

Causality between Trade and Budget Deficits in the Short Run: A Time Series Analysis (1970-2014) In Kenya

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Abstract: Kenya as a country has been recording a growing trade deficit as well as budget deficit which has been a major concern to policy makers. Existing empirical studies used panel and cross-section data to establish the possible relationship between budget deficit and trade deficit. However, this may not have adequately reflected the short-term nature of the relationships. This research study, sought to explore this relationship using annual time series data drawn from Kenya. The study used annual time series data covering the period 1970 to 2014 available in WorldBank world development indicators CD-ROM, 2014. The data was analyzed first by testing for unit root using Phillip- Perron test approach then subjected to autoregressive distributed lag. The overall study reveals the effect of change in a unit of each variable on the other variable. The results show that budget deficit is a key element to be observed as this gives a larger number of unit change as compared to trade deficit. This result confirms the bi directional relationship between the two variables "The twin-deficit hypothesis" in Kenya.

Key words: Budget deficit, Trade-deficit, short-run.

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I. Introduction

Budget deficit refers to the difference between the expenditure of a government and its revenue collections for a given period of time (Feldstein, 1992). If the government expenditures exceed revenue, the government must borrow internally or externally to finance the deficit. On the other hand, when a government's revenues are greater than its expenditure, this implies running on a surplus. Similarly, a trade deficit happens when a country's exports in the form of goods and services are valued less than its imports for a given period of time. Exports and imports are two components of trade. Trading with other countries is primarily needed because some resources are scarce and are sometimes not present in one country. The two deficits are also called "twin deficits" which appears as "Siamese Twins" that could not be separated (Feldstein, 1992). The two variables used in the study are Budget Deficit – consists of government revenue and government expenditure. The negative difference of the two generates the budget deficit and Trade Deficit which is composed of imports and exports. The difference of the two (export-import) will produce the balance of trade. A negative result indicates trade deficit. (Ellorimo & Dr. Tan-Cruz, 2013).

Kenya as a country has been recording a growing trade deficit which has been a major concern and focus of economic development, in 2018 the Kenya's trade deficit amounted to around 11.33 billion U.S. dollars. Similarly, the country faces growing budget deficit forcing the government to turn to debt financing in order to cover the gap and significant measures put in place to bring the deficit down to 5.6% of GDP from 7.7% in 2018/19. As these measures are advanced, it's important for the government to analyze and understand how these two variables interrelate in the Kenyan context to enable the government address the budget deficit from multidirectional perspective. Existing empirical studies use panel and cross-section data to examine the relationship between budget deficit and trade deficit. The findings of these studies may not adequately capture the relationship between the two deficits since these countries have different levels of budget and trade deficits and different levels of economic development. This research study, sought to generate more empirical evidence on the relationship between budget deficit and trade deficit in the Kenyan context by using annual time series data in the short run using co-integration and error correction approaches.

II. Methodology

The study used annual time series data for the period 1970 to 2014 available in WorldBank world development indicators CD-ROM, 2014. The data was analyzed first by testing for unit root using Phillip- Perron (PP) test approach. The variables were found to be integrated and were of the same order, and then test for the existence of co integration vector using the bound test approach to co integration test technique was conducted. For the cointegrated variables, error correction model was estimated using autoregressive distributed lag (ARDL)

technique to address the problem of endogeneity. Five variables were studied Budget deficit (bd), trade deficit (td), gross domestic product growth (gdp), government expenditure growth (gexp) and population growth to give a broader view of the short term causality relationship between trade and budget deficits.

III. Results And Discussion

3.1 Descriptive Analysis

The results presented in table 1 shows the summary statistics of the key variables of interest.

Table 1: Descriptive Statistics

Variable	Obs	Mean	StdDev	Min	Max
<i>bd</i>	33	-3.205627	2.739938	-10.3780	1.35300
<i>td</i>	35	-7.196764	5.020649	-17.47757	4.948779
<i>gdp</i>	35	3.728646	2.338436	-0.799494	8.402277
<i>gexp</i>	33	21.30430	2.141482	18.01700	27.27000
<i>pop</i>	35	3.050052	0.465237	2.580203	3.823203

The summary statistics reveals that trade deficits has high volatility since the standard deviation is large compared to other variables. This may suggest Kenya has been importing more goods than what it exports. The standard deviation for budget is relatively large demonstrating that it is also volatile. This may be explained by high level of government expenditure which has been on the increase particularly the recurrent expenditure. The research findings concur with (Christensen, 2005) who linked high budget deficits with the level and volatility of inflation. Furthermore, a high and sustained budget deficit could lead to adverse effects on the economy especially on private investment.

3.2 Unit Root Test

The data that was used in this study was time series data. Time series data poses several challenges spurious regression result where unrelated series show robust results yet there is no relationship between or among the variables of interest. To address this problem is to ensure that the variables are stationary before regression analysis is conducted. This therefore requires that the data is subjected to unit root test. There are a number of unit root test which includes Dickey Fuller unit root test, Augmented Dickey fuller test and Phillips Perron among many others. In this study Phillips Perron was used to test for non-stationarity of the variable. The result for the unit root showed that all the variables have unit root and when differenced once and subjected for unit root test all were found to be stationary implying that the variables are integrated of order one

Table 2: Unit Root Test Results

Variable	Phillips Perron Test		Statistic	First Difference P-Value	Order of Integration
	Statistic	P-Value			
<i>Bd</i>	-1.998	0.289	-3.285	0.016	I(1)
<i>Td</i>	-0.999	0.754	-5.782	0.000	I(1)
<i>gdp</i>	-1.491	0.128	-3.465	0.000	I(1)
<i>g exp</i>	4.000	0.982	-5.126	0.000	I(1)
<i>pop</i>	-1.938	0.314	0.046	0.046	I(1)

3.3 Regression Analysis

3.3.1 Short-Run Regression Results dependent variable Budget deficits

The short-run results and shows that the estimated coefficients of lagged as well as level variables have the appropriate signs.

