support of the TDH for Sierra Leone, using a multivariate model as opposed to directly between the budget deficit and current account deficit. The Toda Yamamoto Causality test found causal running from the budget deficit to and current account. Similarly, Bagheri et al. (2012) for Iran, Panagiotis et al. (2009) for Greece, and Baharumshah and Lau (2007) for Thailand, all find support for the twin deficit hypothesis.

Nonetheless, opponents of the conventional view on the twin-deficits hypothesis think otherwise and often invoke the Ricardian Equivalence Hypothesis (REH) by Barro (1974) in their defence to suggest no causal relationship between the budget deficit and current account deficit. REH suggests that tax cuts by government would only worsen the fiscal stance which constitutes decline in national savings. But the resultant increase in private disposable income due to the tax cut only leads to increased private savings since households view budget deficits as an 'inevitable deferred taxation'. As such households would expect future tax increases to offset the earlier tax cuts so as to ensure consumption smoothing. Hence aggregate demand for goods and services including imports will not be affected by the expansionary fiscal policy. Therefore, it is only the budget deficit that increases whereas the current account position is unaffected. Enders and Lee (1990), Kaufmann et al. (2002), and Kim and Roubini (2008) are among studies that find support for the Ricardian Equivalence Hypothesis, emphasizing no systematic relationship between budget and current account deficits.

A reverse causality argument also referred to as "current account targeting" (Summers, 1988) argues a unidirectional relationship between the two deficits, with causality running from the current account deficit to the budget deficit. Thus, a deterioration in the current account deficit may lead to slower pace of economic growth and subsequently increase the budget deficit. As observed by Reisen (1998) and Khalid and Teo (1999), reverse causality rather than TDH should be the norm for net debtor developing countries because these countries have limited domestic resources and typically highly depend on foreign capital inflows to finance economic development. Alkswani (2000) also argues that for commodity-based exporting countries, reverse causality must hold as well, because increased export revenues tend to improve fiscal

revenues. Empirically, Saeed and Khan (2012) reports long run relationship between the two deficits for Pakistan with causality running from the current account deficit to the budget deficit for the period 1972 to 2008. Farajova (2011) also found evidence of long run causality running from current account to budget deficit for Azerbaijan. In the same vein, Sobrino (2013), using quarterly data from 1980 to 2012, rejects the twin deficits hypothesis for Peru. His evidence points strongly to reverse causality, that is, the current account causes the fiscal account. Similar results have been found for Kenya by Egwaikhide et al. (2002) in a cross-country study involving selected SSA countries and Lau et al. (2010) for Indonesia and South Korea. Argimon and Roldan (1994), Alkswani (2000) and Magazzino (2012) also found empirical support for the reverse causality proposition.

Some empirical studies, however, show a bi-directional (or two-way) causality between the two deficits, suggesting that fiscal deficits worsen the current account, and *vice versa*. Omoniyi et al. (2012), for instance, investigated the TDH in Nigeria for the period 1970-2008 and show results indicating bi-directional causality between budget deficits and trade deficits. Islam (1998) as well as Kouassi et al. (2004) found evidence of bi-directional causality for Brazil and Thailand, respectively.

3. Methodology and Data

National Income Identities

We provide the link between the budget balance and current account balance using the national income accounts framework. National income, Y , is measured by gross domestic product (GDP) is defined as the sum of private consumption expenditure (C), private investment expenditure (I), government purchases (G), and net exports ($X - M$), i.e. exports minus imports as in equation (1).

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

Alternatively, we can define national income, Y , based on use; either consumed (C), used for private saving (S) or paid in taxes (T).

$$Y = C + S + T \quad (2)$$

Equating (1) and (2), and re-arranging terms gives:

$$X - M = (S - I) + (T - G) \quad (3)$$

From equation (3), ($X - M$) is equivalent to the current account (CA) balance,¹ ($S - I$) is private savings and ($T - G$) represents public savings often called the budget surplus². The sum of private and public savings yields the domestic national savings. The CA balance is thus equal to the surplus of private savings over investment and the gap between government tax revenue and government expenditure on goods and services, that is, the government budget surplus. Equation (3) further suggests that a budget

¹Strictly speaking, $X - M$, is the trade balance. Although, the current account balance is the trade balance plus net income from services and net transfers, these particular sub-accounts usually represent

a small fraction of the total transactions in the current account for many developing countries, including Ghana.

