

## **CURRENT ACCOUNT SUSTAINABILITY IN THE EAC COUNTRIES: AN EMPIRICAL ANALYSIS OF THE RELATIONSHIP BETWEEN EXPORTS AND IMPORTS**

**Moses C. Kiptui**, Kenya School of Monetary Studies, P.O. Box 65041-00618, Ruaraka, Nairobi, Kenya Tel: +254-720393828; 254-20-8646217, Email:

[Kiptuimc@ksms.or.ke](mailto:Kiptuimc@ksms.or.ke) / [moses.kiptui@yahoo.com](mailto:moses.kiptui@yahoo.com)

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### **ABSTRACT**

This study examines cointegration between exports and imports of goods and services in the EAC countries to assess sustainability of current account deficits in the EAC countries. Using the Engle-Granger approach and the Johansen methodology the results confirm cointegration between exports and imports for all EAC countries. It is shown that though exports and imports may drift apart in the short-run, they tend to converge to equilibrium in the long-run suggesting that the macroeconomic policies being pursued in the region have been effective in bringing exports and imports into long-run equilibrium and thus ensuring stability in the current account. The five EAC countries are therefore not in contravention of their international budget constraint. The close relationship between exports and imports is further shown to rely mainly on causality running from exports to imports as expected since imports are known to consist of inputs into the production process. The reverse causality found in the case of Tanzania could mean that import restraint is harmful to exports.

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**KEYWORDS-EXPORTS, IMPORTS, CURRENT ACCOUNT SUSTAINABILITY**

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### **1.0 INTRODUCTION AND OVERVIEW OF LITERATURE**

Recent trends in exchange rates have brought to the fore concerns over the sustainability of the current account deficits. There has been concern that the sharp depreciation of currencies during the global financial crisis and Euro-zone crisis in the East African Community (EAC) could be related to the worsening external balance. An understanding of the current account deficit is becoming a key concern to policy makers as exchange rates continue to show instability.

The current account deficit represents the difference between economic production and expenditure. If domestic expenditure continues to exceed production then current account deficit will worsen. As the deficit exceeds 4% of GDP, its result will be raising indebtedness and consequently high interest rates and volatile exchange rates. Exchange rates will become more subjected to internal and external shocks. Market sentiment will be expected to have major effects on exchange rate. Similarly, external shocks will be expected to have consequences on interest rates and exchange rates.

The sustainability of the current account hinges on what happens to the relationship between exports and imports. If exports and imports are co integrated then long-run sustainability of the current account is assured. However, non-co integration would imply that the current account deficit would exhibit a random walk and hence would be unsustainable in the long-run. Unsustainable current account deficit is a major concern to policy makers as it would have far-reaching consequences on macroeconomic stability. Intervention would be required to ensure that long-run sustainability of the deficit is maintained.

Most studies have applied unit roots and cointegration techniques (Engle-Granger and Johansen cointegration tests) to establish sustainability of current account deficits. Examples

are Rahman (2011) who studies the long-run relationship between exports and imports of two Southeast Asian nations, Indonesia and Malaysia covering data of over 45 years from each country; Choo and Yusop (2004) in the study of the long-run relationship between Malaysian exports and imports; Herzer and Felicitas (2005) in the study of the long-run relationship between Chilean exports and imports during the 1975-2004 period; Upender (2007) in analysis of the relationship between India's exports and imports during the 1949-50 to 2004-05; Uddin (2009) in the study of total exports and total imports of Bangladesh; Baharumshah, Lau and Fountas (2003) in examining the sustainability of the current account imbalance for four ASEAN countries (Indonesia, Malaysia, the Philippines, and Thailand) over the 1961–1999 period; Arize (2001) in the study of the the long-run convergence between imports and exports in 50 countries over the quarterly period 1973:2 to 1998:1; Konya and Singh (2001) in the analysis of the equilibrium relationship between the logarithms of Indian exports and imports between 1949/50 and 2004/2005; Bahmani-Oskooee and Rhee (1997) in the study of the long-run relationship between Korea's imports and her exports; Erbaykal and Karaca (2008) in the analysis of the sustainability of the foreign deficit of Turkey; and Wu and Zhang (1998) in investigation of the behavior of the deficit between U.S. exports to and imports from Japan.

