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Kenya and the East Africa Monetary Union

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Abstract

Kenya and other EAC member states are in the process of forming an EAC Monetary Union. Like other regional blocs with similar arrangement, the EAC has put in place macroeconomic convergence criteria. There are macroeconomic targets that member states should fulfill before the commencement of a monetary union. However, questions have emerged on the suitability of EAC monetary unions in terms of their readiness especially against the backdrop of the recent Euro crisis that rocked the European Monetary Union. Using the Optimum Currency Area (OCA) theory, the suitability and viability of the EAC was assessed. This is done using the OCA Index methodology, which is considered robust in terms of assessing the possibility of successful working countries, and in helping to vet out unsuitable countries in a monetary union. The methodology operationalizes the basic OCA variables by constructing their indices. The OCA index was computed for EAC members using panel regression for the period that coincides with the formation of the EAC (2000-2013). The basic OCA variables included in the model were the exchange rate variability, business cycle synchronization, dissimilarity of export commodity structure, trade intensity, and economic size. That is, the more the basic OCA criteria are fulfilled among the member states, the lower the variability of exchange rate should be and the better prepared the member states are. The OCA index computed reveals that EAC member states are not ready for a monetary union. Though the indices were small, most of the variables were not statistically significant. The policy implication drawn from the study is that there is need for full implementation of the custom union and common market so as to increase intra-EAC trade. There is also need to implement macroeconomic policies that strengthen the EAC institutions to improve surveillance and power to sanction member states that do not comply with the EAC policies.

Abbreviations and Acronyms

CBK	Central Bank of Kenya
CMA	Common Monetary Area
EAC	East Africa Community
EAMU	East Africa Monetary Union
EMU	European Monetary Union
EU	European Union
GDP	Gross Domestic Product
GPPP	Generalized Purchasing Power Parity
IMF	International Monetary Fund
IFS	International Financial Statistics
KNBS	Kenya National Bureau of Statistics
LM	Lagrange Multiplier
MTP	Medium Term Plan
OCA	Optimum Currency Area
PIIGS	Portugal, Ireland, Italy, Greece and Spain
RIP	Regional Integration Policy
SVAR	Structural Vector Auto Regression
WAEMU	West Africa Economic and Monetary Union
WDI	World Development Indicators

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1.   Introduction

1.1.   Background to the Study

Regional integration has recently gained momentum among various regional trading blocs in the world. This has been motivated by the perceived success of the European Monetary Union (EMU). Africa has not been left behind. Various regional blocs within it are assessing the possibility of establishing monetary unions along the lines of the EMU. As a result, the East Africa Community (EAC) member states have put in place mechanisms to steer and fast-track the region towards a monetary union. The achievement so far has seen the launch of the Custom Union in 2005, Common Market in 2010, and the signing of the East Africa Monetary Union protocol in 2013. To steer and fast-track this, EAC member states have put in place nominal macroeconomic convergence criteria. These criteria are to be implemented in two stages: stage one, which entails primary criteria was for the period 2007-2010 and stage two, which entails secondary criteria was for the period 2011-2014. So far, the progress of these countries in aligning their economies to the set macroeconomic convergence criteria is still slow. This is due to differences in their economic structure, social and institutional mechanisms. As a result, this has necessitated the postponement of the commencement date of a currency union by ten years to 2023. Whether the East Africa Community constitutes an Optimum Currency Area (OCA) remains questionable.

Optimum Currency Area (OCA) as introduced by Mundell (1961) is a geographical territory within which one currency is applicable. The theory set out the criteria to be met before countries form a monetary union. A number of theorists have enhanced the contribution of OCA (Flemming, 1971; Kennen, 1969; and Mackinnon, 1963). They argue that before the formation of a monetary union, potential member states should demonstrate similarity in their economic structure. Such states should have a high degree of wage flexibility, labour mobility, goods and market integration, openness and size of the economy, a degree of product/commodity diversification and fiscal integration.

Therefore, before member countries adopt a single currency, cost benefit analysis has to be done. Ideally the adoption of a common currency should be guided by the expectation that benefits outweigh the costs. From the OCA literature, the benefits of participating in a common currency are: reduction in transaction costs during cross border trade; exchange rate volatility across the union, which facilitates trade and investment; a stronger common market due to the unrestricted movement of goods and services; larger capital base and human resource pool, which enhances production efficiency leading to increased Gross Domestic Product (GDP); price

stability and convergence, which leads to reduction in market discrimination and increased economic efficiency (Alesina and Barro, 2002; Fleming, 1971; Kenen, 1969; Mckinnon, 1963; Mundell, 1961).

However, the costs are: loss of national autonomy in the monetary policy, loss of exchange rate policy and loss of fiscal independence (Bean, 1992; Calmfors, 2001; Schuberth and Wehinger, 1998). In order to minimize the cost and maximize the benefits, there has to be a sufficient degree of real macroeconomic convergence, and financial integration among the aspiring member states.

This paper will examine Kenya's position in the envisaged EAC monetary union and whether the EAC constitutes an OCA. The 2008/09 Euro crisis experience is a pointer to the fact that monetary union formation is a complex project. There are potential risks involved. It is therefore prudent to ensure that the preconditions for forming the EAMU are adequate. This involves making sure that economic, political, and institutional requirements are in place. Despite the importance of this initiative and the steps already taken by the EAC, as well as the increasing political will, there is concern that there has not been enough litmus test to determine the feasibility of an EAMU.

The establishment of the East Africa Community Monetary Union (EACMU) protocol lays down the foundations for a monetary union. It provides the criteria for macroeconomic convergence, which includes: fiscal policies; public debt management, building resilience and managing economic shocks; monetary policy; exchange rates policy; and financial, payments and settlement systems (EAMU, 2007). It is important to ensure the convergence of adequate macroeconomic pre-conditions for forming East Africa Monetary Union (EAMU). This will ensure the benefits of joining the union will exceed the cost, and it has been boosted by the ratification of the protocol by member states.

As indicated earlier, the EAC like other regional integrations have put in place macroeconomic convergence criteria to steer and fast-track the monetary union. The primary targets are budget deficit to GDP ratio (excluding grants) of less than 6 per cent, attainment of a single digit inflation of 5 per cent and maintenance of external reserves to cover at least four months of import cover. The secondary convergence targets specified to compliment the primary ones are: real GDP growth rates greater or equal to 7 per cent, debt, savings GDP ratio of greater or equal to 20 per cent, stable real exchange rates, current account (excluding grants), consistent with debt sustainability and adhere to bank supervision and regulations payment and settlement system.

Table 1.1 shows the macroeconomic convergence criteria in the EAC with regard to the primary and secondary convergence criteria. They provide a litmus test for the establishment of an EAC monetary union.

