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"Exchange rate dynamics and monetary integration in the EAC contries"

Simone Maciel Cuiabano and Maxwell Opoku-Afari

Toulouse School of Economics

EXCHANGE RATE DYNAMICS AND MONETARY INTEGRATION IN THE EAC COUNTRIES

Simone Maciel Cuiabano[i] *and Maxwell Opoku-Afari*[ii]

Abstract: A major challenge for most countries in Sub-Saharan Africa is the evaluation of the exchange rate. This is more so in the East African Community (EAC) where macroeconomic and exchange rate management has been in particular challenged by massive foreign aid inflows partly as a result of Heavily Indebted Poor Countries (HIPC) initiative and other debt reliefs. In addition; improved macroeconomic management in the last decade attracted both short and medium to long term inflows to the region, as foreign investors turn to developing and emerging economies for yield. In this paper we estimate the fundamental equilibrium exchange rate (FEER) model for all the countries in the EAC and we assess the convergence of existing exchange rate regimes in the EAC. Our main contribution is that this exercise may contribute as a useful background for the ultimate decision of which exchange rate management framework will best fit the region during the transition period to monetary union.

JEL: F31; F41; C32

Keywords: Real exchange rates; EAC countries; cointegration; exchange rate regimes.

Introduction

East African Community (EAC)[1] overdependence on commodity exports is a bless and a curse in terms of exchange rate. Maintaining competitiveness and a greater flexibility allowing the exchange rate dynamics to be driven by the underlying macroeconomic fundamentals is a key policy challenge. This has even been stressed with the drive to form a monetary union – which then calls for establishing an appropriate exchange rate management during the transition period.

With relatively sustained period of good policies that have attracted both official and private capital inflows to the region, the challenge to avoid the "Dutch Disease" syndrome has also further complicated exchange rate management (Younger, 1992 and Corden and Neary, 1982). In addition, a general move towards greater exchange rate flexibility in the region complicated exchange rate management in these countries (see Table 1). A major contribution to policy making in the region would be to establish whether the existing exchange rate regimes have led to convergence and which different exchange rate regimes would better serve the monetary integration better.

In this paper we estimate the fundamental equilibrium exchange rate (FEER) model for all the countries in the EAC and we assess the convergence of existing exchange rate regimes in the EAC. Our main contribution is that this exercise may contribute as a useful background for the ultimate decision of which exchange rate management framework will best fit the region during the transition period to monetary union.

This paper contributes to the literature in two ways: it applies the concept of an equilibrium exchange rate for a recent dataset of African countries which is unique regarding the application of this methodology. Secondly, giving the recently EAC political compromise

[1] Burundi, Kenya, Rwanda, Tanzania and Uganda.

to stabilish a single currency area by 2024[2], this work evaluates the differences between estimated and real equilibrium exchange rate in the region. Calculated estimatives shows that countries in the region have been receiving similar shocks, reflecting a similar behavior over the real exchange rate – which is preferable in a monetary union. However, the design of a proper monetary union goes way beyond an exchange rate analysis, which we discuss later in the conclusion.

TABLE 1

Exchange Rate Regimes in the EAC countries

1. Burundi maintains, de jure and de facto, a managed float. However, it has a multiple currency practice and it also maintains certain foreign exchange restrictions for security reasons.
2. Kenya maintains an exchange system free of restrictions on payments and transfers for current international transactions.
3. Rwanda's exchange rate system is classified as a conventional peg. Rwanda maintains a system free of restrictions on payments and transfers for current international transactions.
4. Tanzania maintains an exchange system free of restrictions on the making of payments and transfers for current international transactions. Tanzania maintains a floating exchange rate regime.
5. Uganda maintains an exchange system free of restrictions on the making of payments for current international transactions.

Source: International Monetary Fund (IMF) Country Report No. 08/282, August 2008; IMF Country Report No. 10/26, January 2010; IMF Country Report No. 09/58, February 2009; IMF Country Report No. 09/179, June 2009; IMF Country Report No. 09/79, March 2009.

