

Monetary Unification and Trade Outcome: Evidence from East African Community

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Abstract

This paper examines monetary unification and trade outcome in the case of East African Community (EAC) using the Vector AutoRegressive (VAR) and Augmented Gravity Models for the period 1960-2016. We found that all countries in the EAC have challenges meeting the macroeconomic convergence targets, but Burundi is far from achieving most targets anytime soon. After separating various shocks using VAR, the cross-country correlation estimates show asymmetry of supply and monetary shocks despite external and demand shocks dominating; implying that the region is not an Optimum Currency Area. However, the gravity model shows that monetary unification itself will boost intra-EAC trade to around 60% (a factor of 4) from its current 14%. Thus, between 2006 and 2015, total trade with other EAC countries as percentage of total trade in Burundi averaged 22.5%. It was 30.5% in Rwanda and only 6.1%; 8.4% and 17.4% in Tanzania, Kenya and Uganda respectively. The three countries recorded more exports than imports in EAC leading to an overall intra-regional trade surplus balance while Rwanda and Burundi recorded overall intra trade deficit, as they import more from the EAC than they export. As a result, this study reveals that monetary unification may increase trade among member countries in the EAC since the trade creating effects will offset the business cycle shocks.

Keywords: East African community; monetary unification; currency area; shocks; trade.

JEL Classification: C22; C32; F33.

Introduction

Since the signing of the EAC protocol in 2013 aiming at the formation of the East African Monetary Union (EAMU) in 2024, a considerable number of studies assessing the practicability of assuming a single currency in the EAC have emerged. Most of the work reveal that EAC have divergent economic shocks and greater economic losses in event of monetary unification, a pointer that the EAC is not an Optimum Currency Area (OCA) (Adam *et al.*, 2016; Drummond *et al.*, 2015; Bagumhe, 2013; Buigut, 2011; 2006; Rusuhuzwa & Masson, 2012 etc.). While one would expect the EAC partner states as primary agricultural products exporters to exhibit symmetric shocks, only Buigut (2006) and Durewall (2011) suggest that a monetary union within the EAC is feasible since it yields small positive net benefits.

But, most of the conflicting results emanate from small sample sizes and differences in methodologies. For instance Rusuhuzwa & Masson (2012) examined the cyclical behavior of economic aggregates over 1995-2010 in the EAC using Hodrick-Prescott (1997) decomposition to detrend GDP into trend and cyclical components. While the results show high correlation of GDP shocks for EAC except for Burundi and Rwanda, the Blanchard Quah technique shows asymmetric supply shocks which they attributed to differences in production structures among member states. Bayoumi and Ostry (1997) however criticised these methods as not able to distinguish disturbances due to output growth and policy responses thus, not fully capturing the effect of shocks as segment of the time profile of de-trended growth is likely to manifest the policy responses of the authorities. The technique also ignores possibility of similar shock affecting partner states differently, due to disparities in their original starting points and fundamental behavioural conditions such as price or wage stickiness, differences in tax systems, or trade elasticities (Mélitz, 1991; Tobin, 1993).

As a result, Bagumhe (2013) argues that the traditional OCA criteria may not necessary be significant in the EAC, and they form incorrect premises for decisions. This paper has two main objectives. The first is to evaluate the co-movement of shocks in the EAC region. Given the large sample size ranging from 1960-2016, we provide a broader view of symmetry of shocks in the region, unlike other researchers. The second objective is to investigate the impact of monetary unification (assuming it is in existence) on intra-EAC trade. Here, we focus on two key variables; monetary union (given 1 if admitted, and 0 if not admitted); and natural resources as the recent discovery of natural resources in Kenya (Oil), Uganda (Oil) and Tanzania (Natural Gas) might be a potential genesis of uncertain shocks since the region is highly opened to external trade. The consequence of say an export boom in a resource-rich country could impair the union in various ways, through appreciation of the real exchange rate and thereby making another members' export expensive.

Rose (2000), Rose and Wincoop (2001) & Glick and Rose (2002) found that monetary unions strongly stimulate trade. Since rose groundbreaking study in which a common currency union dummy was added to augment the gravity model of bilateral trade, several papers have investigated the effect of monetary unification in various regional economic blocs, but none in the EAC. While much research on EAMU focuses on co-movement of shocks, to the best of our knowledge this is the first study investigating the impact of monetary union on trade in the EAC. We found that although the EAC is highly opened to the world, there are weak and insignificant correlations of supply, demand and monetary shocks between the member countries. However, monetary union with all partner states in the EAC have statistically significant and economic influence on intra-EAC trade, more than any other region. This provides new evidence that EAC should form a monetary union, despite the overwhelming evidence based on the traditional OCA theory that monetary union with all member states is not feasible. The union will itself stimulate economic growth and trade, as postulated by the new OCA theory and this finding is supported by Masson & Pattillo (2005) and Rose (2001) that monetary unions increase trade by a factor of about 3. None the less, the result shows that natural resources exploration will negatively and significant affect the level of intra-regional trade.

The rest of the paper is organised as follows. In the second section, we review the theoretical and empirical literature about monetary union and trade effects. The third section presents the research methodology and data sources. The fourth section discusses the empirical results and the study concludes in the final section.

Optimum Currency Area: Traditional & Endogenous

The workhorse theory of this study is Mundell (1961)'s optimal currency area (OCA) on the viability of monetary unions. To be a suitable candidate for monetary union, early authors distinguish key features that an economy must hold *ex ante*. This view known as the *traditional OCA* emphasises that potential candidates should possess resemblance in economic structure marked by high degree of price and wage flexibility, high labour mobility, and market and goods integration among partner states. Similarly, the potential countries should be highly opened to each other, and fiscally integrated, as well as produced highly diversified products (Mckinnon, 1963; Kenen, 1969; Flemming, 1971). Additional key characteristics include alignment of fiscal and monetary policies and possible motive for political federation (Haberler, 1970; Cohen, 1993).

On the other hand, some writers, known as *endogenous or new OCA* theorists opine that admission into a monetary union could itself metamorphose the economic structures of member states (*i.e., ex post*) (Frankel and Rose, 1998). They believed this could be done through the two channels: increased intra-regional trade and enhanced monetary policy credibility. Endogenous OCA theory posits that by removing the costs of currency conversion, a single currency could stimulate regional trade growth, prevent currencies from devaluing, improve price stability, and accelerate foreign direct and portfolio investment and builds long term economic connections, and possibly promote future political federation (Mongelli, 2002). As a consequence, the monetary union experiences increased output growth and trade through capital and labour productivity improvement (De Grauwe, 2002). Even if the traditional OCA criteria of trade openness, symmetry of shocks, and price/wage flexibility are not fulfilled, the advantages (from credibility imported) of monetary unification with a credible regional central bank and increased intra-regional trade could still be significant. A variate of the new OCA focusing only on effect of monetary union on regional trade has now been developed (see Baldwin and Taglioni, 2004; Baldwin *et al.*, 2005). In this model, a dummy for monetary union is introduced and expected to have a positive and significant coefficient. It has been applied by these authors to the European Monetary Union and due to its generality, the model can also be applied to other forms of monetary agreements. A monetary union normally implies a reduction to zero volatility inducing some impact on top of the effect on trade volumes. This is especially true for EAC partner states since they engage in a great deal of bilateral intra-industry trade.

Consequently, the EAC, like other regional economic communities (RECs) developed convergence criteria as pre-conditions into transiting into the monetary union. The EAC convergence criteria are broadly divided into indicative criteria, aimed at signaling early warnings of economic divergence; and the macroeconomic criteria, meant to reveal the actual compliance level of candidate countries. Table 1 summarises the key convergence criteria set by the EAC Monetary Affairs Committee. This Monetary Affairs Committee comprises of representatives of the six Central Banks in the Community, with key mandate of ensuring monetary policies unification before transition into monetary union.

Table 1. Summarized EAC convergence criteria

No.	Indicative Criteria		Macroeconomic Criteria	
	01.	Core Inflation	≤5%	Headline Inflation
02.	Fiscal Deficit (excluding grants)/GDP	≤6%	Fiscal Deficit (including grants)/GDP	≤3%
03.	Tax/GDP	25%	Public Debt/GDP (present value terms)	≤50%
04.			Reserve cover of Import (in Months)	4.5

Source: MAC (2017).