Table 1.1: Macroeconomic convergence criteria in the EAC

	Indicator	Stage		Stage 3: 2015
		Stage 1: 2007 - 2010	Stage 2: 2011 - 2014	
Primary criteria	Budget deficit to GDP ratio; Excluding grants Including grants	<6% ≤3%	≤5% ≤2%	Introduction of a single currency. But has been postponed to 2023
	Inflation rate	≤5%	≤5%	
	External reserves	≥4 months import cover	≥6 months import cover	
Secondary criteria	Real exchange rates	Stable		
	Interest rates	Market based	Market-based	
	Real GDP growth	≥7% reduced to sustainable levels	Sustainable levels	
	Debt, savings to GDP ratio	≥20%	≥20%	
	Current account (excluding grants)	Consistent with debt sustainability	Consistent with debt sustainability	
	Banking supervision and regulations payment and settlement system	Implementation and adhere to 25 core principles for systematically important systems		

Source: EAMU Protocol (2007)

1.2.   Statement of the Problem

The realization of a successful monetary union by the EAC partner states depends on a sufficient macroeconomic convergence of their economies, under the established Optimum Currency Area criteria. The attainment of these criteria by the EAC member states has been very slow, and the implementation status has remained behind stage I and II. For example, no member country has attained the requirement for an inflation rate of not more than 5; all the countries have consistently found it difficult to attain the set target of less than 6 per cent budget deficit, excluding grants. Member countries have had varied and lower growth rate contrary to the set target of real GDP growth rate of greater or equal to 7 per

cent. Such disparities in the attainment of the set targets enhance the possibility of some member countries not meeting the EAC convergence criteria. As a result, this has necessitated the postponement of the commencement date of a common currency from 2015 to 2023.

From the experiences of the EMU, failure to meet these set criteria is an indicator that costs outweigh the benefits of joining the union and the possibility of some states is destabilizing the union, as was the case with Portugal, Ireland, Italy, Greece, and Spain (PIIGS) in the EMU. Therefore, macroeconomic convergence strategy - that is, a package of policies geared towards convergence in a regional integration is not a viable option. Though there is progress in intra-regional trade, the effects of trade should not be overstated. This is strengthened by the slow implementation of custom union protocol and common market elements such as free mobility of labour, capital and goods. Therefore, the establishment of a monetary union without full implementation of custom union and common market would be a difficult task. This is due to the fact that, a monetary union involving heterogeneous economies may jeopardize growth and employment perspectives in the least prepared members as was the case with the Euro zone crisis. In order to avoid negative effects of monetary integration in Africa, the integration should be based on real rather than nominal convergence. This should evolve gradually following achievement of trade and macroeconomic coordination.

1.3   Research Objectives

The overall objective of the study is to examine Kenya's position in the envisaged EAC monetary union and whether the EAC constitutes an effective monetary union.

In the above context, the specific objectives of the study are to:

(i)   Examine and review the macroeconomic convergence criteria

(ii)   Estimate the OCA index for EAC member states

(iii)   Compute and draw policy recommendations

1.4   Research Questions

(i)   What is the status of the macroeconomic convergence criteria in the envisaged EAC monetary union?

(ii)   What is the OCA index for EAC member states towards a monetary union?

1.5   Justification of the Study

The importance of monetary integration need not be over-emphasized, but there is need to evaluate the suitability of monetary union in the EAC, especially in light of recent development of the European Union. The Kenya Vision 2030 through its implementation framework of Medium Term Plan II (MTP II 2013-2017) recognizes the crucial role of regional integration in economic growth and development. This has necessitated the formulation of National Regional Integration Strategy and Implementation Plan for Kenya by the Ministry of East Africa Affairs, Commerce and Tourism. This paper will inform the current process of formulation of Regional Integration Policy by the Ministry of Foreign Affairs.

The paper also takes cognizance of the existing stock of knowledge and information, while trying to make meaningful contribution on the issues of macroeconomic convergence. This is in light of the formation of a strong and beneficial monetary union for the benefit of Kenya and other EAC member states.

2. Review of the Economic Convergence by EAC

Review of macroeconomic convergence by EAC member states reveals significant variation in meeting the set benchmark. The review of the progress for both primary and secondary criteria are analyzed and discussed below but, first, the Kenyan progress is presented.

2.1 Kenya's Performance on Macroeconomic Convergence Criteria

Kenya's performance with respect to macroeconomic convergence criteria shows that the country achieved an inflation rate of 4.6 per cent in the financial year 2012/13, against a 5 per cent target for macroeconomic convergence. On budget deficit (with grants and including grants), Kenya did not meet this criteria. This was because of declining revenue and increase in expenditure. On the official reserves, Kenya did not meet the set target of at least six months of external reserves. On the secondary criteria, the target of positive real interest rates was achieved, mainly due to declining inflation rates. Macroeconomic performance and convergence under the EAC criteria for Kenya are provided in Table 2.1 (Central Bank of Kenya, 2014).

Table 2.1: Macroeconomic performance and convergence under the EAC criteria

| Criteria	June 2013	2008	2009	June 2010	June 2011	June 2012	June 2013
Budget deficit (excl. Grants)/ GDP	Not exceeding 5% Between 2011-2014	5.2	5.7	7.9	5.2	6.1	7.4
Budget deficit (incl. Grants)/ GDP	Not exceeding 2% Between 2011-2014	3.9	4.9	4.4	4.5	5.6	6.8
Inflation rate – annual average	Not >5% per year Between 2011-2014	16.2	9.4	5.4	6.9	16.0	4.6

Gross Foreign Exchange reserves in months of imports of goods & non-factor services	External reserves of more than 6 months of imports of goods & non-factor services between 2011-2014	4.5	3.6	3.9	3.8	4.3	4.4
GDP growth rate at factor cost constant prices	Not less than 7% p.a. Between 2011-2014	1.1	2.6	5.7	3.8	4.4	
Current Account Deficit (excl. grants)/GDP	Sustainable levels between 2011-2014	7.3	5.3	6.0	8.2	9.5	11.4
Gross National Savings/GDP	At least 20% between 2011-2014	15.9	12.9	11.8	14.0	12.2	

Source: Central Bank of Kenya (2014), Annual Report

2.2   EAC Member States Performance on Macroeconomic Convergence Criteria

The EAC performance with respect to the set macroeconomic convergence criteria is reviewed in this section. The inflation ceiling was set at not more than 5 percent; a 13 year situational review of inflation as illustrated in Figure 2.1. It shows that the attainment of these targets has been elusive for the EAC member states. The increase in inflation rate above the set target has been attributed to rising food prices. Inflation differentials are a pointer to difference in economic policies adopted by member states. The OCA theory specifies that countries envisaging a monetary union should have similar inflation patterns. But this is contrary from the analysis; therefore, the inflation rate target of 5 per cent is highly demanding given the current trends of inflation rates within the EAC.