[2] East African Monetary Union (EAMU) Protocol was signed in November 30rd, 2013.

Literature Review

Despite the collapse of the Smithsonian Agreement in 1973, a great number of countries retained some inflexibility in exchange rate regimes. As most countries did not move to a freely market determined exchange rate, setting the appropriate value of the nominal exchange rate remained a major challenge to macroeconomic policy making. The challenge has been (and continues to be) the avoidance of long periods of misalignment, especially in developing countries that are dependent on exports of raw materials (commodities etc.) as a major source of foreign exchange inflows (Montiel and Hinkle, 1999). The severe macroeconomic crisis during the 90's brought back the importance of "getting the exchange rate right" to constantly maintain a competitive environment.

Edwards (1989) earlier attempts to provide theoretical underpinnings of exchange rate misalignments in developing countries. He defined the equilibrium real exchange rate as the relative price of tradables to nontradables. This relative price results in simultaneous attainment of both internal and external equilibrium for set of given sustainable steady state values and other relevant variables – such as taxes, international prices, and technology. By this definition, there is internal equilibrium when the goods market (nontradables) clears in the current period and it is expected to be in equilibrium in the future period. Similarly, external equilibrium is achieved when the actual and future current account balances are compatible with long-run sustainable flows.

Edwards (1989) identified key variables that influence both the internal and external positions of an economy, called "fundamentals". These included terms of trade, government consumption of nontradables, capital flows, trade and exchange rate control, investment position and measure of technological progress. Using these fundamentals, he estimated different equations for the equilibrium real exchange rate for 10 countries chosen by data

availability[3] with pooled data and fixed-effects estimation techniques with country specific dummies. The conclusion is that excess supply of credit, represented by the government consumption of nontradables, contributes to an appreciation of the real exchange rate; and similarly, an increase in the terms of trade and technological progress causes the real exchange rate to appreciate. However, he found that capital inflows tend to depreciate the exchange rate.

Recent works have overcome challenges with data and econometric methodologies by estimating the long-run equilibrium real exchange rate (ERER) for African countries. For example, Iimi (2006) estimated the behavioral equilibrium real exchange rate for Botswana; Loukoianova and Iossifov (2007) did a similar exercise for Ghana; Bems and De Carvalho Filho (2009) estimated for the oil exporting countries; Eyraud (2009) does the estimation for Madagascar.

Dufrenot and Yehoue (2005) made a major contribution to the empirical literature in Africa by estimating the ERER using a panel cointegration and common factor analysis. They derived a number of common factors that explain the dynamics of the real exchange rate in the sample and found that fundamentals such as productivity, terms of trade, and openness were strongly related to those common factors in low-income countries[4], but no such link was found for the middle-income countries.

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[3] Brazil, Colombia, El Salvador, Greece, India, Israel, Malaysia, Philippines, South Africa, Sri Lanka, Thailand and Yugoslavia. Annually data was used from 1963-1983, depending of the country.

[4] Low-income countries: Bangladesh, Benin, Burundi, Burkina Faso, Cameroon, Chad, Democratic Republic of Congo, Republic of Congo, Côte d'Ivoire, Ghana, Gambia, Haiti, Indonesia, Kenya, Lesotho, Madagascar, Mali, Mauritania, Malawi, Niger, Nigeria, Nepal, Rwanda, Senegal, Togo, Uganda, Zambia, and Zimbabwe.

The link between aid and the "Dutch Disease" has been explored by a number of studies which observe the macroeconomic management and increased aid inflows to most African countries. Sy and Tabarraei (2010) did not find relevant evidence between real exchange rate and foreign aid in a pool of developing countries, however, Opoku-Afari et al. (2004) found that capital inflows appreciated the real exchange rate in Ghana depending on the degree of reversibility of the capital inflows. Even though different studies continue to find mixed results between capital inflows and real exchange rate (RER), with increased inflows to Sub Saharan African (SSA) countries in the last decade, it is still relevant to empirically test the relevance of capital inflows as a key fundamental driving real exchange rate in this region.