The findings of these studies are varied. Rahman (2011) fails to find cointegration in Indonesia but found it in the Malaysian economy. Choo and Yusop (2004) study on the Malaysian conomy also finds that both exports and imports will converge towards equilibrium in the long run. Herzer and Felicitas (2005) find a long-run equilibrium between exports and imports in Chile, despite the balance-of-payments crisis of 1982-83. Upender (2007) found that exports and imports are co integrated showing existence of long run equilibrium between India's exports and imports .The elasticity of India's exports with respect to imports is slightly more than unity. The study by Uddin (2009) reveals long-run equilibrium relationship between exports and imports. The study unveils bidirectional long term causality and unidirectional short term causality between imports and exports of Bangladesh. Arize (2001) finds evidence in favor of cointegration in 35 of the 50 countries studied. The study finds evidence that in most of the countries where the slope coefficient on the export variable is positive, the cointegrating coefficient is also unity. Bahmani-Oskooee and Rhee (1997) show that Korea's imports and exports do have a tendency to converge to a long-run equilibrium indicating that trade imbalances are indeed sustainable in the long-run.

Konya and Singh (2001) finds no cointegration for Indian exports and imports between 1949/50 and 2004/2005. Empirical results of Baharumshah, Lau and Fountas (2003) indicate that for all countries, except Malaysia, current account deficits were not on the long-run steady state in the pre-crisis (1961–1997) era. The study thus concludes that the current accounts of these countries were unsustainable and did not move towards external-account equilibrium. Moreover, the persistent current account deficits might serve as a leading indicator of financial crises. They find strong comovement between inflows and outflows in Indonesia, the Philippines, and Thailand in the period including the post-crisis years.

This study therefore examines exports and imports of goods and services in the EAC region to test for cointegration and hence establish the presence or otherwise of cointegration and thus find whether current account deficits are sustainable in the region.

The rest of the paper is organized as follows: section 2 presents the methodology and data; section 3 empirical results and section 4 conclusions.

## 2. METHODOLOGY AND DATA

This study adopts the theoretical approach by Husted (1992) by assuming a representative individual who produces and exports a single composite good and has no government. Faced by a given world interest rate, the individual borrows and lends in international markets to maximize lifetime utility subject to a budget constraint. The current period budget constraint is given by:

$$C_0 = Y_0 + B_0 - I_0 - (1 + r_0)B_{-1} \quad (1)$$

Which states that current consumption ( $C_0$ ) is dependent on output ( $Y_0$ ), international borrowing ( $B_0$ ), investment ( $I_0$ ) and the historically given initial debt of the individual,  $(1+r_0)B_{-1}$ .  $r_0$  is the one-period world interest rate. The revenues accruing to the particular individual include output and profits from firms.

Assuming (1) holds over all time period they can be combined to derive the economy's inter-temporal budget constraint. Thus, (1) can be expressed as:

$$B_0 = \sum_{t=1}^{\infty} \lambda_t TB + \lim_{\lambda \rightarrow \infty} \lambda_n B_n \quad (2)$$

Where  $TB = X_t - M_t$  ( $= Y_t - C_t - I_t$ ) represents the trade balance in period  $t$  (i.e income minus absorption),  $X_t$  is exports,  $M_t$  is imports and  $\lambda$  is the discount factor defined as product of first  $t$  values of  $\frac{1}{1+r_0}$ .