Figure 2.1: Trends in EAC inflation rates
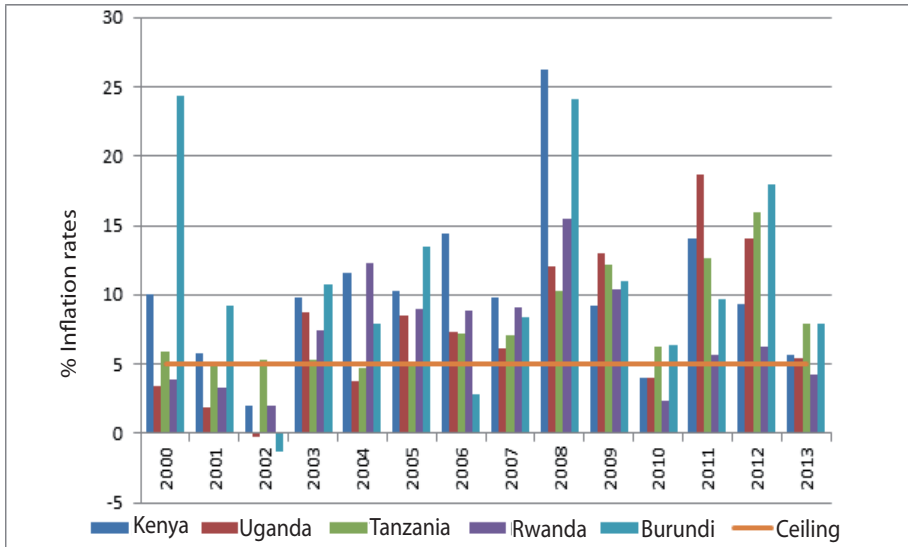
Source: World Bank (2014), World Development Indicators

An overview of the trends of GDP growth rates among the EAC member states is presented in Figure 2.2. The convergence criteria specify that member states should register a GDP growth rate of not less than 7 per cent. However, among the EAC states, GDP growth has been widely varied. On one hand, there is Tanzania, Rwanda and Uganda, which have had a relatively stable growth rate of close to 7

**Figure 2.2: Trends in EAC GDP growth rates**
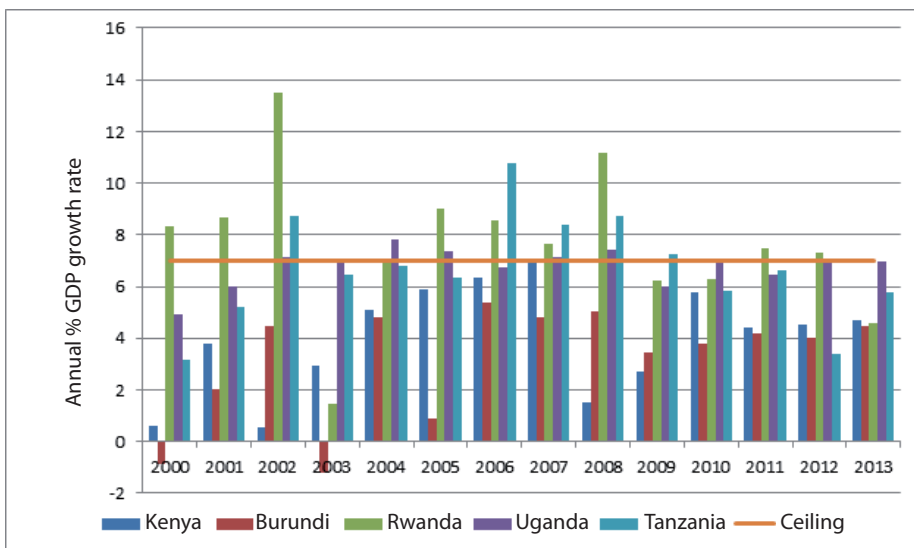
Source: World Bank (2014), World Development Indicators

per cent per annum, while on the other hand there is Kenya and Burundi whose GDP growth rate was way below the set criteria. The wide range of GDP growth rates of the EAC countries points to the varied monetary and exchange rate policy pursued by member states; this may jeopardize a common fiscal policy in the union.

Currently the countries are presumed to have gone through the first and the second of implementation of the convergence criteria. With both stages in place, budget deficit excluding grants shows that all the countries have consistently had difficulties meeting the set target. It is only Tanzania which met the set target in 2013. This may compromise future attainment of this target. This is illustrated in Figure 2.3.

Figure 2.3: Trends in budget deficit to GDP ratio excluding grants for EAC for 2000 - 2013
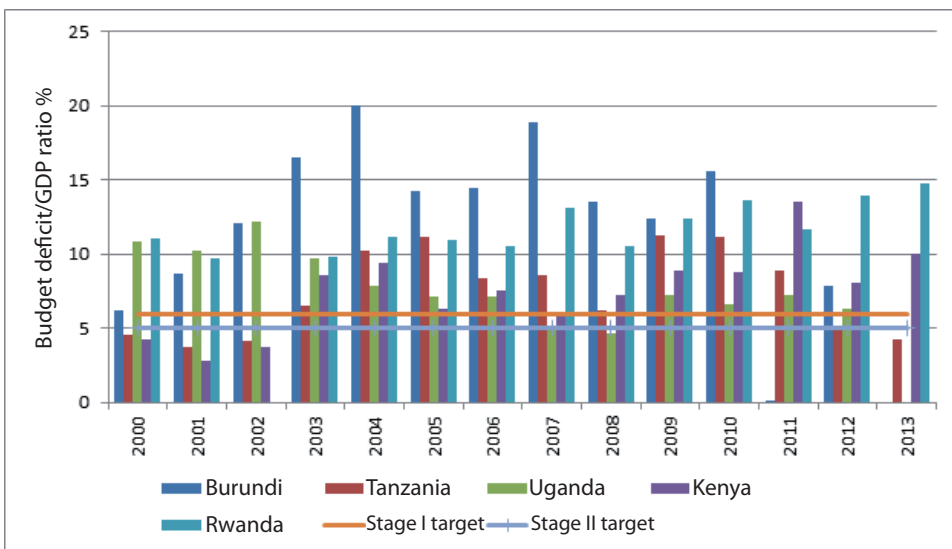
Source: World Bank (2014), World Economic Outlook