Table 3: Short-run Regression Results dependent variable Budget deficits ARDL (1,1,1,1,1) selected based on AIC.

Variable	Coeff.	Std. Err.	t-ratio	P > t
$\Delta bdL1$	0.501**	0.204	2.45	0.024
$\Delta tdL1$	-0.132**	0.060	-2.18	0.042
$\Delta popL1$	-0.759*	0.432	-1.80	0.088
$\Delta g expL1$	-0.606**	0.231	-2.62	0.017
$\Delta gdpL1$	0.043**	0.085	2.14	0.023
<i>ecmL1</i>	-0.830***	0.239	-3.46	0.003
<i>Cons</i>	-2.051***	1.113	-4.15	0.001

$R = F(10,20) = 20.05$ Prob > F = 0.0000 Root MSE = 0.845

NB: *** significant at 1 percent and ** is significant at 5 percent level of significance and *

significant at 10 percent.

The results demonstrate that all the short-run estimated coefficients have the expected sign. Specifically lagged budget deficit has a positive effect which is statistically significant on the current budget deficits. It reveals that a unit increase in the previous budget deficits leads to 0.501 units increase in the current budget deficit other factors being equal. Like the long-run regression results the short-run trade deficits has a negative effect on budget deficit which is statistically significant. A unit increase in the short-run trade deficits leads to 0.132 units increase in budget deficits. Coefficient of population growth in the short-run maintained its negative sign and significant at 10 percent, similar to long-run regression results. This result therefore suggest that if population growth increase by one unit then budget deficits will increase by 0.759 units increase. Thus the short-run and long-run result indicates that population growth has been a constraint to budget deficits.

The estimated short-run coefficient of government expenditure has a negative and statistically significant effect on budget deficit at 5 percent. It shows that a unit increase in government expenditure in the short run lead to 0.606 units increase in budget deficits. The results further reveal that real GDP growth in the short-run has a positive and statistically significant at 5 percent level. Specifically the results indicate that a unit increase in real GDP growth leads to 0.043 units decrease. The error correction term has the appropriate sign negative and statistically significant at 1 percent.

3.3.2 Short-Run Regression Results Dependent variable Trade deficit

This presents short-run regression results on to capture the effects of budget deficits on trade deficits.

Table 4: Short-Run Regression Results Dependent variable Trade deficit

Variable	Coef.	Std. Err.	t	P > t
Δtd	0.234**	0.162	2.36	0.023
Δbd	-0.423*	0.469	-1.91	0.054
Δpop	-0.483**	0.535	-2.60	0.017
$\Delta g \text{ exp}$	0.123**	0.521	2.15	0.044
Δgdp	0.212***	0.173	2.14	0.003
$ecmL1$	-0.883**	0.427	-2.56	0.051
$Cons$	-1.057***	0.294	-3.81	0.004

$$R = F(10,20) = 6.21 \text{ Prob} > F = 0.0003 \text{ ROOT MSE} = 2.051$$

The results above illustrate that all the short-run estimated coefficients have the expected sign. Specifically lagged trade deficit has a positive and statistically significant effect on the current trade deficits. It shows that a unit increase in the previous trade deficits leads to 0.234 units increase in the current trade deficit. Consistent with the long-run regression results the short-run budget deficits has a negative and statistically significant effect on trade deficit. Specifically a unit increase in budget deficit in the short-run leads to 0.423 units increase in trade deficits.

The estimated coefficient of population growth in the short-run maintained its negative sign and significant at 5 percent, like to long-run regression results. This result suggests that if population growth increases by one unit then budget trade deficits will increase by 0.483 units. Therefore the short-run and long-run result indicates that population growth has been a constraint to budget deficits in Kenya. The results further demonstrates that government expenditure has a negative sign and statistically significant on trade deficit at 5 percent level, consistent with long-run regression results. It shows that a unit increase in government expenditure in the short-run leads to 0.123 units increase in trade deficits. The coefficient of real GDP in the short-run is positive and statistically significant at 1 percent. The result shows that a unit increase in real GDP growth in the short-run leads to 0.212 units decrease in trade deficit.

Specifically the results indicate that a unit increase in real GDP growth leads to 0.043 units decrease. This means that emphasis need to be placed on policies that can promote economic growth both in the short-run and long-run since real GDP has significant effect on budget deficits.

The error correction mechanism has the negative sign and is statistically significant at 1 percent. The results indicate that 88.30 percent of the deviation in the long-run is being corrected each year.

The overall regression model shows that it has a good fit as exhibited by the coefficient of determination ($R^2 = 0.6391$) which is relatively high. The results reveal that the explanatory variables explain 63.91 percent of the variation of the dependent variable.

IV. Conclusions

The findings reveal that in the short run, a trade deficit has a negative effect on budget deficits which is statistically significant. A unit increase in trade deficits leads to 0.132 units increase in budget deficits and on

the other hand, budget deficit has a negative effect on trade deficit that is statistically significant. Specifically a unit increase in budget deficit leads to 0.423 units increase in trade deficits. The overall study reveals the effect of change in a unit of each variable on the other variable. The results show that budget deficit is a key element to be observed as this gives a larger number of unit change as compared to trade deficit. This result confirms the bi directional relationship between the two variables "The twin-deficit hypothesis" in Kenya.

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