The testable model is derived by assuming that the world interest rate is stationary with unconditional mean  $r$  and rewriting (1) as follows:

$$Z_t + (1+r)B_{t-1} = X_t + B_t \quad (3)$$

Where  $Z_t = M_t + (r_t + r)B_{t-1}$ . Equation (3) can be solved forward to obtain:

$$M_t + r_t B_{t-1} = X_t + \sum_{j=0}^{\infty} \lambda^{j-1} [\Delta x_{t+j} - \Delta z_{t+j}] + \lim_{j \rightarrow \infty} \lambda^{t+j} B_{t+j} \quad (4)$$

Where  $\lambda = \frac{1}{1+r}$  and  $\Delta$  is the first-difference operator. The left side of equation (4) represents spending on imports as well as interest payments (receipts) on net foreign debt (assets). Thus, (4) can be re-expressed as:

$$X_t = \alpha + MM_t - \lim_{j \rightarrow \infty} \lambda^{t+j} B_{t+j} + \varepsilon_t$$

Assuming that the last term equals zero, (5) can be re-expressed as:

$$X_t = a + bMM_t + e_t$$

Where  $MM_t = M_t + ir_t B_{t-1}$ . This measures imports of goods and services plus net interest payments plus net unilateral transfers.

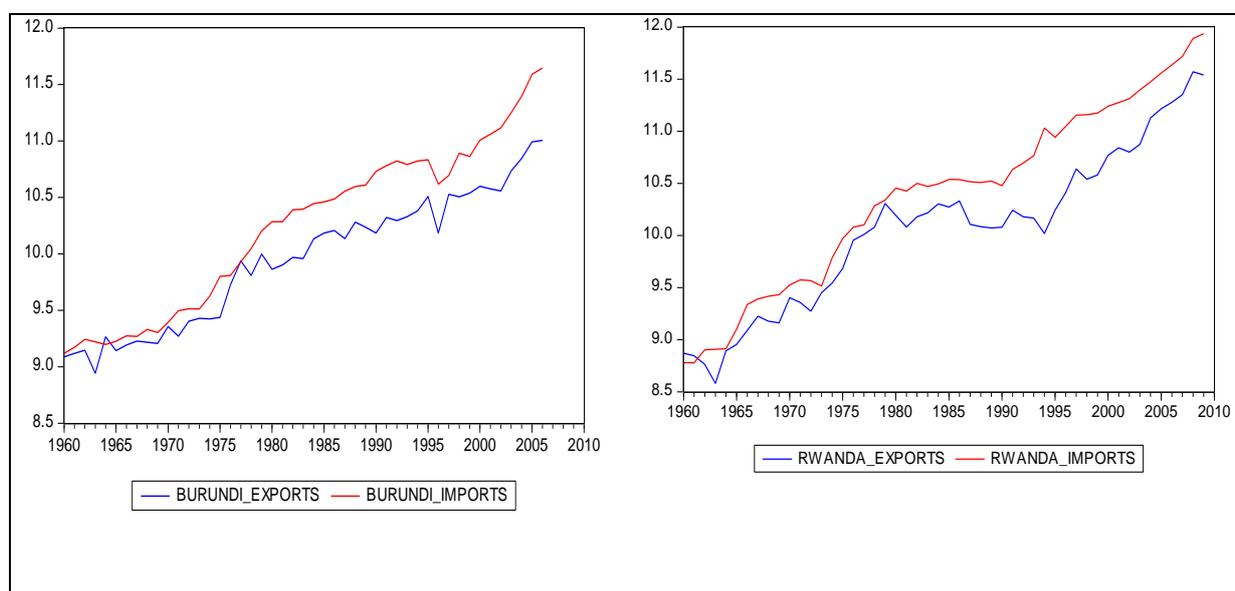
If the economy is satisfying its inter-temporal budget constraint then we expect  $b=1$  and  $e_t$  to be stationary implying that there is co integration. If  $X$  and  $MM$  are non stationary then they are co integrated. When  $b < 1$  there is no co integration and the current account is not sustainable since the economy's imports are growing faster than the economy's exports. In this case the country is more likely to default on its debt.