Theoretical Model

In line with Montiel (1999), we consider a two composite goods market (tradables and non-tradables) and define internal balance (IB) as the condition where the non-tradables goods market clears in the current period and is expected to be in equilibrium in the future on the assumption that production of all non-traded goods is consumed by both governments and households. This is expressed as equation (1) below.

$$y_N(e) = c_N + g_N = (1-\theta)ec + g_N \qquad (1)$$

where y_N is the supply of non-tradable goods given full employment, e is the real exchangerate, c is total private spending, with θ being the proportion of this total private spending on traded goods and g_N represents government consumption of non-traded goods. The above shows the IB position where the real exchange rate (RER) is inversely related to consumption. This follows from the fact that, if we start from an initial equilibrium IB position, then an increase in private spending (c) results in an excess demand for non-tradable goods at the initial real exchange rate. To restore equilibrium, a real exchange rate appreciation is required to promote supply of non-tradable goods and increase demand for tradable goods.

Similarly, the external balance (EB) is defined as the current account balance that is compatible with long-run capital flows. This is represented as:

$$\dot{f} = y_T(e) - g_T - (\theta + \tau)c + z + rf \qquad (2)$$

where $\dot{f}$ is change in net foreign assets over time, f is total net foreign assets, r is the real yield on the foreign assets (measured in traded goods), $y_T(e)$ is the production of traded goods locally, g_T is government consumption of traded goods, c is total private consumption with θ representing the proportion of private consumption on traded goods, τ captures transaction costs associated with private spending, with z and rf capturing net aid inflows and external debt service respectively.

Equation (2) states that EB is given by trade balance (that is, domestic output of traded goods net of local consumption of these goods) and net aid inflows minus costs on foreign debt. In equilibrium, EB has a positive relationship between consumption and RER because, assuming it started from an equilibrium position (initial EB), an increase of private spending would generate a current account deficit at the original real exchange rate. To restore equilibrium, RER must depreciate. Depreciation would then switch demand towards non-traded goods and supply towards traded goods. As established so far, whereas an increase in private spending in IB yields to appreciation of the real exchange rate (that is increase in the supply of non-traded goods), a similar shock in EB yields depreciation and promotes an increase in the supply of traded goods. The overall effect of the two markets, that is IB and EB, produces the equilibrium real exchange rate which is consistent with the fundamentals determining the RER.

By setting equation (2) to zero, the EB is then defined by the trade balance, aid inflows and foreign debt.

$$y_T(e) = g_T + (\theta + \tau)c - z - rf \qquad (3)$$

Solving equations (3) and (1) simultaneously yields the equilibrium exchange rate that should be a function of:

$$e^* = e^*(g_N, g_T, r, z, \pi) \qquad (4)$$

where π is the rate of inflation in the domestic price of traded goods and r is the world interest rate.

Elbadawi (1994) and Baffes et al. (1997) both modified equation (4) by including policy variables such as terms of trade and productivity. This paper will adopt both proposed modifications.

Regression Results – Panel Cointegration Analysis

We used a balanced panel data for the 5 EAC countries from 1980 until 2015 (180 observations) to investigate the long-run relationship between the real effective exchange rate a set of fundamentals in the region.

We estimate equation (4) using the panel procedure because of the increased power that may be gained by accounting not only for the time-series dimension but also for the cross-sectional dimension. A representation of the long-run behavior in a panel is done by estimating the equation using DOLS[5]. The empirical estimation is approximately:

$$LREER_{it} = \alpha_i + \beta_{1i} LTOT_{it} + \beta_{2i} LOPEN_{it} + \beta_{3i} LAID_{it} + \beta_{4i} LGEXP_{it} + u_{it} \qquad (5)$$

Where LREER is the logarithm of the ratio of the traded-weighted index of foreign wholesale prices expressed in local currency to the home CPI. LTOT is the logarithm of the index of relative prices of exports to imports (goods and services). LOPEN is the logarithm of imports

[5] Dynamic Ordinary Least Square (see Kao and Chiang (2001)).

plus exports ratio to GDP. LAID is the total official aid receipted in dolar, converted to local currency, to nominal GDP ratio. LGEXP is the logarithm of nominal government consumption to nominal GDP ratio, measuring how government expenditure on non tradables occurs.