In addition, Table 2 shows the level of convergence achieved by partner states between 2010 and 2016. The results reveal that apart from Kenya, the 50% ceiling of public debt to GDP was attained by all partner states in the bloc. However, despite EAC states showing relative fiscal discipline, the recent expansion in infrastructural projects across all countries could worsen fiscal stance in the medium term. Due to the growing public debts in recent times, most of the countries face pressures to embark on deficit financing. In terms of budget deficits, including grants, only Rwanda has been able to consistently fulfil the criterion of not exceeding 3 percent of GDP. Additionally, all countries except Uganda and Kenya have not been able to achieve the 6 percent of fiscal deficit, excluding grants indicative criterion. This implies that most states have weak domestic revenue mobilisation mechanisms, resulting in high dependence on volatile foreign aids.

This is most worrisome especially for Burundi, Rwanda and Tanzania as they join the monetary union. However, the risk of debt distress remains low across the EAC, except for Burundi and South Sudan (IMF World Bank Debt Sustainability Analysis, 2017).

Furthermore, the results also indicate that since 2012 all countries except Uganda found it difficult to achieve the convergence criteria of foreign reserves cover of import at 4.5 months. The compliance level has hover around 4.1 months in Kenya and Rwanda; 3.4 months in Burundi; and 3.9 months in Tanzania. The low foreign reserves in the EAC might increase the possibility of financial and economic instability through problems with their balance of payments. Among others, this criterion is meant to ensure that countries adequately absorb shocks such as aid and grants cuts and smoothens consumption and output levels arising thereof. Accordingly, it is crucial to understand the impacts of shocks and exchange rate volatility on inflationary developments in the EAC. Between 2010 and 2016, all countries in the EAC maintained less than double digits inflation rates, often floating around 4.1% in Rwanda to 8.7% in Tanzania. As a result, except for few years, the 8 percent convergence criterion of headline inflation was attained by all countries. More so, the volatility in inflation were more pronounced in Burundi (S.D=4.5), Uganda (S.D=4.3), and Tanzania (S.D=4.1), but the pressure was less in Kenya (S.D=3), and Rwanda (S.D=1.7) as food prices de-escalated, and exchange rates volatility stabilized in the region.

Across the EAC countries, economic growths have been diverse. In terms of real economic growth, it ranges from 7.9 percent on average in Rwanda to 3.1 percent in Burundi. Table 2 however shows that in the recent periods (2012-2016), economic growth in the region has been very low and unstable swinging around 2 percent (Burundi) to 7.2 percent (Rwanda). Even though Kenya had lower growth during the same periods, it experienced less variability than the other four countries. Since 1990, the contribution of the agricultural sector to economic growth has been falling in all EAC partner states, an indication of economic diversification. Although the services sector has taken central position recently, agriculture continues to play crucial role in the livelihoods of many citizens. From 1990/5 to 2012/6, apart from Kenya, where services development remains relatively constant, the sector contributions to GDP increased from 29% to 38% in Burundi; 36% to 48% in Rwanda; 40% to 44% in Tanzania; and 36% to 50% in Uganda. In addition, since 2005 regional trade is dominated by Kenya, Tanzania and Uganda as the huge trade deficits of Rwanda and Burundi continues to deteriorate. But the industrial sector which encourages intra-regional trade is relatively underdeveloped in all countries, making the region highly vulnerable to external disturbances.

Table 2. EAC Macroeconomic convergence criteria

Country	Indicator	2010	2011	2012	2013	2014	2015	2016	Average	SD
Burundi	Headline inflation	6.5	9.6	18.2	7.9	4.4	4.6	5.5	8.1	4.5
	International Reserves (months of imports)	4.1	3.2	3.4	3.4	3.5	4.2	1.9	3.4	0.8
	Fiscal deficit, including grants (in % of GDP)	-3.6	-3.9	-3.7	-1.7	-3.4	-5.3	-6.2	-3.97	1.44
	Gross public debt (% of GDP)	46.9	42.7	41.4	36.1	35.7	46	47.2	42.29	4.86
Tanzania	Headline inflation	7.2	12.7	16	7.9	6.1	5.6	5.2	8.7	4.1
	International Reserves (months of imports)	4.1	3.5	3.6	4	4.3	4	3.7	3.9	0.3
	Fiscal deficit, including grants (in % of GDP)	-4.8	-3.6	-4.1	-3.9	-3	-3.3	-3.8	-3.79	0.58
	Gross public debt (% of GDP)	27.5	28	29.2	31.4	33.2	36.9	39	32.17	4.45
Uganda	Headline inflation	3.7	15	12.7	4.9	3.1	5.4	5.5	7.2	4.3
	International Reserves (months of imports)	3.9	3.7	4.5	4.8	5.1	4.8	4.5	4.5	0.5
	Fiscal deficit, including grants (in % of GDP)	-5.8	-2.6	-3	-3.9	-3.3	-2.7	-3.6	-3.56	1.09
	Gross public debt (% of GDP)	23.6	23.3	24.6	27.4	30.1	33.2	36.9	28.44	5.21
Kenya	Headline inflation	4.3	14	9.4	5.7	6.9	6.6	6.3	7.6	3
	International Reserves (months of imports)	2.9	2.8	3.7	3.9	5.3	5.1	4.8	4.1	1.0
	Fiscal deficit, including grants (in % of GDP)	-4.4	-4.1	-5	-5.7	-7.4	-8.2	-7.3	-6.01	1.62
	Gross public debt (% of GDP)	44.4	43	40.8	42.2	48.6	52.4	54.4	46.54	5.31
Rwanda	Headline inflation	2.3	5.7	6.3	4.2	1.8	2.5	5.7	4.1	1.7
	International Reserves (months of imports)	5.2	6.5	5.6	4.8	3.9	3.5	4	4.8	1.1
	Fiscal deficit, including grants (in % of GDP)	-0.7	-0.9	-2.5	-1.3	-4	-2.8	-2.4	-2.09	1.18
	Gross public debt (% of GDP)	20	19.9	20	26.7	29.1	33.4	37.6	26.67	7.14

Source: MAC (2017).

Empirical Evidence: Traditional and Endogenous

For ease of explanation, the empirical evidence on the EAMU is divided into two broad categories: Traditional and New OCA. The results are densely summarised in Table 3. As shown, almost all the empirical literature on EAMU deal with the traditional OCA criteria and do not provide unambiguous evidence that EAC is a viable OCA, although some results indicate that a small cluster of the traditional EAC members of Kenya, and Uganda and sometimes Tanzania, could establish a monetary union. Rusuhuzwa & Masson (2012) examined the cyclical behavior of economic aggregates over 1995-2010 in the EAC using Hodrick-Prescott (1997) decomposition and Blanchard Quah technique. They found out that business cycles synchronisation is very low in the region, attributed to differences in production structures among member states. Similarly, Adam *et al.* (2016) and Drummond *et al.* (2015) established that the EAC has substantial asymmetry structural differences and found no convergence in their real, fiscal and monetary policies. None the less, Buigut (2006) and Durewall (2011) suggest that a monetary union within the EAC is feasible since it yields small positive net benefits.

On the new OCA, very little empirical work deal with credibility but none (to the author's best knowledge) on the endogeneity of trade within the specific context of EAC countries. Masson & Pettillo (2004) using a Calibrated DMP (2001) model on a subgrouping of only the traditional EAC (Kenya, Uganda & Tanzania) for the period 1995-2000, opined that there are asymmetry of demand and supply shocks but like the defunct EAMU, only Kenya gains in event of monetary unification. On their part, Buigut & Valev (2006) point out that should the Euro provide credibility by serving as an anchored currency for the EAMU like in the CFA franc zones, all members states will gain from the union. But this is very unlikely to happen in the EAC. Among other things, because it will erode the EAC of its political independence as it is currently observed in the CFA franc zones. The rest of the empirical literature are summarised in Table 3.

From the aforementioned, it is apparent that quality empirical literature on the feasibility of EAMU is scarce. This study closes that gap by adding to the scant existing literature on the viability of EAMU from traditional perspective by modelling a four Structural Vector Autoregressive model. In addition, this study provides a novel evidence on the application of the New OCA in the EAC by examining specifically the effect of EAMU and natural resources exploration by some partner states on EAC's regional trade. Rose (2000), Rose and Wincoop (2001) & Glick and Rose (2002) found that monetary unions strongly stimulate trade.