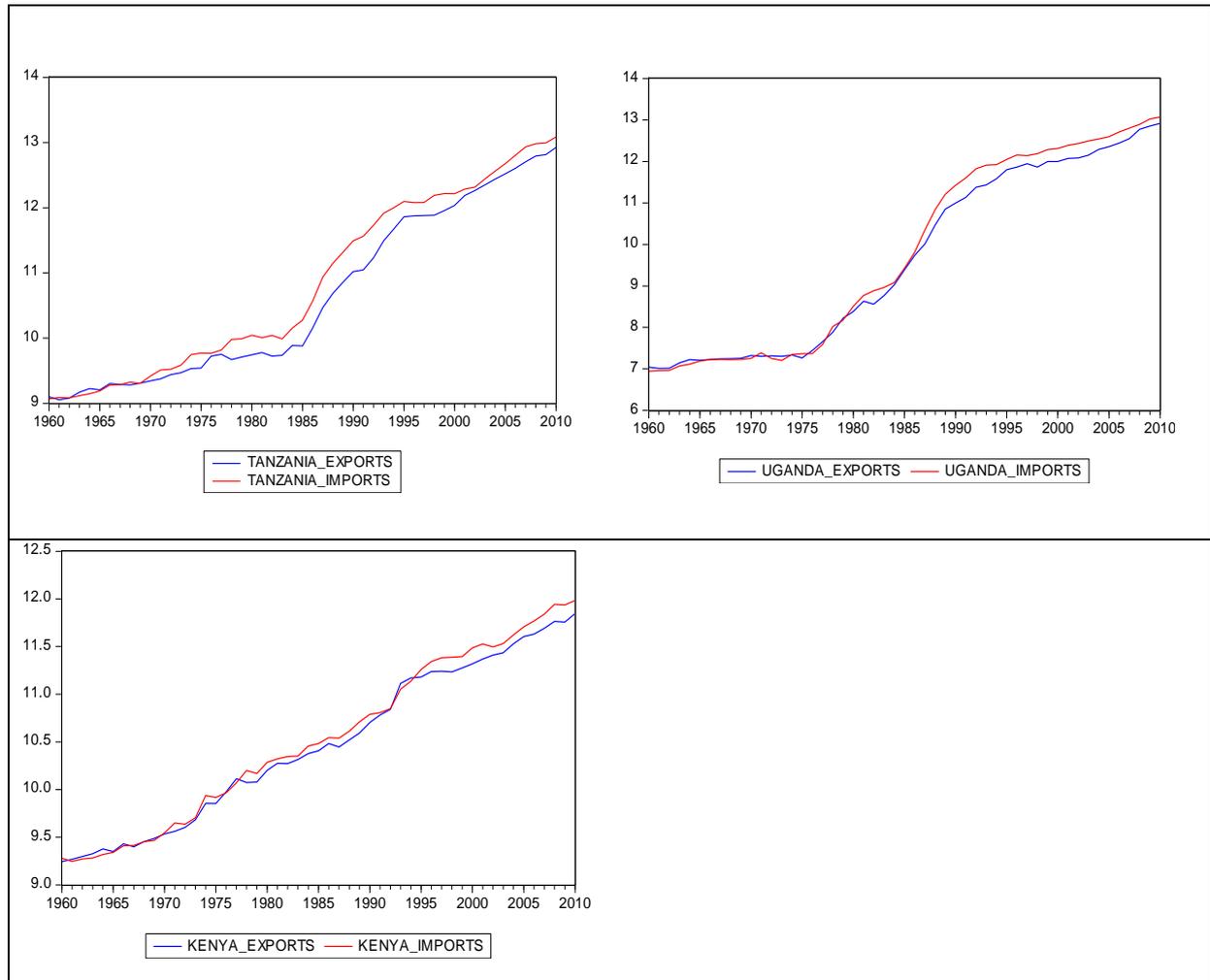
The analysis is based on annual data for the 1960-2010 period using data collected from World Bank databases and the International Financial Statistics by the international monetary Fund (IMF). Exports include exports of goods and services while imports include imports of goods and services. Exports and imports are expressed in nominal domestic currency terms.