Panel estimation of equation (5) requires equilibrium errors to be stationary. First, we evaluated if the real exchange rate and the fundamentals are nonstationary. We test each variable for a unit root using Levin et al. (2002) and Im et al. (2003). The results in Table 2 point that we cannot reject the null of unit root using either the Levin-Lin-Chu or Im-Pesaran-Shin tests.

TABLE 2.

Panel Unit Root Tests

Tests	**REER**	**OPEN**	**TOT**	**AID**	**Gov. Exp.**
Levin-Lin-Chu	-0.6445	-0.1371	-1.7153*	-0.3732	0.1013
	(0.2596)	(0.4455)	(0.0431)	(0.3545)	(0.5403)
Im-Pesaran-	-0.0767	-0.4673	-1.0339	-0.9497	-1.0878
Shin	(0.4694)	(0.3201)	(0.1506)	(0.1711)	(0.1383)

Pooled ADF test, 2 lags, using constant. Adjusted t*, p-values in parenthesis, 2 lags, using constant.* Rejected at 1%. Tests ran in Stata 14.

Source: own calculations.

We found evidence that real exchange rates and the fundamentals are nonstationary, so we performed panel cointegration tests to look for stable long run relationships among them. If a set of variables is cointegrated, the residuals from the cointegrating equation should be stationary. Table 3 presents the results for the Kao and Pedroni panel cointegration tests. The null hypothesis for all of the tests is that the residuals of the cointegrating vectors contain unit

roots, implying no cointegration. The null hypothesis of no cointegration is rejected for the Kao test and for 4 out of 7 statistics in the Pedroni test. Thus, overall we reject unit roots in the residuals of the cointegrating vectors. This is the same as finding strong evidence for cointegration of real exchange rates, openness degree, terms of trade, aid flow and government expenditure.

TABLE 3.

Panel Cointegration Tests

Kao Residual Cointegration Test*			
ADF	-5.0989		
	(0.000)		
Pedroni Residual Cointegration Test**			
Panel v-Statistic	Panel PP-Statistic	Panel rho-Statistic	Panel ADF-Statistic
--0.0366	-2.2789	-0.7310	-2.2810
(0.5146)	(0.0113)	(0.2324)	(0.0113)
Group rho-Statistic	Group PP-Statistic	Group ADF-Statistic	
0.0215	-1.6413	-1.6210	
(0.5086)	(0.0504)	(0.0525)	

* No deterministic constant or trend. Automatic 9 lags choice using Schwarz Information Criterion.

** No deterministic constant or trend, Automatic Schwarz Info Criterion with a max lag of 7.

P-values in parenthesis.

Source: own calculations using Eviews 9, student version lite.

Under the assumption of I(1) cointegrated variables, the pooled mean group estimator (PMG) of Pesaran, Shin and Smith (1999) is one recent solution for cointegrating panels. The model takes the cointegration form of an autoregressive distributed lag model and adapts it

for a panel setting by allowing the intercepts, short-run coefficients and cointegrating terms to differ across cross-sections.

In order to assess the speed at which the real exchange rate adjusts towards its long run cointegrating relationship the model is estimated in an error correction specification. This includes changes of the real exchange rate on the lag of the error correction term as well as on lagged changes of the real exchange rate and of the other right hand side variables entering the baseline. The coefficient of the error correction term was of 0.17 suggesting that a shock to the gap would have a half life of about 3.5 years[6]. Table 4 reports the estimation results.

TABLE 4.

Regression Results

Long-run	
LTOT	0.479
	(5.11)
LOPEN	-0.434
	(-4.03)
LAID	-0.078
	(-1.26)
LGExp	-0.148
	(-1.46)
Short-run	
Intercept	0.290

[6] The half-life of a unit shock (the amount of time it takes for 50 percent of the effect of the shock to die out) can be inferred from coefficient of ECM term in error correction equation using the following formula: ln(0.5)/ln(1+error correction coefficient) (David et al., 2014).