Table 3. Summarised empirical evidence on the potential East African Monetary Union

No	Author(s)	Period	Countries	Methodology	Feasibility	Conclusion
(a) Traditional OCA Studies						
01	Mkenda (2001)	1980-1998	Kenya, Uganda, Tanzania	Generalized Purchasing Power Parity (GPPP) model.	Yes	Real exchange rates between partner states cointegrated.
02	Bangaké (2008)	1990-2003	21 African countries	System of simultaneous equations and GMM.	Yes	Feasible for Tanzania, Kenya, Uganda (structural similarities).
03	Asongu (2013)	1980-2010	EAC	Granger causality	Yes	Coordinated monetary policy
04	Buigut (2011)	1997-2008	EAC	Cointegration technique	No	Only partial convergence.

Table 3 (cont.)

05	Rusuhuzwa & Masson (2012)	1990-2010	EAC	Correlation and cointegration	No	Substantial asymmetric shocks and production structures.
06	Davoodi <i>et al.</i> (2013)	2000-2010	EAC	SVAR	No	Poor transmission of monetary policy
07	Mafusire & Brixiova (2013)	1980-2009	EAC	SVAR	No	No convergence of macroeconomic indicators
08	Lepetit <i>et al.</i> (2014)	2003-2010	EAC	Stylised model of policymakers' decision problem	No	High uncertainty affects monetary and financial stability.
09	Asongu (2014a)	1981-2009	EAC	GMM	No	No convergence of real, monetary and fiscal policy.
10	Asongu (2014b)	1980-2010	EAC	SVAR	No	Poor coordination of monetary policy.
11	Buigut & Valev (2005)	1970-2001	EAC	SVAR	No	Asymmetric demand and supply shocks.
					Yes, with more integration	Similar speed and magnitude in adjustment of shocks.
12	Buigut & Valev (2009)	1990-2004	EAC	Simulation of welfare effects from a monetary union	Yes/No	No, except restraint monetary policy recently
13	Falagiarda (2010)	1990-2006	EAC	Cointegration analysis	Yes/No	Single currency viable but currently doubtful.
14	Kishor & Ssozi (2011)	1970-2007	EAC	Unobserved component /time-varying parameter models	Yes/No	Increased but weak business cycle synchronisation since 2000.
15	Sheik <i>et al.</i> (2011)	1980-2010	EAC	Cross country correlations/ variance analysis.	Yes/No	Asymmetric shocks but Similar business patterns, except for Rwanda.
16	Bagumhe (2013)	2001-2010	EAC	Cointegration analysis	Yes/No	EAMU is not feasible but, Kenya, Uganda and Tanzania are suitable
17	Balparda <i>et al.</i> (2015)	2001-2013	EAC	Fractional Integration and Cointegration analysis	Yes/No	Partial convergence
b) Endogenous OCA (Credibility) Studies						
18	Masson & Pettillo (2004)	1995-2000	Kenya, Uganda & Tanzania	Calibrated DMP (2001) model	Yes/No	Only Kenya gains and asymmetric shocks like old EAC
19	Buigut & Valev (2006)	1990-2003	EAC	Baro-Gordon Calibrated framework	Yes/No	EAMU feasible if Euro provides credibility
20	Drummond <i>et al.</i> (2015)	1990-2013	EAC	Cluster analysis & Blanchard Quah Decomposition	Yes/No	EAC exhibits asymmetric shocks but feasible if Kenya serves as anchor country

Source: Author's compilation (2022).

Methodology

Here, we are interested in two things. The first part is to model symmetry of economic shocks affecting all partner states using the Structural Vector Autoregressive model and in the second part, we model the trade creating effect of monetary union using an augmented gravity model.

According to the traditional OCA literature, for countries to form a Monetary Union, they must possess symmetric shocks, and this is regarded as an important factor necessary for monetary unification. It implies that, if there is symmetry of shocks (high positive correlations) among EAC member states, then EAC is an optimal currency area and EAMU is feasible. To this end, the Structural VAR model based on Bayoumi-Eichengreen (1992)'s AD-AS framework with some modifications to encompass the four key macroeconomic areas was adopted. This four-variable SVAR model examines the shocks according to the OCA predictions. The estimation entails identifying the SVAR using long-run restrictions to extract structural economic shocks across EAC. Following Sheikh & Aslam (2013) and Kandil & Trabelsi (2010), these variables are changes in logs of world real output (y_t^*), domestic real output (y_t), real exchange rate (e_t) and the domestic price level (p_t).

Considering the vectors $\Delta x_t = X_t = (\Delta y_t^*, \Delta y_t, \Delta e_t, \Delta p_t)$ and $\varepsilon_t = (\varepsilon_{st}^*, \varepsilon_{st}, \varepsilon_{dt}, \varepsilon_{mt})$ where Δ is the first-difference operator and $\varepsilon_{st}^*, \varepsilon_{st}, \varepsilon_{dt}, \varepsilon_{mt}$ are external supply shock, domestic supply shock, domestic demand shock and monetary shock, respectively. The structural model can be written as follows:

$$\Delta x_t = X_t = A_0 \varepsilon_t + A_1 \varepsilon_{t-1} + A_2 \varepsilon_{t-2} + \dots = A(L) \varepsilon_t \quad (1)$$

$$\text{Where } A(L) = \begin{pmatrix} A_{11}(L) & A_{12}(L) & A_{13}(L) & A_{14}(L) \\ A_{21}(L) & A_{22}(L) & A_{23}(L) & A_{24}(L) \\ A_{31}(L) & A_{32}(L) & A_{33}(L) & A_{34}(L) \\ A_{41}(L) & A_{42}(L) & A_{43}(L) & A_{44}(L) \end{pmatrix}$$

The impulse responses of the endogenous variables to each structural shock are provided by the matrix A above, which is a 4×4 matrix. The vector $\varepsilon_t = (\varepsilon_{st}^*, \varepsilon_{st}, \varepsilon_{dt}, \varepsilon_{mt})$ assumes to be uncorrelated serially and orthonormal (and this makes $\Omega = E u_t u_t' = E A_0 \varepsilon_t \varepsilon_t' A_0' = A_0 A_0'$) denotes the possible impact of the structural shocks on the macroeconomic variables in the economy. To place long run restrictions, we assume that EAC economies do not impact on the world real output. This is because the EAC GDP is insignificant of world GDP. However, domestic variables are deemed to be impacted on by both external and domestic shocks. This implies $A_{12}(L) = A_{13}(L) = A_{14}(L) = 0$ but $A_{11}(L) \neq 0$. Similarly, since only supply disturbances affect domestic output, $A_{22}(L) \neq 0$. $A_{32}(L) = A_{33}(L) \neq 0$ because real exchange rate is assumed to be impacted on by both supply and demand disturbances. Due to neutrality of money in the long run, $A_{24}(L) = A_{34}(L) = 0$, implying that money shocks affect neither real output nor exchange rates.

With these, the long run restrictions are presumed to be adequate identification for A_i matrices and the structural shocks series. Accordingly, the system now becomes:

$$\begin{pmatrix} \Delta y_t^* \\ \Delta y_t \\ \Delta e_t \\ \Delta p_t \end{pmatrix} = \begin{pmatrix} A_{11}(L) & 0 & 0 & 0 \\ A_{21}(L) & A_{22}(L) & 0 & 0 \\ A_{31}(L) & A_{32}(L) & A_{33}(L) & 0 \\ A_{41}(L) & A_{42}(L) & A_{43}(L) & A_{44}(L) \end{pmatrix} \begin{pmatrix} \varepsilon_{st}^* \\ \varepsilon_{st} \\ \varepsilon_{dt} \\ \varepsilon_{mt} \end{pmatrix} \quad (2)$$

We however, transformed the SVAR for estimation purpose into the reduced-form VAR model below:

$$X_t = B(L)X_{t-1} + u_t \quad (3)$$

where u_t represents a reduced-form disturbance vector. In addition, equation (3) in moving average form becomes:

$$X_t = C(L)u_t \quad (4)$$

where $C(L) = (1 - B(L)L)^{-1}$ and the leading matrix of $C(L)$ is $C_0 = I$. Finally, the association between the structural and the reduced-form disturbances is represented by

$$u_t = A_0 \varepsilon_t \quad (5)$$

Combined with the above long-run restrictions, $A(L)$ is the Cholesky lower triangle, implying that $\varepsilon_t = A_0^{-1}u_t$ identify sufficiently the structural A_i matrix and the shocks $\varepsilon_t = (\varepsilon_{st}^*, \varepsilon_{st}, \varepsilon_{dt}, \varepsilon_{mt})$.