### 3. EMPIRICAL RESULTS

Trends in exports and imports of goods and services in the EAC countries is shown in figures 1 and 2 below. The values in local currencies have been converted into logarithmic values and plotted in levels and also in first differences. It is clear that exports and imports have trended more closely in Tanzania, Uganda and Kenya than in Rwanda and Burundi. Similar pattern appears when examining the first differences of exports and imports. The relationship appears stronger in Uganda, Kenya and Tanzania and appears weaker in Rwanda and Burundi. In fact the correlation between changes in exports and imports is 0.75 in Uganda, 0.66 in Tanzania, 0.65 in Kenya compared to 0.18 in Rwanda and 0.28 in Burundi.

Graph 1: Trend in Log of Exports and Log of Imports of EAC Member Countries





Prior to performing tests for cointegration, unit root tests are carried out using Dickey-Fuller and Phillips-Perron tests as well as Granger Causality tests. Two tests for cointegration are applied in analysis, the so-called Johansen cointegration test and the Engle-Granger methodology. In the Johansen test, the trace and maximum eigenvalue tests are used to determine the number of cointegrating vectors. In conformity with the Engle Granger approach, ordinary least squares regressions are estimated, residuals generated and tested for stationarity. The Augmented Dickey Fuller test is applied to test for stationarity but in keeping with finite sample properties of the data, the critical values are obtained by applying Mackinnon (1991) approach of linking critical values to a set of parameters of an equation of the response surfaces.

The outcome of unit root tests using Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests are as reported in table 1 below. The ADF and PP test results are reported together with their corresponding probability significance levels of 5 per cent. Exports and imports of goods and services of all the EAC countries are found to be integrated of order 1. The null hypothesis of a unit root is accepted in ADF and PP tests on variables in level form. Upon differencing, the null hypothesis of a unit root is rejected in all the cases implying that the variables become stationary once differenced. It is therefore in order to proceed to test for cointegration.

**Table 1: Unit root test results of logarithmic values**

Country and series	Test statistics	
	ADF (sig. level)	PP (sig. level)
<b>A: variable at level</b>		
<b>Kenya</b>		
EXP	0.180(0.968)	0.172 (0.968)
IMP	0.257 (0.973)	0.419 (0.982)
<b>Tanzania</b>		
EXP	0.65 (0.99)	1.99 (0.99)
IMP	0.25 (0.97)	0.53 (0.99)
<b>Uganda</b>		
EXP	-0.58 (0.87)	0.17 (0.97)
IMP	-0.57 (0.87)	-0.12 (0.94)
<b>Burundi</b>		
EXP	0.31 (0.98)	0.19 (0.97)
IMP	0.73 (0.99)	0.62 (0.99)
<b>Rwanda</b>		
EXP	0.02 (0.95)	0.09 (0.96)
IMP	-0.49 (0.88)	-0.49 (0.88)
<b>B: First difference of variable</b>		
<b>Kenya</b>		
EXP	-6.724 (0.000)	-6.721 (0.000)
IMP	-7.481 (0.000)	-7.493 (0.000)
<b>Tanzania</b>		
EXP	-4.41 (0.00)	-4.46 (0.00)
IMP	-4.04 (0.00)	-4.00 (0.00)
<b>Uganda</b>		
EXP	-3.79 (0.01)	-3.79 (0.01)
IMP	-2.93 (0.05)	-2.91 (0.05)
<b>Burundi</b>		
EXP	-11.39 (0.00)	-11.68 (0.00)
IMP	-6.07 (0.00)	-6.09 (0.00)
<b>Rwanda</b>		
EXP	-6.97 (0.00)	-6.99 (0.00)
IMP	-6.99 (0.00)	-6.99 (0.00)