Regarding budget deficit including grants, most countries have progressed well by remaining below the three percent and two percent target. On combining the two findings, it is apparent that the countries' capacity to generate their own revenues is low compared to their financial demands. The high dependence on grants or aid for economic development is risky for any economy. This is even more dangerous as nations ascend to a union status given that most donor support is seasonal.
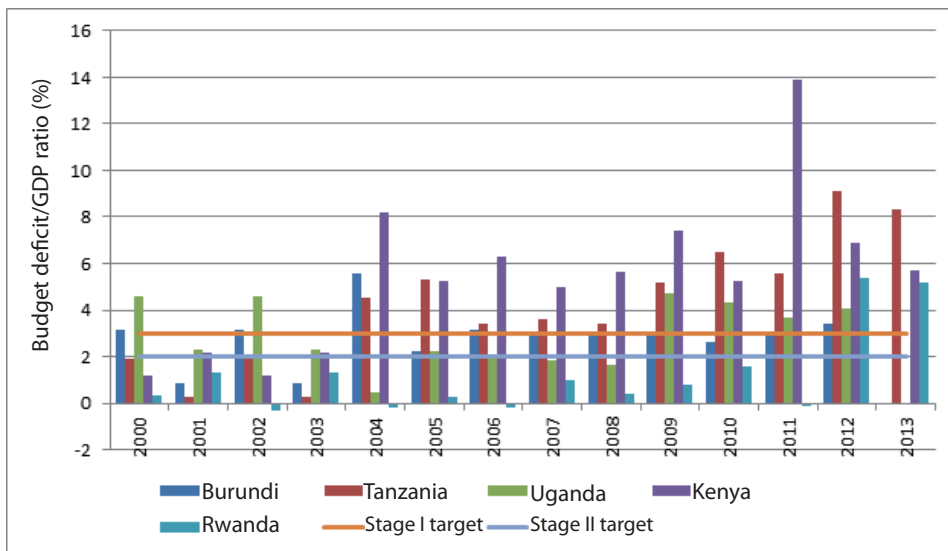
Figure 2.4: Trends in budget deficit to GDP ratio including grants for the EAC for 2000-2013

Source: World Bank (2014), World Economic Outlook

The real interest rates for the EAC have been volatile, but the maintenance of market-based interest rate has been achieved. Based on the set criterion, interest rates offer the best indication of economic integration, but as demonstrated, countries have exhibited differing interest rates.

Figure 2.5: Trends in real interest rates for EAC for 2000-2013
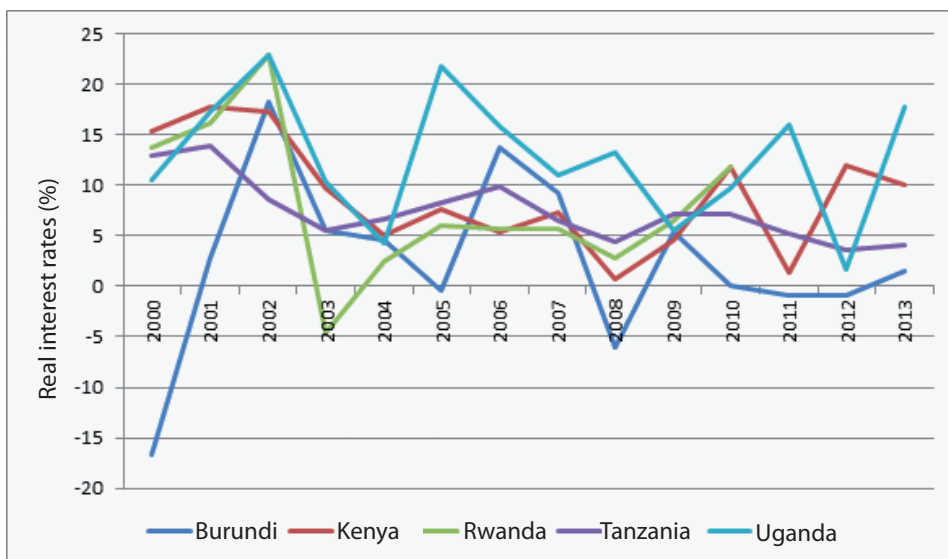
Source: World Bank (2014), World Development Indicators

Figure 2.6: Gross national savings/ GDP for EAC countries
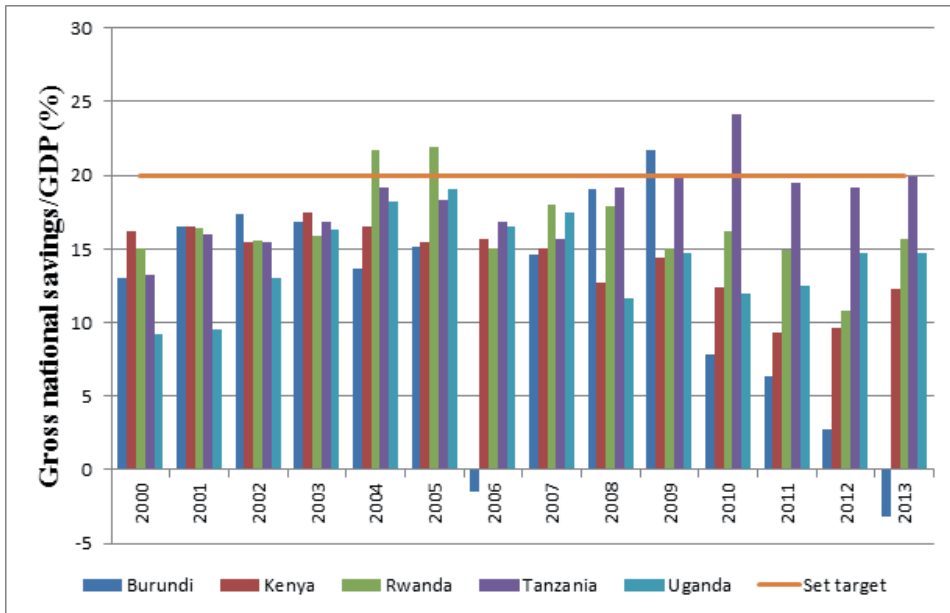
Source: World Bank (2014), World Economic Outlook

The EAC member states have found it difficult to achieve the 20 per cent set target of national saving as a percentage of GDP a shown in Figure 2.6. Tanzania performed exceptionally well in meeting the target in 2010 and 2013, respectively. National savings to GDP is crucial in that it encourages fiscal discipline. It also reduces the risk of lower saving countries taking funds from higher saving countries. Therefore, the difference in savings rate between member states poses a greatest risk to the monetary union.

In a nutshell, the above is an indication of the economic progress countries have made towards a monetary union. There is partial convergence of some countries to the benchmark criteria, but most remained unaligned to these convergence criteria, posing a risk to the establishment of the monetary union. These dissimilarities point to the fact that countries largely follow independent fiscal and monetary policies. Therefore there is need to harmonize these policies for a more credible and stable union.