This approach although similar to Sims (1992) and Christiano, Eichenbaum & Evans (1999), is adapted bearing in mind the conduit of economic shocks in the EAC.

In addition, the New OCA theory opines that even if countries do not possess symmetric shocks, they could still benefit immensely from trade creation upon monetary unification. To this end, the gravity model was used to assess the impact of EAMU and natural resources exploration on EAC intra trade. The basic Gravity model postulated by Tinbergen (1962) for trade between two countries (a and b) takes the form of

$$X_{ab} = G \frac{Y_a^{\beta_1} Y_b^{\beta_2}}{DI_{ab}^{\beta_3}} \quad (6)$$

where X is the trade flow, Y is the economic power of each country a and b, DI is the distance and G is a constant.

Since the gravity model for trade does not hold exactly, in econometric applications it is customary to specify as

$$X_{ab} = G \frac{Y_a^{\beta_1} Y_b^{\beta_2}}{DI_{ab}^{\beta_3}} \eta_{ab} \quad (7)$$

where X_{ab} denotes trade levels from country a to country b, Y_a and Y_b , the real output for countries a and b, DI_{ab} , the two countries' distance, and η_{ab} signifies error term of expectation equals to 1.

In this study, the explanatory variables include the product of both the real output, and per capita of the two countries, their distances and land masses. Furthermore, the dummy variables to reveal possible impacts of common features of partner states, comprise: monetary union membership, common languages, common borders, common colonizers, natural resources etc. (1 if yes; 0 if otherwise).

Then, with the use of logarithms, the above gravity model is augmented to become:

$$\ln(X_{ab}) = \beta_0 + \beta_1 \ln(Y_a Y_b) + \beta_2 \left(\frac{Y_a}{P_a} \frac{Y_b}{P_b} \right) + \beta_3 \ln(A_a A_b) + \beta_4 \ln(DI_{ab}) + \sum_{k=1}^n \beta_{4+k} D_k \quad (8)$$

where P is population, A is land mass, D are the various dummy variables and other variables as defined before.

Because our key variable of interest, monetary union, is time invariant, fixed effects estimator cannot be adopted. Additionally, the Breusch-Pagan Lagrange multiplier (LM) test determined whether to use a random effects regression or a pooled OLS regression.

Macroeconomic data for this study was sourced from Feenstra, *et al.* (2017) The Next Generation of the Penn World Table. This dataset provides a comprehensive macroeconomic data from 1960 to 2016 on 148 countries in the World and it is the most complete and widely

used dataset in Macroeconomic studies. Intra-EAC trade for the period 2004 to 2015 (the only period data is available) was sourced from the EAC database (2018). The rest of the data were sourced from the World Bank (2016)'s World Development Indicators (WDI) dataset. Each country's real GDP was expressed in 2011 constant US dollars for the analysis that follows. Unit root were tested using Augmented Dickey-Fuller Tests, and the optimal lags selected in according with the Schwarz Information Criteria.

Empirical Results

We divide the empirical results into two main sub-headings. In Section 5.1 we discuss the results of the symmetry of shocks based on the traditional OCA view and we investigate the effects of Monetary Union on intra-EAC trade in Section 5.2. The new OCA posits that monetary unification positively impact on intra-regional trade and this effect likely offsets any loss arising from business cycle volatility.

Symmetry of shocks

Based on the Augmented Dickey-Fuller and Phillips Peron Tests, all the variables were stationary at order $I(0)$ and all VARs have 1 optimal lag order based on Schwartz Information criteria. Using the Blanchard-Quah decomposition, the various shocks were extracted (The results are available upon request). Upon extraction of shocks from the structural VAR model, cross-country correlations analysis was carried out to reveal the EAC economic disturbances co-movements. For a proposed monetary union to be feasible, the traditional OCA requires partner states to possess statistically significant and positive co-movements of shocks.

Tables 4-7 present the correlation coefficients of the identified external supply, domestic supply, domestic demand and domestic monetary shocks among the EAC. Table 4 shows that the world supply shocks are all positive and statistically significant at 1% level across EAC countries during 1960-2016. The external shocks range from 93% (Burundi -Others) to 96% (Rwanda-Tanzania), higher than all the other shocks in the region. The result reveals that the EAC is highly open to the rest of the world and it is clear how the 2008 world financial crisis negatively impacted on the region economy. Thus, like Sheik *et al.* (2015), this result shows that the effect of global supply shock in the region is strong and affects them symmetrically, implying that EAC wide policy in face of external shocks could be mutually beneficial to all countries.

Table 4. Correlations of external supply shocks from 1960-2016

Correlation Probability	BURUNDI	KENYA	RWANDA	TANZANIA	UGANDA
BURUNDI	1.000000 -----				
KENYA	0.939504 0.0000	1.000000 -----			
RWANDA	0.934218 0.0000	0.947166 0.0000	1.000000 -----		
TANZANIA	0.931356 0.0000	0.942380 0.0000	0.961048 0.0000	1.000000 -----	
UGANDA	0.959839 0.0000	0.934869 0.0000	0.941713 0.0000	0.940142 0.0000	1.000000 -----

Source: Author's computation (2022).

Table 5 reports the correlation coefficients of domestic supply shocks across EAC countries from the period 1960 to 2016. EAC countries' supply shocks' correlations are generally negative or insignificant apart from few countries that display positive and significant correlations. The only positive significant correlation at 10% significance level is between Kenya and Uganda (+0.24). The latter evidence reflects low symmetry of adjustments to supply shocks in these two countries. Thus, the costs of adopting a common currency is higher than its benefits for all EAC countries except Kenya and Uganda.

Table 5. Correlations of domestic supply shocks from 1960-2016

Correlation Probability	BURUNDI	KENYA	RWANDA	TANZANIA	UGANDA
BURUNDI	1.000000 -----				
KENYA	-0.127778 0.3619	1.000000 -----			
RWANDA	0.137695 0.3255	-0.028333 0.8404	1.000000 -----		
TANZANIA	0.127368 0.3634	0.082454 0.5572	-0.098690 0.4820	1.000000 -----	
UGANDA	-0.014018 0.9206	0.244753 0.0773	-0.166114 0.2345	0.040368 0.7741	1.000000 -----

Source: Author's computation (2022).

In addition, Table 6 presents correlation coefficients of demand shocks across EAC. However, demand shocks are for some reason larger than supply shocks across the EAC. The correlation coefficients of the domestic demand shocks range from 0.28 (Burundi-Rwanda) to 0.43 (Rwanda-Uganda). Moreover, Rwanda has positive and significant correlations with all its neighbours except Tanzania. Buigut & Valev (2005) and Sheik *et al.* (2015) also establish that homogeneous domestic shocks rather than supply shocks are more likely to influence the EAC partner states.

Table 6. Correlations of domestic demand shocks from 1960-2016

Correlation Probability	BURUNDI	KENYA	RWANDA	TANZANIA	UGANDA
BURUNDI	1.000000 -----				
KENYA	0.221684 0.1106	1.000000 -----			
RWANDA	0.284772 0.0388	0.385723 0.0043	1.000000 -----		
TANZANIA	0.163609 0.2418	0.166666 0.2330	0.031164 0.8247	1.000000 -----	
UGANDA	0.084984 0.5452	0.349848 0.0102	0.430036 0.0013	0.060124 0.6689	1.000000 -----

Source: Author's computation (2022).

Unlike demand shocks, the results in Table 7. show that there are no statistically significant monetary shocks correlations between the EAC countries, and this might be as a result of differences in exchange rate management practised by these states until very recently. This evidence points out that the region is not an OCA and that there could be significant damages should the monetary unification comprises of all EAC partner states.

Table 7. Correlations of domestic monetary shocks, 1960-2016

Correlation Probability	BURUNDI	KENYA	RWANDA	TANZANIA	UGANDA
BURUNDI	1.000000 -----				
KENYA	0.148248 0.2894	1.000000 -----			
RWANDA	-0.051726 0.7130	0.141287 0.3129	1.000000 -----		
TANZANIA	0.023489 0.8674	0.074551 0.5957	-0.281946 0.0408	1.000000 -----	
UGANDA	0.067417 0.6315	-0.059827 0.6704	0.051603 0.7136	0.063354 0.6522	1.000000 -----

Source: Author's computation (2022).