²When G exceeds T then we have a budget deficit (BD).

deficit (BD) may be offset by an increase in private saving or fall in domestic investment (I). The latter adjustment response does not cause the trade balance to fall contrary to the twin-deficits hypothesis. The twin-deficits hypothesis maintains that the external balance is dominated by the government budget balance, and that trade deficits reflect predominantly budget deficits.

However, it must be stressed that while equation (3) shows that the current account balance is associated with the gap between domestic savings and investment, it does not provide a theory of how the current account balance is determined. This condition implies that net exports (X-M) must provide the resources to cover the excess of government spending (G) that is not coming from domestic sources (national savings).

Econometric Strategy and Data

The paper uses annual data for the period 1980-2014, with emphasis on the budget balance (BD) and current account balance (CAD), obtained from the IMF's World Economic Outlook Database and the World Bank's World Development Indicators online. In line with recent literature we employ the Augmented Dickey Fuller (ADF) test to check stationarity of the variables. We proceed to ascertain whether there is long-run association between the budget and current account deficits using the Johansen cointegration test. The Error Correction Model (ECM) is estimated to check stability of the long-run association between the two deficits. Lastly, Granger causality test is performed to determine the direction of causality between the variables.

Unit Root Test

The Augmented Dickey-Fuller (ADF) test is employed to test the stationarity of the variables since many time series data tend to have unit root. The ADF procedure tests the null hypothesis that a series Y_t has unit root or is non-stationary by calculating t-statistics for the coefficient of the lagged dependent variable $\beta=0$ in the following regression equation:

$$Y_t = \alpha + \beta Y_{t-1} + \gamma_t + \sum_{k=2}^n \delta_k Y_{t-k} + \varepsilon_{it} \quad (4)$$

If the value of the ADF test statistic is less than the critical value (conventional 5 percent level of significance) then we accept the null hypothesis and conclude that the series Y_t is non-stationary, and vice versa. If a series is found to have unit root, then the series is differenced d number of times for it to be stationary. Hence if the first difference of the series Y_t becomes stationary, then we conclude that the series Y_t is integrated of order one or $Y_t \sim I(1)$.

Cointegration Test

The literature suggests three widely used procedures to determine the existence of long-run association

(cointegration) or otherwise between stationary time series variables, namely, the Engle-Granger two-step method, the Johansen test, and the Phillips-Ouliaris cointegration test. The paper will adopt the Johansen test as it is more suitable for a two variable model as noted by (Gonzalo, 1994) relative to the others. The Trace test and the Maximum eigenvalue test will be adopted to determine the number of cointegrating vectors. The Trace (λ_{trace}) test examines the null hypothesis that the number of cointegrating vectors equals or is less than (r) and computed as:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^p \ln(1 - \lambda_i)$$

Then again, the Maximum eigenvalue (λ_{max}) test examines the null hypothesis that there is (r) number of cointegrating vectors in contrast to the alternative hypothesis that there are ($r+1$) cointegrating vectors. The λ_{max} test is thus calculated as follows:

$$\lambda_{max}(r, r + 1) = -T \ln(1 - \lambda_i)$$

Error Correction Model (ECM)

We can proceed to run regressions in first difference provided the series of interest are $I(1)$. Although we may well lose the long-run relationship inherent in the data. There is need to use variables in their levels as well in the regressions. The Error Correction Model is designed to fit in variables both in their levels and first differences and thus captures both the short run disequilibrium and long run equilibrium adjustments between variables. Following Mukhtar et al. (2007), the Error Correction Model showing the relationship between the CAD_t and BD_t is specified as follows:

$$CAD_t = \alpha_1 + \alpha_2 BD_t - \rho U_{it-1} + v_{it} \quad (5)$$

$$BD_t = \beta_1 + \beta_2 CAD_t - \rho U_{it-1} + \varepsilon_{it} \quad (6)$$

For instance, in equation (5), the short-run effect or impact multiplier is represented by α_2 and it describes short run impact of a change in BD_t on CAD_t .³ The ρ explains long run gravitation towards the equilibrium relationship between the variables, that is, how much of the disequilibrium in the LHS variable in the previous period is corrected in the current period. The v_{it} and ε_{it} are the serially uncorrelated white-noise error terms. The error correction model thus gives an indication of the speed of adjustment from the short-run equilibrium to the long-run equilibrium state. The higher the co-efficient of the parameter ρ , the greater the speed of adjustment.