3. Literature Review

3.1 Theoretical Literature

The study used the Optimum Currency Area (OCA) that was developed from the seminal work of Mundell (1961). His work was further supplemented by the contribution of McKinnon (1963) and Kenen (1969). Optimum Currency Area (OCA) as advanced by Mundell (1961) defines an optimal geographical area within which one currency is applicable. The optimality was assessed by a number of criteria that evolves over time after the Mundell theory. These criteria include: the mobility of labour and price flexibility of Mundell (1961); the degree of economic openness of McKinnon (1962); production diversification of Kenen (1969); financial integration of Ingram (1962); and fiscal integration of Johnson (1970). Other criteria were from Flemming (1971) and DeGrauwe (1975) on similarity of inflation and trade-off between inflation and unemployment. Blanchard and Quah (1989), Bayoumi and Eichengreen (1992) focused on similarity of demand and supply shocks and business cycles synchronization.

The satisfaction of this traditional OCA theory are the pre-requisites to ensure optimality of the currency area. The 1980s saw the emergence of the new OCA theory as a result of the European Union project development. The new developments were: the monetary critique of the Philips curve (Friedman, 1968 and Lucas, 1972); credibility, time inconsistence and policy rules (Kydland and Prescot 1977, De Grauwe 1989 and 2000); the disputed role of the exchange rate (De Grauwe, 2000) and the endogeneity of OCA criteria (Frankel and Rose, 1997). They advocated for the positive effects of a monetary union, that is, the OCA criteria is probable to be satisfied after (ex-post). Empirical studies (Baxterand Kouparitsas, 2005; Darvas et al., 2005; Imbs, 2004; Inklaar et al., 2008; Rose, 2002) found out that countries with high trade relations tend to have highly correlated business cycles.

3.2 Empirical Literature

The study assesses the empirical literature by following key methodological approaches used to analyze the OCA theory; that is: correlation and co-integration. They isolate demand and supply movements using the Structural Vector Auto Regression (SVAR); co-integration analysis to assess the level of integration of real exchange rate movements using Generalized Purchasing Power Parity (GPPP); synthesis and evaluation of an OCA index over time to assess the extent of exchange rate convergence; and the gravity model estimation to isolate the trade effects of

monetary union and custom union. This will provide a clear understanding of the various techniques applied to test the optimality of the currency union.

3.2.1   Asymmetric studies; Structural Vector Auto Regression (SVAR) technique

The application of Structural Vector Auto Regressive (SVAR) technique to analyze currency area was introduced by Bayoumi and Eichengreen (1994). They borrowed it from Blanchard and Quah (1989), who had used it by applying time series data for real and nominal GDP growth to isolate demand and supply shocks. While analyzing the possibility of a currency union by the European Union, Bayoumi and Eichengreen (1994) established several probable currency areas within the European Union (Germany and its North European neighbours; North East Asia; and South East Asia).

Studies by Buigut and Valev (2005) used the SVAR methodology, following the methodology that was developed by Blanchard and Quah (1989) to assess if the EAC is an OCA. They investigated the asymmetric shocks of the member countries through the demand and supply shocks. The results from the study concluded that demand and supply shocks were not symmetric in the EAC. Therefore, the results did not support the creation of a monetary union.

Studies that investigated business cycles correlation and synchronization were conducted by, Debrun et al. (2010) and Kamaludin et al. (2011). Debrun (2010) conducted a fully-fledged cost-benefit analysis of monetary integration and applied it to some currency unions in Africa, including the EAMU. The study found that an average correlation on terms of trade for EAC member states in the period 1990-2007 was higher than those of West Africa Economic and Monetary Union (WAEMU) and Common Monetary Area (CMA) in South Africa. A further study by Kamaludin et al. (2011) found that EAC states do not differ significantly in cyclical components, hence lending some support to the feasibility of a monetary union.

3.2.2   Generalized Purchasing Power Parity technique

This technique uses co-integration analysis to assess the level of similarity in the movement of real exchange rate relative to a central dominant country. It was developed by Enders and Hurn (1994) to assess the extent to which a group of countries exhibit integration of their real exchange rates. It is presumed that real exchange rates depend on economic fundamentals that are capable of showing

similarities between economies and hence the suitability for a monetary union.

This methodology was used by studies by Mkenda (2001), Falagiarda (2010) and Buigut (2011). The model postulates that real exchange rates of countries envisaging a currency union should be co-integrated. The study by Mkenda (2001) found that during the period 1981 to 1998, the real exchange rates of the three EAC countries were co-integrated. Therefore they were likely to be affected by similar shocks. As a result, they are good candidates for a currency union. Using the same methodology, Falagiarda (2010) carried out the same study but with the expanded EAC. The study concluded that a monetary union is feasible in the EAC, but identified some country-specific or statistical weakness. A study by Buigut (2011) adds to these efforts by analyzing both real and nominal exchange rates in the EAC using data from 1991 to 2009. The study found partial convergence among member states. This was because some countries exhibited some convergence in the short run. In the long run, he was unable to find a common trend; hence caution has to be exercised in taking on a currency union.

3.2.3   An OCA index methodology

This methodology was developed by Bayoumi and Eichengreen (1997a, b, 1998a). They constructed an OCA index using a basic equation. The equation related the variability of a nominal exchange rate with several independent variables allied with the OCA theory. While assessing the European Monetary Union (EMU), they estimated the equation and compared it with a base or a "centre" country, which in their case was Germany over a number of different time periods. The dependent variable movement was compared with the OCA index, over time. They then used forecast to project into the future and diagrammatically group the countries into convergent, converging and non-converging sets. The OCA index therefore shows whether the OCA criteria are relevant in a particular area at a particular time. This study will pursue this methodology due to it robustness, and due to the fact that OCA index gives a loose indication of the most appropriate groupings of countries for a currency union.

3.2.4   Trade effects, gravity model technique

This methodology was developed by Rose (2002). These studies try to separate the trade inducing effect of a monetary union from other trade factors. Gravity models were found to be very useful and robust, returning significant coefficient on a constant basis. Using cross sectional approach, Rose (2002), found that common currency increases trade by three times between two countries. Later, Rose applied panel data technique to investigate the effects of currency union

membership using time series data. The empirical literatures based on this technique returned conclusive results and can make a useful contribution to assessing the benefits from a monetary union. Rose (1998) and Zhang (1995) concluded that trade creation can be construed as capturing many of the important benefits of a monetary union.

3.2.5   Overview of literature

The literature review has assessed both the theoretical and methodological analysis and highlighted the research gap that exists, with specific reference to EAMU. With no clear-cut chance for a monetary union and cautious approaches proposed on the formation of EAMU, there is need for further analysis on the feasibility of EAMU. On the basis of this, the study will construct an OCA index for EAC countries along the lines of Bayoumi and Eichengreen (1997a, b). This is due to the fact that OCA index gives a loose indication of the most appropriate groupings of countries for a currency union.