Now, we look at the impulse response function (IRF) to analyse how each EAC economy responses to the various macroeconomic shocks. The impulse responses of output in EAC countries to a supply shock are mostly insignificant, with few significant ones vanishing in the first two years, reflecting a quicker adjustment rate. Comparatively, Figures 3 and 5 reveal that despite high sizes in Uganda and Rwanda, domestic prices often adjust within the same period. The exchange rates, however, do not tend to respond to demand shocks in the region as seen in Figure 1-5. Although output reacts to demand shocks only after the first year, the bulk of the adjustment occurs within a period of two years. Finally, the results show that EAC inflation is highly dependent on fluctuations in exchange rate through imports and less on demand through budget deficits. All things being equal, the results show that EAC nations are not good candidates for a potential monetary unification because they exhibit little or insignificant economy-wide shocks.

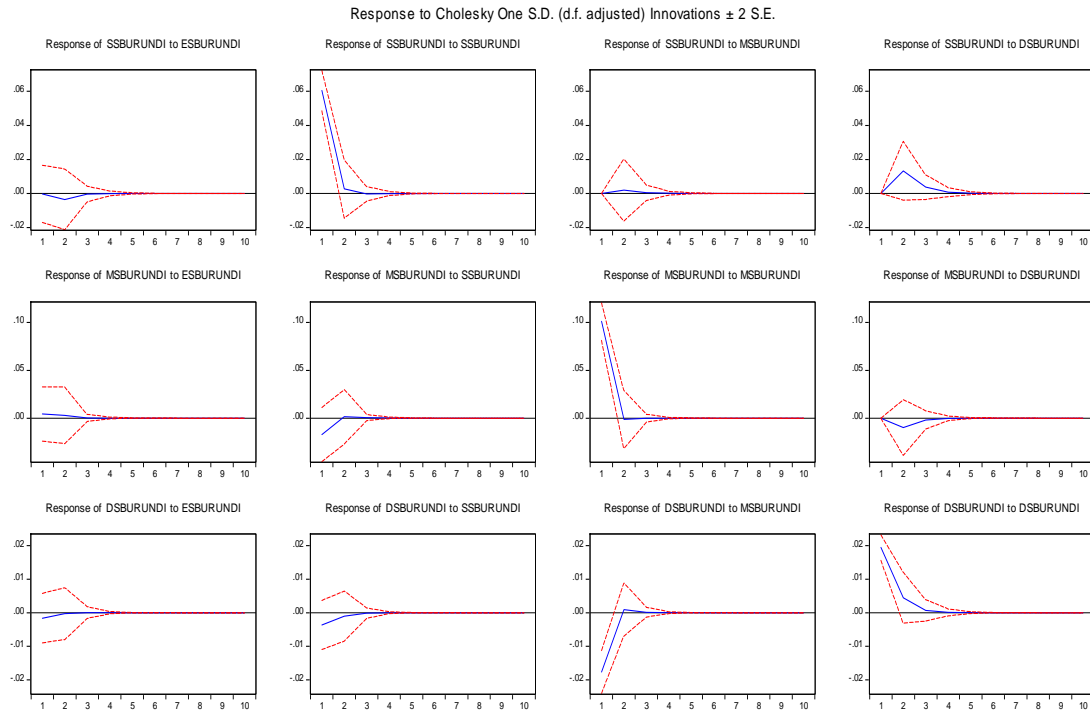


Fig. 1. Size of Impulse Responses to the Various Shocks: *Burundi*

Source: Author's computation (2022).

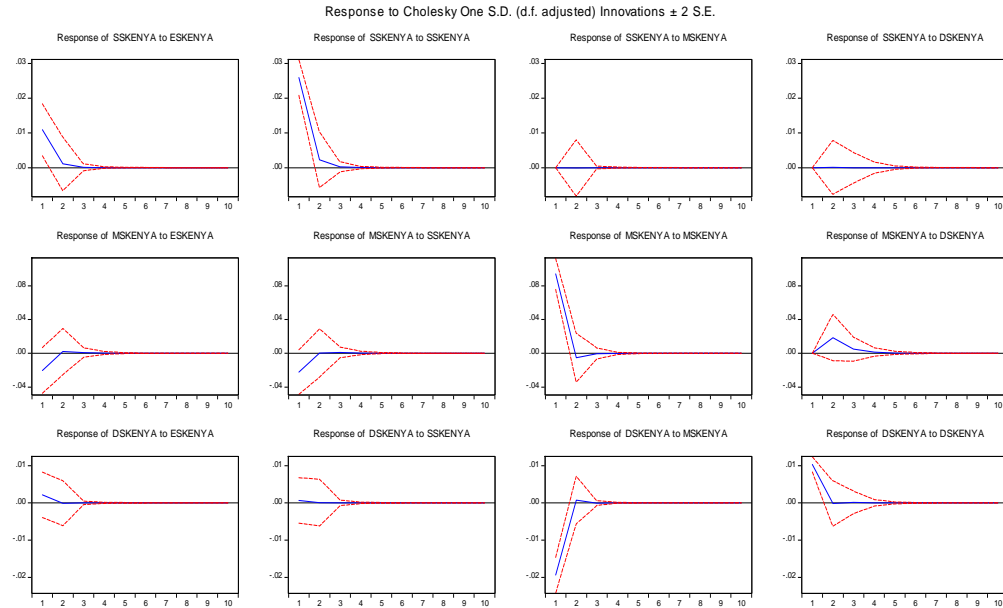


Fig. 2. Size of Impulse Responses to the Various Shocks: *Kenya*

Source: Author's computation (2022).

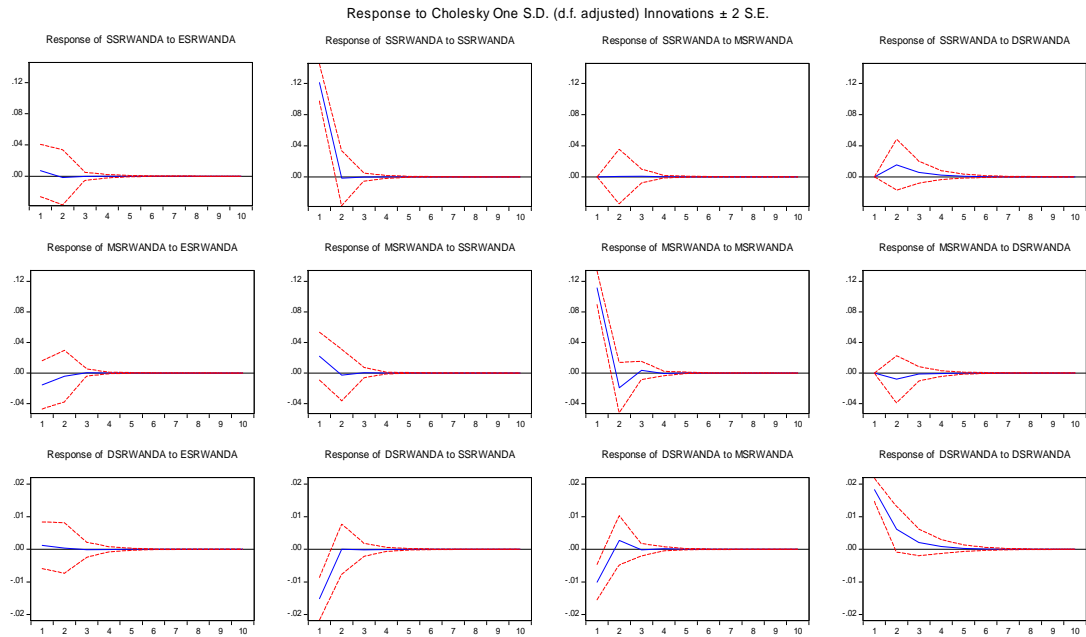


Fig. 3. Size of Impulse Responses to the Various Shocks: *Rwanda*

Source: Author's computation (2022).