Granger Causality Test

³ β_2 in equation (6) on the other hand measures the short run impact of a change in CAD_t on BD_t .

If the current or lagged terms of a series say X_t determines another Y_t then there is granger causal relationship between the variables where Y_t is granger caused by X_t (Granger, 1969). We specify in equations (7) and (8) as:

$$Y_t = \gamma_1 + \sum_{i=1}^n \alpha_i X_{t-i} + \sum_{j=1}^n \beta_j Y_{t-j} + \varepsilon_{1t} \quad (7)$$

$$X_t = \gamma_2 + \sum_{i=1}^n \lambda_i X_{t-i} + \sum_{j=1}^n \delta_j Y_{t-j} + \varepsilon_{2t} \quad (8)$$

The coefficients are; $\alpha_i, \beta_j, \lambda_i, \delta_j$, while γ_1 and γ_2 are the constant terms with ε_{1t} and ε_{2t} as the error terms. We test four hypotheses assuming X_t represents budget deficit (BD) and Y_t denotes current account deficit :1) BD Granger-cause CAD; 2) CAD Granger-cause BD; 3) Causality is bi-directional (runs in both directions); and 4) BD and CAD are independent.

4. Results and Discussion

Unit Root Tests

We use the ADF test to check the stationarity of our variables of interest. Based on the ADF test results presented in Table 1, BD and CAD appear to be non-stationary at levels but stationary at first difference. Hence we conclude that the two variables are integrated of order one i.e. $I(1)$.

Test for Cointegration

We proceed to test for cointegration between the two variables to ascertain whether there is long-run equilibrium relationship between the budget and current account deficits for Ghana. Table 2 reports the results of the trace and maximum eigenvalue tests and suggest rejection of the null hypothesis of no cointegration in favour of the alternative hypothesis (existence of one cointegration equation between the two deficits at 5% level. This implies that the budget and current account deficits are cointegrated and that there is a stationary linear combination between the two variables.

Table 1: Unit Root Test Results

	Level Test statistic	Mackinnon critical values			1st Diff. test statistic	Mackinnon critical values		
		1%	5%	10%		1%	5%	10%
CAD	Intercept	-2.4938	-	-	-	-	-	-
	Intercept & trend	3.9266*	-	-	-	-	-	-
	None	-0.7649	3.6394	2.9511	2.6143	7.6126*	3.6463	2.9540
BD	Intercept	-1.9779	-	-	-	-	-	-
	Intercept & trend	4.9618*	-	-	-	-	-	-
	None	-0.6790	2.6347	1.9510	1.6109	7.4927*	4.2627	3.5530

The superscript * indicates rejection of null hypothesis of unit root at 5% significance level and lag length based on Schwarz Information Criterion.

Table 2: Results of Johansen tests for Cointegration

Unrestricted Cointegration Rank Test (Trace)				
Null	Alternative	Statistic	5% critical value	Prob.
$r = 0^*$		23.3239	15.4947	0.0027
r		2.5109	3.8415	0.1131
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Null	Alternative	Statistic	5% critical value	Prob.
$r = 0^*$		20.8030	14.2646	0.0040
r		2.5109	3.8415	0.1131

Rejection of the null hypothesis of no cointegration equation at 0.05 level of significance is denoted by *.

Error Correction Model

We test the stability of the long-run association between BD and CAD by estimating an error correction model with one cointegrating vector and one lag¹ in both equations. The ECM allows the long-run behaviour of the endogenous variables to converge to their long-run equilibrium relationship while letting a variety of short term dynamics.