4. Methodology

4.1 Conceptual Framework

The dependent variable is the variability of nominal exchange rate, which in this case will be represented by the Optimum Currency Area index. The inter-relationship of the dependent and independent variable will aim at lowering the nominal exchange variability between member states. The variability of output captures the symmetric shocks. The lower the value of this variable implies relative symmetry in business cycle synchronization, hence lower value for the OCA index. Also, the asymmetric output movement captures asymmetric shocks in the output movement of agriculture and manufacturing sectors of their economies. The higher the dissimilarity in output movement, the lower the OCA index will be. On trade linkages, a higher trade linkage is an indication of closer cooperation and higher response to shocks, hence lower OCA index. The size of the economy determines the benefits that will accrue to economies. Smaller economies are expected to benefit more from unit of account, store of value and means of payment provided by a common currency. This inter-relationship is illustrated in Figure 4.1.

Figure 4.1: Conceptual framework
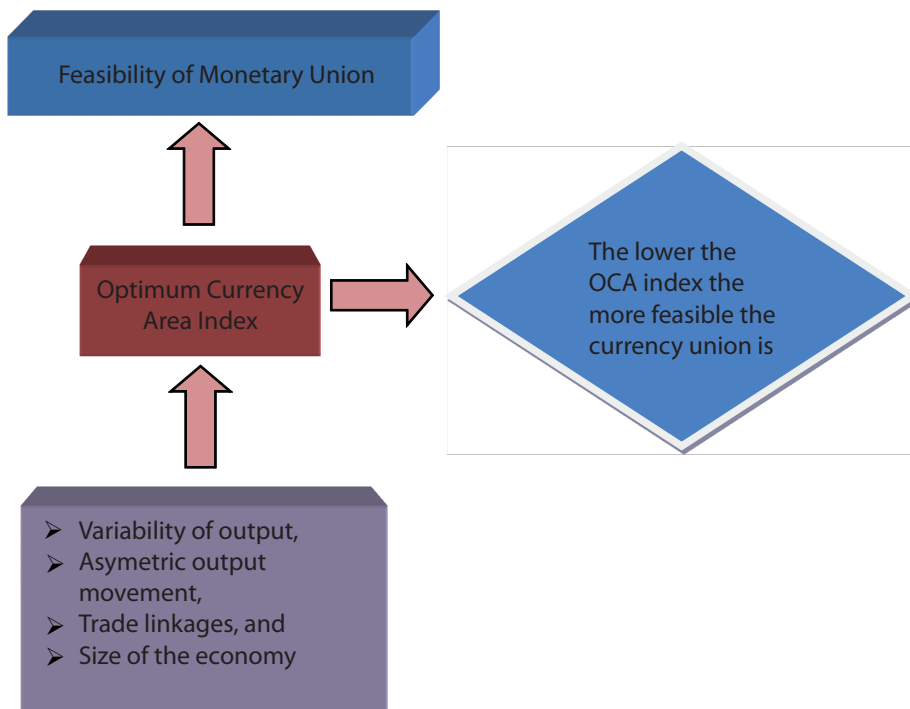
4.2 Empirical Model

The methodology used during this research was adopted from Bayoumi and Eichengreen (1997a, b and 1998a), who found that the OCA theory well explains well the variability of exchange rates and operationalize the OCA theory by constructing an OCA index, which indicates the readiness of the country to adopt a common currency. The dependent variable for the OCA index is based on the variability of the nominal exchange rate. Therefore, bilateral exchange rate volatility is computed as:

$$SD_{(eij)} = \text{Standard deviation } (\log_{erij}, t - \log_{erij}, t - 1) ....(1)$$

Where e_{ij} is the nominal exchange rate between country i and j in a given year. The nominal exchange rate was preferred than the real exchange rate, since it provides an easier benchmark for comparison to a single currency, where the variability of the nominal exchange rate is zero.

Therefore, the OCA index is the outcome of regressing nominal exchange rate variability on the OCA relevant criteria. In this respect, the explanatory variables that represent OCA criteria included in the model are as follows:

(a)   The asymmetry of business cycles ($SD(\Delta_i - \Delta_j)$) as measured by the standard deviation of the difference in the logarithm of real output between country i and country j

(b)   The differences in trade structures ($DISSIM_{ij}$) calculated as the sum of the absolute differences in the shares of agricultural and manufacturing trade in total merchandise trade

(c)   The share of bilateral trade in total trade ($TRADE_{ij}$) computed as the mean of the ratio of bilateral exports to domestic GDP for the two countries

(d)   The relative size of countries ($SIZE_{ij}$) calculated as the mean of the logarithm of the two GDPs (in US dollars)

These four variables stand for the basic OCA criteria and it is assumed that the more the OCA criteria are fulfilled among countries, the lower the variability of exchange rates should be, i.e. the better prepared they are to join a monetary union. As a result, the model is empirically specified as follows:

$$SD(e_{ij}) = \beta_0 + \beta_1 SD(\Delta_i - \Delta_j) + \beta_2 DISSIM_{ij} + \beta_3 TRADE_{ij} + \beta_4 SIZE_{ij} + e_{ij} ....(2)$$

Following the line of Bayoumi and Eichengreen (1997a, b and 1998a), the OCA index is obtained from regression panel analysis using an annual data set for EAC countries over the period 2000-2013.

The country taken as a numèraire to estimate the suitability of a monetary union is Kenya, because it is widely perceived as the core member of the EAC to which other potential participants need to converge.

Table 4.1: Variables used and expected signs

Variable	Description	Expected sign
Exchange rate variability: SD (e_{ij})	Standard deviation of the change in the logarithm of the end-year bilateral exchange rate	
Business cycle synchronization: SD (Δ_i - Δ_j)	Standard deviation of the difference in the logarithm of real output between each country pair	Positive
Dissimilarity of export commodity structure: DISSIM$_{ij}$	Sum of absolute difference in the share of agriculture and manufacturing trade in the total merchandise trade	Positive
Trade intensity: TRADE$_{ij}$	Mean of the ratio of bilateral exports to domestic GDP for the two countries	Negative
Economic size: SIZE$_{ij}$	Mean of the logarithm of the two GDPs measured in US dollars	Positive

The formal derivations of the above variables are as follows;

Table 4.2: Formal derivation of the variables

Variable	Formal derivation
Exchange rate variability	$SD(e_{ij}) = SD(\log e_{rij}, t - \log e_{rij}, t-1)$
Business cycle synchronization	$BSC_{ij} = SD(\Delta y_i - \Delta y_j)$
Dissimilarity of export commodity structure	$DISSIM_{ij} = 1/T\sum [\,\lvert A_{it} - A_{jt}\rvert + \lvert B_{it} - B_{jt}\rvert\,]$
Trade intensity	$TRADE_{ij} = 1/T\sum [ex_{ijt}/y_{it} + ex_{jit}/y_{jt}]$
Economic size	$SIZE_{ij} = 1/T\sum (\log y_{it} + \log y_{jt})$

4.3   Data Sources

The data used in the study was obtained from Kenya National Bureau of Statistics (KNBS), Central Bank of Kenya, IMF´s International Financial Statistics (IFS) and IMF Directions of Trade and World Bank databases.