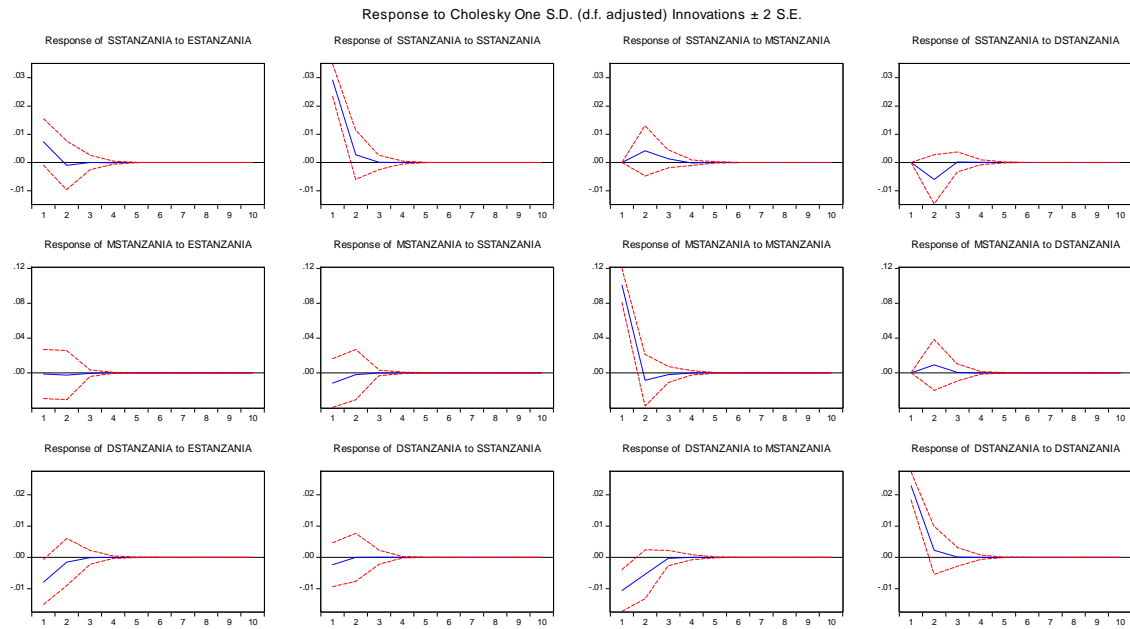


Fig. 4. Size of Impulse Responses to the Various Shocks: *Tanzania*

Source: Author's computation (2022).

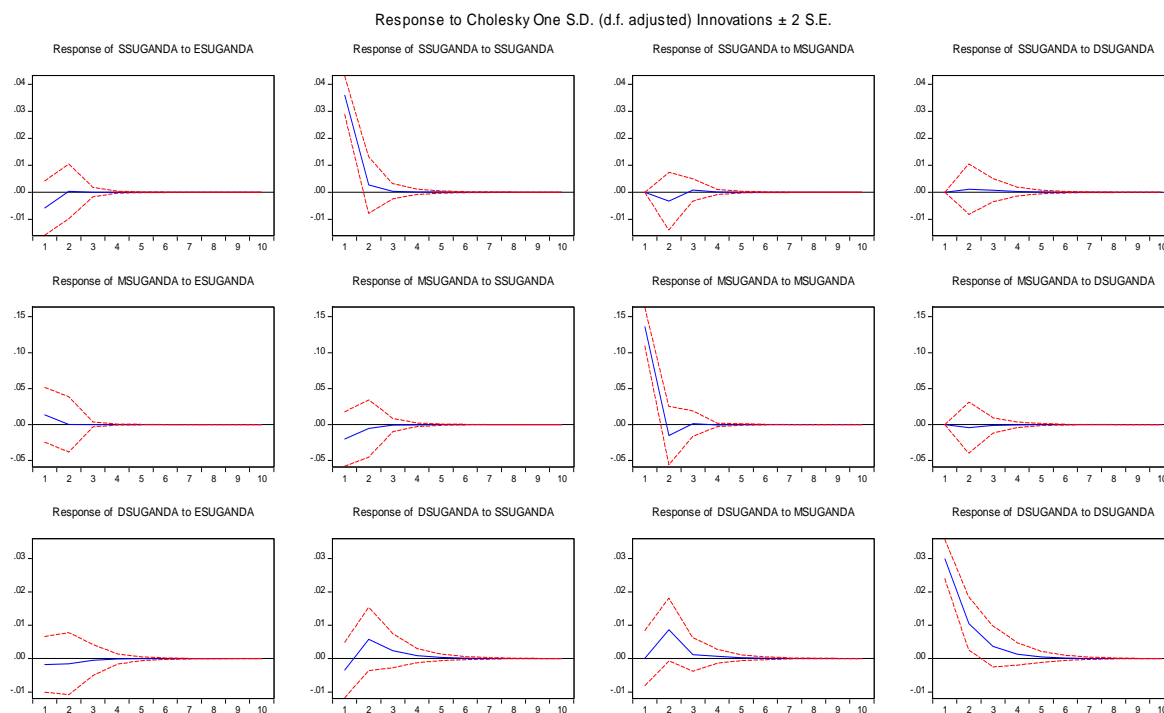


Fig. 5. Size of Impulse Responses to the Various Shocks: *Uganda*

Source: Author’s computation (2022).

Finally, to show how the four macroeconomic variables evolve due to each shock, a variance decomposition analysis was carried out. Tables 8-9 summarise the variance decomposition of the various shocks. The results show that each country’s output is affected more by its own supply shocks volatility since at least 84% of variations at different periods are accounted for by supply shocks. Also, at all horizons demand shocks impact more on real exchange rates in all countries except Rwanda and Kenya. In addition, the contribution of monetary shocks seems more dominant in price fluctuations in all countries. The effects are however concentrated in the smaller countries than in their larger counterparts. For instance, 22% and 55% of exchange rates volatility are caused by demand shocks in Kenya and Burundi respectively. The rest are accounted for by the monetary shocks and this could influence the type of exchange rate systems in these countries.

Table 8. Variance decomposition of the changes in real output, exchange rate

	Domestic Real Output				Real Exchange Rate			
	World Supply Shock	Domestic Supply Shock	Domestic Monetary Shock	Domestic Demand Shock	World Supply Shock	Domestic Supply Shock	Domestic Monetary Shock	Domestic Demand Shock
Burundi	0	99.99	0	0	0.17	2.81	97	0
	0.32	94.61	0.1	4.95	0.24	2.8	95.99	0.95
	0.32	94.61	0.1	4.95	0.24	2.8	95.99	0.95
Kenya	15.06	84.93	0	0	4.23	5.1	90.65	0
	15.09	84.89	0	0	4.12	4.91	87.32	3.64
	15.09	84.89	0	0	4.12	4.91	87.31	3.64

Table 8 (cont.)

Rwanda	0.34	99.65	0	0	1.82	3.67	94.49	0
	0.36	97.77	0	1.85	1.89	3.6	94	0.49
	0.36	97.76	0	1.85	1.89	3.6	94	0.49
Tanzania	5.93	94.06	0	0	0.01	1.33	98.65	0
	5.65	88.7	1.98	3.66	0.07	1.34	97.75	0.81
	5.65	88.7	1.98	3.66	0.07	1.34	97.75	0.81
Uganda	2.51	97.48	0	0	0.95	2.14	96.9	0
	2.48	96.52	0.83	0.14	0.94	2.26	96.69	0.09
	2.48	96.52	0.83	0.14	0.94	2.26	96.69	0.09

The values reveal forecast error variance % at 1, 5 and 10 years intervals respectively.

Source: Author's computation (2022).

Table 9. Variance Decomposition of the Changes in Level

	Price Level			
	World Supply Shock	Domestic Supply Shock	Domestic Monetary Shock	Domestic Demand Shock
Burundi	0.37	1.87	44.2	53.54
	0.37	1.96	42.94	54.71
	0.37	1.96	42.94	54.71
Kenya	0.96	0.08	77.09	21.85
	0.96	0.08	77.11	21.83
	0.96	0.08	77.11	21.83
Rwanda	0.22	34.54	15.23	50
	0.22	32.1	15.2	52.46
	0.22	32.1	15.2	52.46
Tanzania	8.82	0.79	16.06	74.3
	8.69	0.75	19.25	71.28
	8.69	0.75	19.25	71.28
Uganda	0.34	1.32	0	98.32
	0.49	4.52	6.7	88.27
	0.49	4.53	6.70	88.26

The values reveal forecast error variance % at 1, 5 and 10 years intervals respectively.

Source: Author's computation (2022).

EAC trade creation

Table 10. shows the extent of intra-regional trade among the EAC countries. Trade linkages (the proportion of imports and exports to EAC countries as a share of total imports and exports of individual member countries) between EAC countries has been increasing overtime due to the implementation of common market protocol, but remain low.