Two null hypotheses were examined: the null hypothesis that exports does not Granger Cause

imports and the reverse null hypothesis that imports does not Granger Cause exports. In four out of five cases, the direction of causality is shown to run from exports to imports since the null hypothesis that exports does not Granger Cause imports is rejected. Only in the case of Tanzania is imports shown to cause exports i.e. case in which causality runs from imports to exports. The Granger Causality tests are carried out using four lags for Kenya and two lags for the rest of the EAC countries. The Granger Causality results are shown in Table 2 below. The Granger Causality results have established that the most common direction of causality is from exports to imports for Kenya, Uganda, Burundi and Rwanda implying that export performance is dependent on imported inputs required in production of exports. More exports imply more imports and hence the close relationship. The reverse is true for Tanzania since imports Granger Cause exports implying that more imports would generate larger amounts of exports. Import restraint would therefore curtail exports.

**Table 2: Granger causality results**

		<b>Ho: exports does not Granger Cause imports</b>	<b>Ho: imports does not Granger Cause exports</b>
	lags	F-statistic (significance level)	
Kenya	4	3.29 (0.02)	1.32 (0.28)
Tanzania	2	0.18 (0.84)	6.24 (0.00)
Uganda	2	9.49 (0.00)	2.35 (0.11)
Burundi	2	0.31 (0.73)	0.94 (0.39)
Rwanda	2	3.71 (0.03)	0.84 (0.44)

The test for cointegration between exports and imports started with an estimation in a VAR framework to determine optimal lags by examining the Akaike information criterion (AIC), Schwarz information criterion (SC) and the Hannan-Quinn information criterion (HQ). The results obtained were consistent for the three information criteria. One lag was found optimal for the EAC countries except for Uganda where two lags were found optimal. In estimation of the VAR therefore, one lag was adopted in estimations for Kenya, Burundi and Rwanda. Lag lengths were extended to four for Tanzania and Uganda. The results of the cointegration tests are reported in table 3 below. At the 5% level of significance, the results indicate one cointegrating vector for four countries. In the case of Rwanda, one cointegrating vector is however confirmed by the trace test at 10% level of significance when a trend term is included in the cointegrating vector. When the cointegrating vector is normalized on the import variable so that it is the dependent variable, the coefficient on exports is shown to range from 0.97 to 1.27. The coefficients as reported in table 4 are 1.06, 0.97, 1.05 and 1.27 for Kenya, Tanzania, Uganda and Burundi respectively.

**Table 3: Johansen-Juselius Cointegration test results where r=Number of Cointegrating Vectors**

Null	Alternative	$\lambda_{\max}$		Trace	
		actual	95% C.V.	actual	95% C.V.
A. Kenya (one lag in VAR)					
r=0	r=1	15.35	14.26	15.69	15.49
r≤1	r=2	0.34	3.84	0.35	3.84
B: Tanzania (4 lags in VAR)					
r=0	r=1	16.35	14.26	16.94	15.49
r≤1	r=2	0.59	3.84	0.59	3.84
Uganda (4 lags in VAR)					
r=1	r=1	19.34	15.89	24.14	20.26
r≤1	r=2	4.79	9.16	4.79	9.16
Burundi (One lag in VAR)					
r=1	r=1	16.7	14.2	17.34	15.49

$r \leq 1$	$r=2$	0.59	3.84	0.59	3.84
Rwanda (One lag in VAR)					
$r=1$	$r=1$	7.81	14.26	8.61	15.49
$r \leq 1$	$r=2$	0.80	3.84	0.80	3.84

**Table 4: Estimates of cointegrating vectors (Long-run results: Imports being the dependent variable)**

Country	constant	$\alpha$ -Coefficient on exports	t-statistic
Kenya	-1.32	1.06	85.69
Tanzania	1.32	0.97	35.59
Uganda	-0.89	1.05	124.59
Burundi	-5.66	1.27	35.74
Rwanda	Constant: 9.05 Trend: 0.07	0.56	5.04