5.   Empirical Estimation and Results

5.1   Diagnostic Tests

Before statistical analysis, it was important to ascertain to what extent the linear regression assumptions were satisfied. The following diagnostic tests were done:

5.1.1 Panel unit root test

In order to investigate the stationary properties of the panel data series, the presence of unit root was tested; that is, whether the variables are stationary at levels or not. Two methods were used to test for stationarity. The Fisher-type test and Harris-Tzavalis test. They have the null hypothesis that all the panels contain a unit root and the alternative series is stationary. Unit root results are reported in Table 5.1 below.

Table 5.1: Fisher-type test and Harris-Tzavalis unit root test

Variable	Fisher-type test (Philip-Perron test)	Harris-Tzavalis	
	Level	Level	1st Difference
Exchange rate variability	-7.7460**	0.3312**	
Variability of output	-0.7622***	0.1618**	
Dissimilarity of exports	-2.1956**	0.7542***	
Trade linkages	0.02667***	1.0575	-6.0824**
Size of economy	1.5453***	1.0019	-1.1618***
Openness	-0.1896***	1.0553	0.3494***
Financial development	-3.1676**	1.0310	-3.3396**
Inflation differentials	-0.9036**	0.2731**	

, *, denotes levels of significance, respectively

The Fisher-type unit root test shows that the variables are stationary at levels, while the Harris-Tzavalis shows that the variables' exchange rate variability, variability of output, dissimilarity of exports and inflation differentials are stationary at levels. The variables trade linkages, size of the economy, openness and financial development were not stationary at levels, but were stationary in the first difference. Since there was no problem of non-stationarity, the estimation was done with the variables being in levels.

5.1.2 Test for poolability of the data

In order to determine the appropriate model to use, the necessary tests where conducted: The F test for the fixed effect model and the Breusch-pagan Lagrange Multiplier (LM) test, and Hausman test if both fixed and random effects are present. In the fixed effect (F test or Wald test) if the null hypothesis is not rejected, it means there are no fixed effects. For random effects (Breusch-pagan (LM) test), if the null hypothesis is not rejected it means there are no random effects. The absence of both fixed and random effects implies that the data is pooled, and the estimation method to be used will be standard OLS using panel data analysis. It also implies that there is no need to go further and conduct the Hausman test. Poolability test results are reported in Table 5.1.

Table 5.1: Test for fixed and random effects

Test	2000-2004	2005-2009	2010-2013
F test for the fixed effect	0.2806	0.2226	0.1621
Breusch-pagan Lagrange Multiplier (LM) test for random effect	0.4499	0.2416	0.1211

From the above, we fail to reject the null for both fixed and random effects and conclude that there are no fixed and random effects. Therefore, the estimation will be by standard pooled OLS panel data analysis.

5.2 Estimation Results

The regression was run on repeated five-year averages from 2000 to 2013. This was based on econometric model in equation 2. The data did not portray multicollinearity, and no serial correlation since there was no natural ordering in the data and countries, and there was no problem of heteroscedasticity. The estimation results are reported in Table 5.2 for the period 2000-2004, 2005-2009 and 2010-2013. Results show that the variables that have the anticipated signs were, variability of output (2005-2009), dissimilarity of output (2000-2004), trade linkages, and economic size (2005-2009, 2010-2013). The coefficients are not statistically significant, except for variability of output (2000-2004), economic size (2005-2009) and dissimilarity of exports (2010-2013). This indicates a weak support of the empirical implications of the OCA theory in the EAC countries.

The variability of output (2000-2004) and (2010-2013) decreases variability of bilateral exchange rate variability. The dissimilarity in the commodity structure (2010-2013) of bilateral exports decreases bilateral exchange rate variability. The

positive sign on the size of the economy (2005-2009) is an indication that the larger the size of the economy, the greater the exchange rate variability.

Table 5.2: Estimation results

Variable	2000 – 2004	2005 -2009	2010 - 2013
Variability of output	-0.007***	0.012	-0.009
Dissimilarity of exports	0.083	-0.074	-0.450***
Trade linkages	-0.125	-0.861	-1.201
Size of economy	-0.008	0.013***	0.008
Number of observations	20	20	16
R - squared	0.38	0.45	0.27

***, Denotes significance at 10% level

The strength of the regressions in terms of their predictive power does not compare well with the results found by Bayoumi and Eichengreen (1997a, b and 1998a). For the period 2000-2004, the equation explains 38 per cent of variation in exchange rates while Bayoumi and Eichengreen (1997a) found an R^2 of 51 per cent. For the period 2005-2009, R^2 rises to 45 per cent then drops again to 27 per cent for the period 2010-2013, which may mean traditional OCA criteria explain less of the variability of the exchange rates in 2010-2013 than 2005-2009. The results on the dissimilarity of exports are not consistent with Kenen (1969), supporting the hypothesis that the more diversified the economies are, the better candidates they are for a currency union and vice versa. This is due to the fact that in a single product economy, workers who lose their jobs due to fall in exports cannot be absorbed into the economy.

5.3   Sensitivity Analysis

Several additional variables were tested to assess the robustness of the above relationship. Besides the "traditional" OCA criteria, other relevant variables were added. These were:

a)   Trade openness ($OPEN_{ij}$) - This variable measures the benefits from stabilizing the exchange rate as suggested by McKinnon;

b)   The level of financial development (FIN_{ij}), capturing Ingram's (1969) criterion of OCA stating that a stable and developed financial system should reduce the need for exchange rate adjustments; and

c) The inflation rate differential ($INFL_{ij}$), represents the similarity of inflation as proposed by Fleming (1971).

Table 5.3: Description and measurement of the additional variables

Variable description	Formulation	Expected sign
Trade openness; mean of the two countries ratios of trade (exports + imports) to its GDP	$OPEN_{ij} = 1/T\sum [(ex_{it} + im_{it}) / y_{it} + (ex_{jt} + im_{jt}) / y_{jt}]$	Indeterminate
Inflation differential; mean of the difference in the year-on-year CPI inflation rates for the two countries	$INFL_{ij} = 1/T\sum (\log \pi_{it} + \log \pi_{jt})$	Positive
Financial development; mean of the M2 GDP ratios of each country pair	$FIN_{ij} = 1/T\sum (M2_{it} / y_{it} + M2_{jt} / y_{jt})$	Negative

Thus, with the addition of the variables, the equation to be estimated was:

$$SD(e_{ij}) = \beta_o + \beta_1 SD\ (\Delta_i - \Delta_{yj}) + \beta_2 DISSIM_{ij} + \beta_3 TRADE_{ij} + \beta_4 SIZE_{ij} + \beta_5 OPEN_{ij} + \beta_6 INFL_{ij} + \beta_7 FIN_{ij} + e_{ij} \dots \dots \dots (3)$$

The results are reported in Table 5.3. Generally, most of the variables did not have the expected signs. The R^2 for the periods were 59 per cent, 55 per cent and 27 per cent, respectively. The coefficients are not statistically significant, except for trade openness (2000-2004), and economic size (2005-2009). As indicated earlier, this shows a weak support of the empirical implications of the OCA theory. Again, as the R^2 is lower for the 2010-2013, the results confirm the hypothesis that the model explains more of the exchange rate variability in the 2000-2004 and 2005-2009 than in the 2010-2013.