Total intra EAC trade increased by 151.7%, from USD 2137.34 million in 2006 to USD 5380.31 million in 2015, but with significant disparities among EAC countries. Kenya accounts for 35.6% of total inter EAC trade (61.4% of exports and 14.9% of imports) followed by Uganda which accounts for 28.1% (13.1% of exports and 19.6% of imports), Tanzania accounting for 19.9% (22% of exports and 31.8% of imports), Rwanda accounting for 12.5%

(3% of exports and 25.2% of imports) and Burundi accounting for only 3.9% (0.5% of exports and 8.4% of imports).

Table 10. Intra EAC trade (imports and exports, in USD million)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average
Burundi	66.4	85.1	91.3	135.1	102	291.5	163.2	378.9	178.2	174.6	166.63
Tanzania	333.3	316	464.9	640.4	689.7	794.8	1198.4	1517	1310.9	1281.6	854.7
Uganda	637.9	802.3	1095.6	1077.1	1144.1	1373.4	1437.4	1429.9	1523.2	1583.8	1210.47
Kenya	821.5	1137.1	1375.7	1329.4	1535.5	1847.6	1961.5	1785.4	1847.7	1700.8	1534.22
Rwanda	278.24	361.2	507.35	496.99	567.51	550.43	648.15	639.33	689.25	639.51	537.796
Total	2137.34	2701.7	3534.85	3678.99	4038.81	4857.73	5408.65	5750.53	5549.25	5380.31	4303.816

Source: EAC Database (2018).

Between 2006 and 2015, total trade with other EAC countries as percentage of total trade in Burundi averaged 22.5%. It was 30.5% in Rwanda and only 6.1%; 8.4% and 17.4% in Tanzania, Kenya and Uganda respectively. The three countries recorded more exports than imports in EAC leading to an overall intra-regional trade surplus balance while Rwanda and Burundi recorded overall intra trade deficit, as they import more from the EAC than they export.

Rwanda and Burundi have had consistent trade balance deficit within EAC, amounting to USD 139.2 million and USD 375.6 million respectively on average, between 2006 and 2015. The coverage of imports from EAC by exports to EAC was only 8.9 and 17.2 for Burundi and Rwanda respectively in the period under review. Kenya has the largest trade surplus balance with EAC, amounting USD 993.8 million between 2006 and 2015, followed by Tanzania with USD 143.5 million and Uganda with USD 60 million in the period under review. During the same period, the total exports from the intra EAC trade amounted to US 2,493.2.6 million while the total imports amounted to US 1,810.6.5 million, giving an intra-regional trade surplus of US 682.5 million.

Although the EAC bloc do not possess significant symmetric shocks, a monetary union comprising of Kenya, Rwanda, Uganda, and Tanzania could be feasible. This is because the macroeconomic convergence criteria analysis reveal that Burundi fall shorts of many targets. The key dummy, monetary union takes 1 for all countries, except Burundi. However, Rwanda takes 1 only from 2007, the period its ceded to the Community. For natural resources exploration, all except Rwanda and Burundi takes 1 for the sample period (see Rose 2001; Rose *et al.* 2005 for similar application). South Sudan is however excluded from our analysis since data is not available and it is still in the progress of full customs and common market integration.

For emphasis purpose, the fixed effect model cannot be adopted given the time invariant nature of our key variable of interest, monetary union. We first tested the Breusch-Pagan Lagrange Multiplier test for the sample period 2004 to 2015 to determine whether to adopt the Pooled OLS estimator or the Random Effect Estimator. The results presented in Table 11 failed to reject the null hypothesis that variances across entities is zero. We therefore conclude that Pooled OLS estimator rather than random effects estimator is the most appropriate.

Table 11. Breusch and Pagan Lagrangian multiplier test for random effects

$$\text{Bilateraltrade}[\text{country},t] = Xb + u[\text{country}] + e[\text{country},t]$$

Estimated results:		
	Var	sd = sqrt(Var)
Bilateral trade	3.226654	1.796289
e	0.0926108	0.3043202
u	0	0
Test: Var(u) = 0		
	chibar2(01) =	0.00
	Prob>chibar2 =	1.0000

Source: Author's computation (2022).

As a result, the results of the Pooled OLS estimation is shown in Table 12. Table 12 presents the predictions of the gravity model with respect to the EAC intra-regional trade, Africa and the World for comparison purpose. Our model explains 97% of the variations in bilateral trade in the region. most importantly, the result shows that despite asymmetry of shocks in the EAC, the monetary union significantly increases regional trade by a factor 4 (a coefficient of 1.35 on a dummy variable that is unity if the two countries are members of the same monetary union yields a factor more than 3 i.e. $e^{1.35}=3.86$). The size of this estimate is slightly larger than those in Masson & Pettillo (2005) and Glick & Rose (2001) for Africa and World respectively.

Furthermore, the results reveal that natural resources exploration in Uganda, Kenya and Tanzania negatively affect the regional trade. This might also contribute to weakening the insulation of the region to external shocks in event of major crude oil price fluctuations and increases economic disparities between potential oil producers and oil importers. However, the factor of 1.26 ($e^{0.23}$) could still be managed in the long run, especially if the EAC oil exporting countries did not join Organisation of Petroleum Exporting Countries and/ or cannot influence international oil market. The economic variables indicate that exports are pushed, and imports are pulled more by the bigger countries; the poorer countries seem to trade less, and longer distances reduce trade too. Being landlocked also diminishes trade, due to high transactional costs making landlocked countries' commodities less competitive. Expectedly, countries with common colonial master trade more but common language becomes less significant in the region since all the countries adopt similar official language and local languages. Moreover, countries with common border trade more due to poor regional transportation linkages. Due to the long trading history, all variables have substantial impacts in the EAC than in Africa and the World. In a nutshell, the results show that EAMU provides an important stimulus to economic growth and development. Guillaumont & Guillaumont, (1984); Devarajan & de Melo, (1987); and Rose (2000), among others corroborate these findings that monetary unification positively impacts on intra-regional trade and economic growth.

Table 12. Predictions of the Gravity Model for the EAC, Africa and the World

	EAC		AFRICA*		WORLD**	
	Coef.	t-test	Coef.	t-test	Coef.	t-test
Bilateral Trade (in log)						
Economic Variables (in log)						
Real GDP	2.20	26.19	1.00	56.89	0.93	93.01
Real GDP per Capita	0.21	8.62	0.39	14.9	0.46	30.18
Land Area	-0.28	-6.07	-0.17	-12.82	-0.09	-11.27
Distance	-2.23	-22.38	-1.20	-24.78	-1.11	-47.28

Table 12 (cont.)

Dummy Variables						
Monetary Union	1.35	5.54	1.29	7.88	1.30	10.15
Natural Resources	-0.23	-3.35	NA	NA	NA	NA
Common Language	0.55	2.63	0.11	1.65	0.32	7.68
Common Border	0.11	2.48	1.18	6.68	0.43	3.57
Land Locked	-1.09	-2.86	-0.17	-3.65	-0.14	-4.21
Common Colonizer	1.29	3.04	0.4	4.17	0.45	6.45
Constant	-31.49	-21.83	-30.5	-44.09	-30.58	-81.16
Statistics						
R ²		0.97		0.51		0.64
No. Obs.		60		91,791		219,558

Source: Author (2022), *Masson & Pettillo (2005) and **Glick & Rose (2001).

Conclusions

In this study, we provide new evidence on the prospects for monetary unification in the EAC since the available empirical evidence point that the countries are too dissimilar to benefit from the union. First, we discovered that the level of macroeconomic convergence by partner states is low, with varying economic bases as service and agriculture sectors continue to play dominant roles in the region. Although Kenya is more industrialised, the overall contribution of industry to economic growth in all countries is meagre. In addition, we cautioned that Kenya and Tanzania making up more than two-third of the entire EAC GDP, could exert much economic powers like Ivory Coast and Senegal in the West African CFA zone whose fiscal indiscipline might cost the monetary union greatly. Despite the relatively large volume of intra EAC trade, significant challenges to monetary unification such as low purchasing power, thereby limiting internal markets; export of mainly agricultural products; limited transportation linkages; population centres far apart; and large informal trade caused by porous borders, remain.

Second, the cross country correlation shocks analysis shows that EAC countries are highly open economies to the rest of the world. They exhibit positive and significant external shocks correlations, ranging from 93% (Burundi-Others) to 96% (Rwanda-Tanzania), higher than any other shocks in the region. This means that an EAC-wide policy response to external shocks could be mutually beneficial to member states. However, the demand shocks are somehow more than supply shocks in the region, with correlation coefficients of 0.28-0.43. None the less, the impulse responses reveal insignificant economic shocks and few significant speedy shocks adjustments, often within first two years in all the countries; thus, EAC is not an OCA. This result is supported by the variance decomposition.