	(1.80)
Δ LREER	0.183
	(1.65)
Δ LTOT	-0.06
	(-2.17)
Δ LOPEN	0.116
	(0.95)
Δ LAID	-0.177
	(-3.82)
Δ LGExp	-0.065
	(-1.308)
Error correction term	-0.177
	(-1.737)

Source: own calculations using Eviews 9, student version lite.

All variables, except terms of trade, were associated with real exchange rate depreciation. Government consumption associated with real exchange rate depreciation is usually the case under the presumption that government spending on tradables is higher than private spending. An improvement in the terms of trade causing an appreciation to the real exchange rate is the case of a strong substitution effect.

Aid inflows are in the long run associated with a more depreciated exchange rate, potentially indicating a positive effect on productivity in the nontradable sector relative to the tradable sector. Aid is generally considered to push up domestic prices (especially of nontradables), thus leading to a real exchange rate appreciation (Dutch disease) in the short-run, i.e. when the supply side of the economy has not had a chance to adjust. In the long run, however, an increase in aid would be consistent with real exchange rate depreciation if it

would raise productivity of nontradables relative to the productivity of tradables (Torvik, 2001). This is due the fact that in most cases aid to these countries (and for that matter most SSA) have higher import content, thus implying higher degree of reversibility of foreign exchange inflows (leakages). Opoku-Afari et al. (2004), for example, found similar results for Ghana. Countries where aid causes appreciation could be the case of greater part of the (untied) aid flow going to direct budget support.

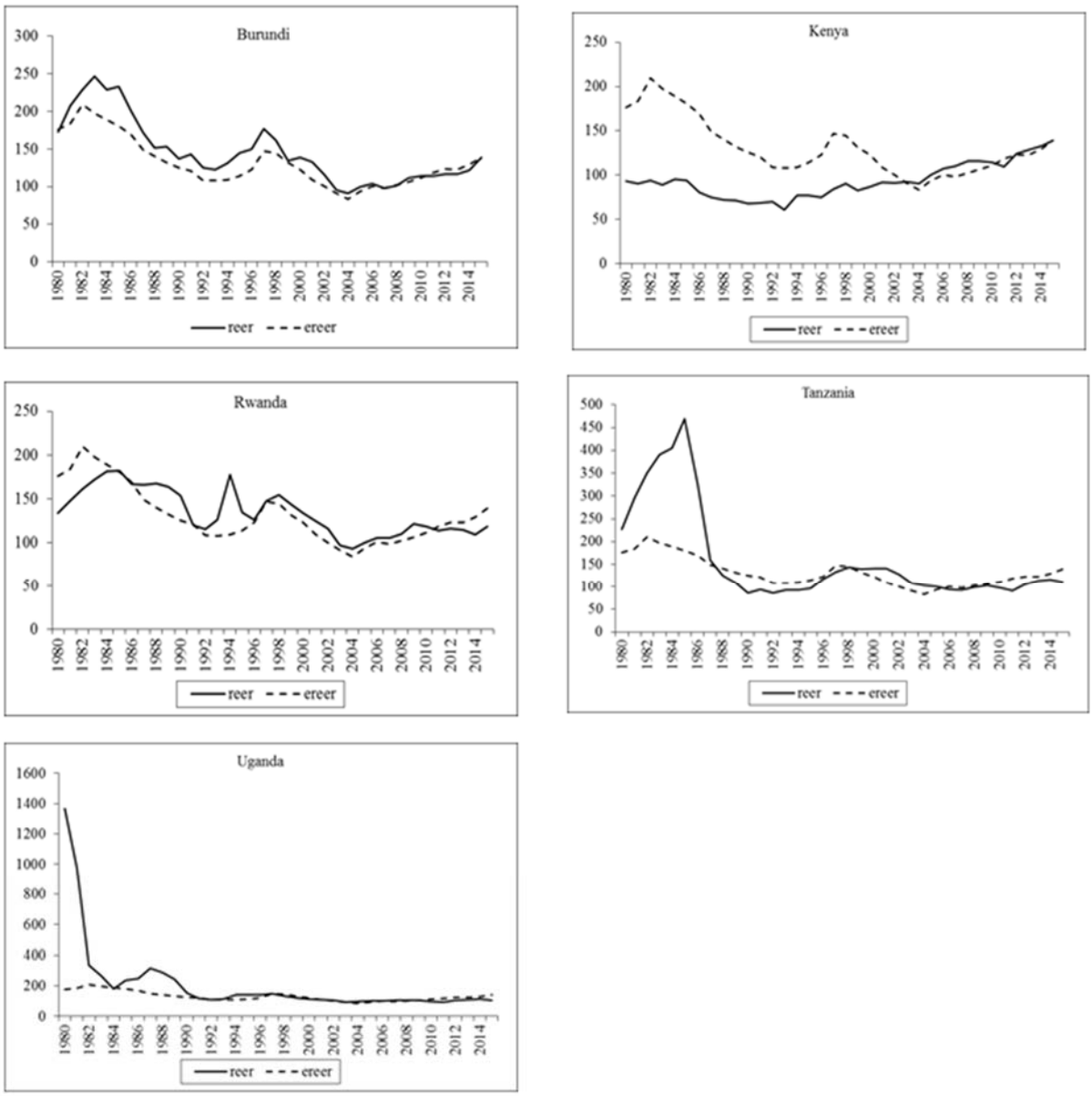
A higher degree of openness, as expected by the literature, is associated with real exchange rate depreciation. All coefficients are statistically significant, with the exception of terms of trade.