The coefficient on variability of output and dissimilarity of exports are not statistically significant. This might probably be due to the fact that the EAC countries exhibit both a large similarity in their output cycles and export structures. Therefore, these two variables may convey the same information, which can explain the fact that the dissimilarity of exports is not significant. Therefore, including the additional regressors does not change much the estimates of the traditional OCA variables. Nevertheless, a few of the new results are informative.

For instance, Money M2 to GDP ratio was not significant; this implies that the ability of M2 to GDP to decrease the level of exchange rate variability is lacking for the EAC countries.

Table 5.4: Variability of bilateral exchange rates

Variable	2000 − 2004	2005 -2009	2010 - 2013
Variability of output	-0.003	0.001	-0.008
Dissimilarity of exports	0.109	-0.119	-0.452
Trade linkages	-0.448	-0.941	-1.199
Size of economy	0.009	0.012***	0.008
Openness	-0.173***	-0.048	0.001
Financial development	0.076	-0.0007	-0.013
Inflation differentials	-0.0007	-0.0003	-0.0001
Number of observations	20	20	16
R − squared	0.59	0.55	0.28

***, denotes significance at 10% level

The results were consistent with the study by MacKinnon (1963), which envisaged that the more open an economy is, the greater the need for fixed exchange rates to prevent any price instability caused by exchange rate fluctuations. Thus, greater openness is associated with exchange rate variability. In addition, Flemming (1971) hypothesized that members of a currency area should at least have similar inflation rates. A large difference in inflation rates means that fixed exchange rates cannot be maintained. This makes common monetary policy difficult due to potential conflict in monetary policy goals of member countries.

In general, the variables proposed by the OCA theory seem not to play a sufficient role in determining the bilateral exchange rate variability in the EAC countries. Thus, traditional OCA is less applicable in developing countries. This supports the fact that developing countries felt it necessary to maintain greater control of exchange rate movements in order to manipulate the exchange rate movements. This is in line with the findings by Adams (2005) who found that traditional OCA theory is less applicable in developing countries.

5.4   The OCA index estimation

In this respect, the values of individual variables were combined by calculations of a single variable, i.e. the OCA index, indicating the degree of the country's readiness for the adoption of a single currency (Bayoumi and Eichengreen, 1997a, b and 1998a). They postulated that the long term variability of bilateral exchange

rates should reflect the level of fulfilment of the OCA criteria irrespective of the actual exchange rate arrangement. Therefore, countries meeting the OCA criteria were expected to experience low volatility of bilateral exchange rates.

The OCA index is the predicted value of exchange rate variability in the given period adjusted for exchange rate variability based on the OCA criteria. The result is interpreted as a measure of the readiness for the adoption of a single currency. The lower the values of OCA index, the higher the benefit-cost ratio for monetary integration for the given pair of countries.

The results of the estimates of the indices are reported in Table 5.5. These were obtained by substituting for the values of the coefficiencies and the independent variables in equation one, for the periods 2000-2004, 2005-2009 and 2010-2013. The resulting OCA index for the period 2000-2004 is relatively low reflecting sufficient convergence of the EAC economies compared to the two periods (2005-2009 and 2010-2013).

Table 5.5: OCA index

	Index		
	2000-2004	**2005-2009**	**2010-2013**
Burundi	0.0146236	0.026854	0.038848
Rwanda	-0.0625827	0.095189	0.41344
Tanzania	-0.074567	0.10066	0.394702
Uganda	-0.0684724	0.074109	0.342302

Table 5.5 presents the OCA index estimates for Kenya vs EAC countries based on actual regression relationship estimated. As shown, the readiness of Kenya for a common currency with the EAC countries in the period 2000-2004 was quite low compared to the other two periods. This means that as the index increases, the less optimal the EAC countries are for the monetary union. In general, there is an increase in the OCA index for all the countries from period 2000-2004 to 2005-2009. Therefore, the results indicate that structural convergence of Kenya with EAC, which is expected to continue, still has a long way to go. Furthermore, the findings suggest that the benefit that is expected to accrue from common currency seems to be less than the cost of common currency accession. The result does not seem to favour a fixed exchange rate between the EAC economies.

6.   Conclusion and Policy Recommendations

6.1   Conclusion

The objective of this research was to assess whether it would be optimal for Kenya to form a currency union with the other EAC countries. It assessed the overall costs and benefits relating to Kenya's accession to the EAC monetary union. The review of macroeconomic convergence criteria reveals that there is no considerable advancement in meeting them, given the fact that the first and the second stage of implementation has elapsed. Therefore, it is clear that the EAC member states appear not to have converged. Though the commencement date for a monetary union has been postponed, there is a lot that needs to be done for member states to converge, without which monetary union will be difficult to attain. In other words, the cost of currency union in terms of macroeconomic policy foregone are more than the benefits related to transaction costs.

The question of whether the EAC is suitable for a monetary union was addressed by operationalizing the OCA theory. This was achieved by the construction of the OCA index for the EAC member states, with Kenya as a numeriè country. The estimated indices obtained in the study suggested that not all EAC members are equally prepared, and thus should not advance at the same speed to a monetary union. The level of trade linkages and openness by the EAC member states portrays the unsuitability in the formation and adoption of a monetary union. Though there seems to be an increase in intra-regional trade, it is not significant enough to warrant the formation of a monetary union. Therefore, there is need to enhance the level of intra-EAC trade so that monetary union is beneficial to member states. On the other hand, dissimilarity of export and the size of the economy did not suggest any benefit of a monetary union for the EAC.

In a nutshell, EAC member states do not constitute an OCA, and the suitability of an EAC monetary union at the moment is not viable. This is due to the fact that low inflation rate, sustainable debt levels, and fiscal management are aspects of macroeconomic stability rather than macroeconomic convergence.

6.2   Policy Recommendations

The study highlighted the following policy implications:

(i)   There is need to increase trade among the EAC member states. This can be done through the full implementation of a Custom Union and common market protocols.

(ii)   There is need for harmonized formulation and implementation of macroeconomic policies, and harmonization of financial, banking and political systems.

(iii) The EAC institutions should be strengthened to improve surveillance and power to sanction member states that do not comply with EAC policies.

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