Table 3 presents results of the error correction model and reveals that the short-run impact of BD on CAD is insignificant at the 5 percent level. A similar result is achieved with the long-run effect although the coefficient of the error correction term ρ is negative. On the other hand, the ECM results show that the short-run and long-run effects of CAD on BD is significant at the 5 percent level as the adjustment parameter (ρ) is negative indicating that 33 percent of the disequilibrium in the BD is corrected annually. The diagnostic test statistics indicate that there is no evidence of serial correlation in the error terms.

Table 3: Error Correction Model Results

Dependent variable is DCAD		Dependent variable is DBD	
Variables	Coefficient	Variables	Coefficient
Constant	-0.2929 (-.6453)	Constant	-0.1063 (-.3354)
DBD	0.0292 (.1271)	DCAD	-0.3307* (-2.1921)
ECM (ρ)	-0.1803 (-.9545)	ECM (ρ)	-0.3309* (-3.3193)
R ²	0.1257	R ²	0.374
Adj R ²	0.0352	Adj R ²	0.3093
DW	1.9077	DW	1.4179
F-Stat	1.3892	F-Stat	5.7757
Prob (F)	0.2659	Prob (F)	0.0032
No. of obs.	33	No. of obs.	33

*T-statistics are in parenthesis and *denotes the significance of statistics at the 5 percent level.*

Granger Causality Test Results

We ascertain whether either or both variables help determine each other in line with previous studies probing the twin deficits hypothesis. The current account balance is said to be Granger-caused by the budget balance if BD aids the prediction of CAD or better still, if the coefficients of the lagged BD is statistically significant. Granger-causality test results presented in Table 4 indicates a unidirectional positive causal relationship from the current account balance to the budget balance, and not the reverse, thus, rejecting the twin deficits hypothesis for Ghana in favour of the reverse causality argument. This is in contrast to the findings of Egwaikhide et. al. (2002), who found evidence in support of the twin deficits hypothesis for Ghana in a cross-country study setting. Our results, however, corroborate the findings of Saeed and Khan (2012) for Pakistan, Farajova (2011) for Azerbaijan, Sobrino (2013) for Peru, Lau et al. (2010) for Indonesia and South Korea, and Egwaikhide et al. (2002) for Kenya. As noted by Sobrino (2013), the reverse causality outcome is consistent with small open commodity-based economies such as Ghana.

Table 4: Pairwise Granger Causality Test Results

Null hypothesis	F-	P-	Decision
	statisti	valu	
	c	e	
BD does not cause CAD	0.2139	0.808	Cannot be rejected
CAD does not cause BD	5.1829	0.012	Rejected

5. Conclusion

This paper sought to investigate the twin deficit hypothesis for Ghana in view of the persistent co-movement between the budget and current account deficits over the past three decades. Using time series data for 1980-2014, the paper 1) tests the stationarity of the variables, namely, the budget balance and the current account balance; 2) performs the cointegration test (Johansen test); 3) estimates a vector error correction model; and 4) performs causality tests. The results confirm the existence of long-run equilibrium relationship between the budget and current account balances. The error correction model finds an insignificant effect of the BD on the CAD both in

¹ Choice of lag one based on optimal lag selection criteria LR, FPE, AIC HQIC and SBC.

the short and long runs. The ECM result was however significant for both the long run and short run regarding the effect of CAD on BD even as the adjustment parameter suggests that 33 percent of the disequilibrium in BD in the previous period is corrected in the current period. Granger causality results found support for the reverse causality argument with causality running from the current account deficit to the budget deficit.

As observed by Sobrino (2013), the reverse causality outcome is consistent with small open commodity-based economies, which are exposed and sensitive to external price shocks. Thus, for a relatively open economy such as Ghana in which trade plays an important role, increased foreign exchange earnings from trade will not only

improve the current account balance but also have a positive impact on the budget balance position. Policy initiatives aimed at improving the trade balance and export competitiveness should be given serious attention. For instance, improving trade infrastructure as well as maintaining a conducive macroeconomic environment, including a competitive real exchange rate, will support domestic industries to expand output to meet domestic and foreign demand to engender the much needed foreign exchange as a measure to complement efforts to arrest the country's worsening current account and budget positions which have persisted in recent years.

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