Equilibrium Exchange Rate

Using the long-run estimated coefficients in the panel and the countries' specific effect we estimate the equilibrium exchange rate by each country and compare it with the real exchange rate as shown in Figure 1.

FIGURE 1.

Equilibrium Exchange Rate



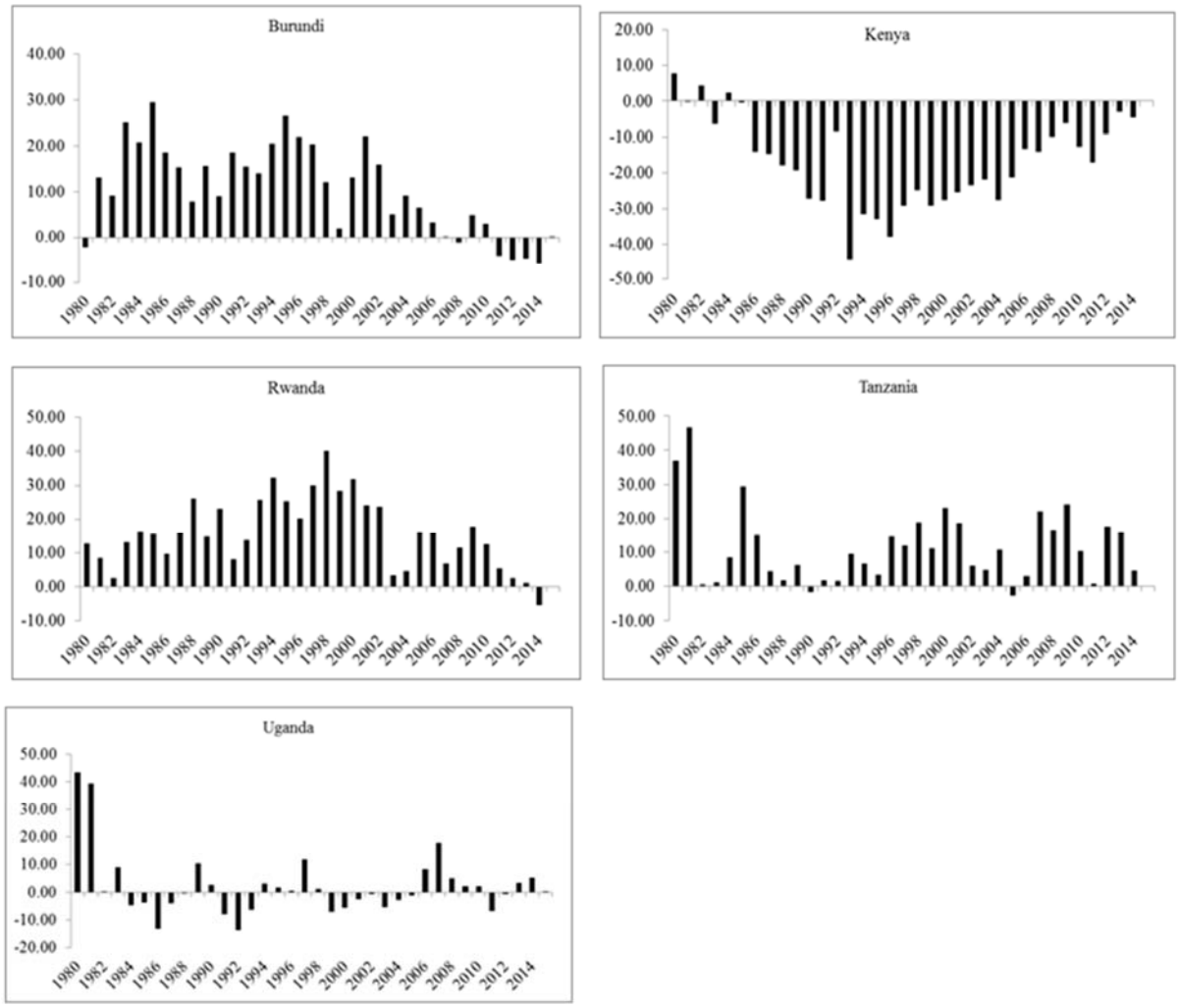
Source : own calculations

In general, the actual real effective exchange rate appears to be broadly in line with the fundamentals in all the countries. In the last years, most of the real exchange rates in the region are overvaluated in relation to the estimated exchange rate – similar result obtained using the univariated analysis. The differences between the two models occurred mainly in

Burundi and Kenya, where there was a greater percentual difference. Figure 2 plots the degree of misalignments measured as $RER_{mis} = \frac{RER - ERER}{ERER}$.

FIGURE 2.

Degree of Misalignment



Source : own calculations

Exchange Rate Regime and Monetary Union—Which Way for the EAC

The observed long-run real exchange rate among the EAC countries suggests a reduction in misalignment and that it takes approximately 3.5 years to restore a long-run equilibrium following distortions in the region. This might be an indicator that the region has been receiving similar shocks, reflecting a similar behavior over the real exchange rate. This

similarity is important because, as pointed by Beetsma and Giuliodori (2010), when countries are both ex-ante and ex-post identical (that is, they all have the same finance needs and are hit by identical shocks), monetary unification is preferred to autonomy.

From the perspective of each individual country, policy responses to the shock are optimal and the government budget constraint is properly internalized in the policy decisions, while distortions (the incentive to generate an inflation surprise) are alleviated with the union central bank internalizing the cross-border externalities of inflation surprises. With countries that are identical in terms of finance needs, but not necessarily in terms of shocks, the choice between unification and autonomy generally involves a trade off among the effects discussed above.

Monetary union implies the adoption of a single currency and countries agree in fixing their exchange rate. So, they must agree on a joint design of monetary policy and on the division of seignorage revenues. The common monetary policy helps to stabilize the exchange rate and, as a relative price between two currencies, the cost of resisting to a speculative attack should be smaller. Since the five countries have similar trade pattern (based on commodity exports), monetary unification eliminates the possibility of nominal exchange rate adjustments among its members and effectively forces countries to coordinate their national monetary policies. The common monetary policy conducted by the union's central bank allows countries to achieve the same outcomes for output, but with lower inflation.