Third, we found that despite the asymmetry of shocks, monetary unification increases bilateral trade by a factor of 4, slightest higher than in Africa and the world generally. In economic terms, the richer regional countries will export more, longer distances will reduce trade and bigger countries are likely to trade more as well. Additionally, member countries with same official language, close borders and former colonies trade more. Total intra EAC trade increased by 151.7%, from USD 2137.34 million in 2006 to USD 5380.31 million in 2015, but with significant disparities among EAC countries. Kenya accounts for 35.6% of total inter EAC trade (61.4% of exports and 14.9% of imports) followed by Uganda which accounts for 28.1% (13.1% of exports and 19.6% of imports), Tanzania accounting for 19.9% (22% of exports and

31.8% of imports), Rwanda accounting for 12.5% (3% of exports and 25.2% of imports) and Burundi accounting for only 3.9% (0.5% of exports and 8.4% of imports).

Thus, the EAMU stimulates economic growth and trade, as postulated by the new OCA theory and this finding is in line with Masson & Pattillo (2005) and Rose (2001) findings that monetary unions increase trade by about a factor of 3. As a result, this study concludes that there are high prospects for East Africa monetary unification and the EAC need not necessarily exhibit symmetry of shocks before transiting into monetary union. Finally, structure must however be put in place to deal with the possible negative impact of natural resources exploration on regional trade.

References

1. Adam, C., Allsopp, C. & Vines, D. (2016). Designing Fiscal Institutions for an East African Monetary Union, *International Growth Centre*, I-40212-TZA-1
2. Asongu, S. A., (2013). A short-run Schumpeterian Trip to Embryonic African monetary zones, *Economics Bulletin*, 33(1), pp. 859-873.
3. Asongu, S. A., (2014). Are Proposed African Monetary Unions Optimal Currency Areas? Real, Monetary and Fiscal Policy Convergence Analysis. *African Journal of Economics and Management Studies*, 5(1), pp. 9-29.
4. Bagumhe, E. P. (2013). *Feasibility and implication of the East African Community Monetary Union : An Application of Optimal Currency Area Index Methodology*, International Conference on Development Policy , held on 14 th to 15 th August 2013 at National College of Tourism Table of Contents, (August).
5. Baldwin, R., & Taglioni, D. (2004). Positive OCA criteria: Micro-foundations for the Rose effect. Graduate Institute of International Studies, Geneva/hei.unige.ch/~baldwin/PapersBooks/OCA_BaldwinTaglioni17Mar04.pdfS.
6. Baldwin, R., Skudelny, F., & Taglioni, D. (2005). Trade effects of the euro. Evidence from sectoral data. Working paper No. 446, European Central Bank.
7. Balparla B., Caporale G. M & L. A. Gil-Alana (2015). Exchange rate dynamics and monetary unions in Africa: A fractional integration and cointegration analysis, *African Journal of Business Management*, 9(22), pp. 752-761.
8. Bangaké, C., (2008). Exchange Rate Volatility and Optimum Currency Area: Evidence from Africa, *Economics Bulletin*, 6(12), pp. 1-10.
9. Bayoumi, T. & Ostry, J. D. (1997). Macroeconomic Shocks and Trade Flows within Sub-Saharan Africa: Implications for Optimum Currency Arrangements. *Journal of African Economies*, 6(3), pp. 412-44.
10. Buigut, S., (2006). Monetary integration initiatives in Eastern and Southern Africa (ESA): sorting the overlapping membership, *International Finance*, 9(3), pp. 295-315.
11. Buigut, S., (2011). A Fast-Track East African Community Monetary Union? Convergence Evidence from a Cointegration Analysis, *International Journal of Economics and Finance*, 3(1), pp. 255-261.
12. Buigut, S. K., & Valev, N.T., (2005). Is the Proposed East African Monetary Union an Optimal Currency Area? A Structural Vector Autoregression Analysis, *World Development*, 33(12), pp. 260-267.
13. Buigut, S., & Valev, N., (2006). Eastern and Southern Africa Monetary Integration: A Structural Vector Autoregression Approach, *Review of Development Economics*, 10(4), pp. 586-603.
14. Buigut, S., & Valev, N. T., (2009). Benefits from Mutual Restraint in a Multilateral Monetary Union, *World Development*, 37(3), pp. 585-594.
15. Christiano, L. J., Eichenbaum, M. & C. Evans (1999). Monetary Policy Shocks: What Have We Learned and to What End? in *Handbook of Macroeconomics*, eds. Michael Woodward, and John Taylor.
16. Davoodi, H. R., Dixit, S., & Pinter, G., (2013). Monetary Transmission Mechanism in the East African Community: An Empirical Investigation, *IMF Working Paper* No. 13/39, Washington.
17. Drummond, P., Aisen, A., Alper, E., Fuli, E., & Walker, S. (2015). *Toward a Monetary Union in the East African Community: Asymmetric Shocks, Exchange Rates, and Risk-Sharing Mechanisms*, International Monetary Fund, Washington, D.C.

18. Durewall, D. (2011). *East African Community: Pre-conditions for an Effective Monetary Union*, London: The International Growth Centre.
19. Falagiarda, M. (2010). *Are the East African countries ready for a common currency? Traditional indicators and cointegration analysis*, School of Economics of the University of Reading, http://www.tn.auf.org/CEAFE/Papiers_CEAFFE10/Monnaie/Falagiarda.pdf(Accessed: 13/04/2018).
20. Feenstra, R. C., R. Inklaar & M. P. Timmer (2015). The Next Generation of the Penn World Table, *American Economic Review*, 105(10), 3150-3182, available for download at www.ggd.cnet/pwt
21. Kandil, M., & Trabelsi, M. (2010). Is The Announced Monetary Union In GCC Countries Feasible ? A Multivariate Structural Var Approach. *The Economic Research Forum (ERF)*, 522.
22. Kishor, N. K., & Ssozi, J., (2011). Business Cycle Synchronization in the Proposed East African Monetary Union: An Unobserved Component Approach, *Review of Development Economics*, 15(4), pp. 664-675.
23. Lepetit, L., Rugemintwari, C., & Strobel, F., (2014). Monetary, Financial and Fiscal Stability in the East African Community: Ready for a Monetary Union? *The World Economy*, 38(8), pp. 1179-1204.
24. Mafusire, A., & Brixiova, Z., (2013). Macroeconomic Shock Synchronization in the East African Community, *Global Economic Journal*, 13(2), pp. 261-280.
25. Masson P. R. & Pattillo, C. (2005). *The Monetary Geography of Africa*, Brookings Institution Press, Washington, D.C.
26. Masson, P. & Pattillo, C. (2004). A Single Currency for Africa?”, *Finance and Development*, 41(4), pp. 9-15.
27. Mélitz, J. (1991). Brussels on a Single Money. *Open Economies Review*, 2, pp. 323-36.
28. Mkenda, B. K., (2001). Is East Africa an optimum currency area? *Working Papers in Economics*, No. 41. School of Economics and Commercial Law, Goteborg University.
29. Rose, A. (2000). One Money, One Market: Estimating the Effect of Common Currencies on Trade, *Economic Policy* 30: 9-45.
30. Rusuhuzwa, T. K., & Masson, P. R., (2012). Design and Implementation of a Common Currency Area in the East African Community, University of Toronto, *Department of Economics Working Paper* No. 451, Toronto.
31. Sheikh, K. A, Azam, M. N, Rabby, T.G, Alam, G. M. & I. Khan (2011). Monetary union for the development process in the East African community: Business cycle synchronization approach," *African Journal of Business Management*, 5(17), pp. 7632-7641, 2011.
32. Sheikh, K. A., Yusuf, Z., & Aslam, M. (2013). Feasibility of a Monetary Union in the East African Community : A Structural Vector Autoregression Model, *Journal of Economics, Business and Management*, 1(1)102-105.
33. Sims, C. A., (1992). Interpreting the Macroeconomic Time Series Facts: The Effects of Monetary Policy, *European Economic Review*, 36, 975–1000.
34. Tobin, J. (1993). International Currency Regimes, Capital Mobility and Monetary Policy. *Greek Economic Review*, 15, pp. 1-15.