The Engel Granger approach was applied in which ordinary least squares regressions were estimated for the five countries while interchanging exports and imports as dependent variables. The residuals are then obtained from each of the equations and tested for stationarity. The test results were compared with critical value of 2.91 calculated using the approach proposed by Mackinnon (1991) for finite samples. The residual based tests confirmed cointegration between exports and imports in four countries: Kenya, Uganda, Burundi and Rwanda. In the case of Tanzania, cointegration is confirmed after introducing a trend term and a dummy variable to proxy for structural break in the data over 1987-1995. The appropriate critical values are provided in Gregory and Hansen (1996). The critical value at 5 percent significance level given the presence of a structural break is -5.19. The results therefore confirm cointegration between exports and imports for Tanzania using the Engle-Granger methodology.

The coefficients generated using the Engle-Granger approach and the Johansen multivariate methodology are comparable and very close in magnitude. When the equations are normalized on imports thus making it the dependent variable, the coefficients on exports are 1.05, 1.06 and 1.25 for Kenya, Uganda and Burundi as derived from the Engle Granger approach compared with 1.06, 1.05 and 1.27 as obtained from the Johansen methodology. The results are presented in tables 5 and 6 below.

**Table 5: Engle-Granger cointegration test summary**

Country/ dependent variable	constant	Coefficient ( $\alpha$ ) on causal variable (t-stat)		Adj.R <sup>2</sup>
		EXP	IMP	
<b>Kenya</b>				
EXP	1.19		0.95	0.99
IMP	-1.18	1.05		0.99
<b>Tanzania</b>				
EXP	Constant: -0.72 Trend: -0.72 Dummy: -5.8		1.29	0.99
IMP	Constant:-5.57 Trend: 0.06 Dummy: 0.57	0.72		0.99
<b>Uganda</b>				
EXP	1.05		0.94	0.99
IMP	-1.07	1.06		0.99
<b>Burundi</b>				
EXP	4.55		0.78	0.98
IMP	-5.16	1.25		0.97
<b>Rwanda</b>				
EXP	2.88		0.84	0.96
IMP	-2.27	1.13		0.96

**Table 6: ADF of residuals**

Country/Dependent variable	ADF	Decision*	Order of integration
<b>Kenya</b>			
EXP	-3.99	Cointegrated	I(0)
IMP	-3.98	Cointegrated	I(0)
<b>Tanzania</b> (With trend and dummy variable)			
EXP	-5.77	Cointegrated	I(0)
IMP	-6.19	Cointegrated	I(0)
<b>Uganda</b>			
EXP	-3.26	Cointegrated	I(0)
IMP	-3.29	Cointegrated	I(0)
<b>Burundi</b>			
EXP	-6.32	Cointegrated	I(0)
IMP	-6.21	Cointegrated	I(0)
<b>Rwanda</b>			
EXP	-3.25	Cointegrated	I(0)
IMP	-3.35	Cointegrated	I(0)

\*Mackinnon (1991) critical values adjusted for small sample size (50 observations) is 2.91.

#### 4. CONCLUSION

This study examined cointegration between exports and imports of goods and services in the EAC countries to assess sustainability of current account deficits in the EAC countries. Using the Engle-Granger approach and the Johansen methodology the results confirm cointegration between exports and imports for all EAC countries. The cointegration tests based on the Engle Granger approach and the Johansen methodology both confirm cointegration between exports and imports for all EAC countries. It is therefore certain that there is comovement between exports and imports in the EAC countries. Though the two variables may drift apart in the short-run, they tend to return to equilibrium and therefore maintain stability in the external account in the long-run.

The finding that exports and imports in the EAC countries converge to equilibrium in the long-run suggests that the macroeconomic policies being pursued in the region have been effective in bringing exports and imports into long-run equilibrium and thus ensuring stability in the current account. The five EAC countries are therefore not in contravention of their international budget constraints. The close relationship between exports and imports is shown to rely mainly on causality running from exports to imports implying that imports consist of inputs into the production process. In the case of Tanzania however this relationship follows from imports being the drivers of exports suggesting that import restraint would harm exports.

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