The adoption of a common currency brings up a question about the exchange rate regime. A growing recent literature analyzes monetary unions in the context of micro-founded New-Keynesian type of models characterized by nominal rigidities and imperfect competition. Examples are Benigno (2004), which is extended by Beetsma and Jensen (2005) to include fiscal policy. These papers characterize optimal policies in monetary unions. However, in

terms of maximum achievable welfare, these unions are indeed generally dominated by a flexible exchange rate regime. Other related contributions are Pappa and Vassilatos (2007), Galí and Monacelli (2008) and Ferrero (2009).

The advantage of monetary autonomy in New-Keynesian models also depends rather critically on the degree of exchange rate pass-through in import prices, as demonstrated by Corsetti and Pesenti (2002) and Devereux and Engel (2003). The standard assumption is that there is full pass-through. However, in reality prices of imported products often show only limited variation in response to exchange rate changes. The simple two-country exposition in Corsetti (2008) shows that when pass-though is completely absent, i.e. prices are preset in the currency of the destination market (also referred to as local currency pricing), the optimal monetary policies under autonomy effectively result into a fixed exchange rate.

Of course, the choice to join a monetary union can bring benefits but it implies costs. Table 6 summarizes benefits and costs of having a common currency.

TABLE 5.

Benefits and Costs of the Adoption of a Common Currency

Benefits	Costs
- Reduced transaction costs from currency conversion;	- Loss of the ability to use the monetary policy to respond to country-specific macroeconomic disturbances;
- Reduced accounting costs and greater predictability of relative prices for firms doing business across the region;	- Loss of the ability to use inflation to reduce the real burden of public debt;
- Insulation from monetary disturbances and speculative bubbles that might lead to unnecessary fluctuations in real exchange rate;	- Political problems may arise in determining how member countries split seignorage revenue;
- Less political pressure for trade protection because of shifts in real exchange rates.	- Speculative attacks may arise during the transition from individual currencies to a common currency.

Source: Obstfeld and Rogoff (1996).

Conclusion

Evidence from the estimations show that the actual real exchange rate have moved broadly in line with the fundamentals in all the countries in the EAC in recent years, as shown by reducing misalignments over time (Figure 2). The analysis showed that it takes approximately 3.5 years to restore a long-run equilibrium following distortions in the region.

The panel analysis showed that all fundamentals were associated with the real exchange rate in the region, mainly having a depreciating effect. For instance, if government consumption is related with real exchange rate depreciation, it is usually the case that

government spending on tradables is higher than private spending. An improvement in the terms of trade also depreciates the real exchange rate which might be the case of a higher income effect than the substitution effect. Aid inflows are in the long run associated with a more depreciated exchange rate, potentially indicating either a positive effect on the productivity in the nontradable sector or to the fact that aid inflows have higher import content, causing leakages. A higher degree of openness, as expected by the literature, is associated with real exchange rate depreciation.

Estimated long-run real exchange rate among the EAC countries suggests a reduction in misalignment for all countries, excepting for Burundi and Kenya. Diminishing misalignments indicate the region has been receiving similar shocks, reflecting a similar behavior over the real exchange rate. This similarity is important because a monetary unification is preferred under each country's autonomy, suggesting the implementation of a common currency in the region might benefit all countries.

Challenges to the design of a proper monetary union go way further though. First movements regarding the integration of the EAC countries started in 1967, but the union collapsed in 1977 when Tanzania closed its border with Kenya. Hazlewood (1979) points that the monetary union idea was abandoned after the failure to find an acceptable system for a regional central banking. Other issue regarding the integration is the absence of a sovereign regional body to overlook individual's countries policies. As an intergovernmental treaty, any economic shock solution depends on the individual governments' cooperation.

A major requirement for the success of the Monetary Union and the EAC is the continuation of the cultivation of excellent relations and peace between the countries. Further research in the area could include institutional quality analysis as approached by Nnyanzi, Babyenda and Bbale (2016).

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[i] Postdoctoral fellow, Toulouse School of Economics. 21 Allee de Brienne, Manufacture des Tabacs, MH 206, Toulouse, France. Corresponding author: simone.cuiabano@tse-fr.eu.

[ii] International Monetary Fund, 700 19th Street, N.W., Washington, D.C. 20431, United States.
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