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# PROSPECTS FOR A MONETARY UNION IN THE EAST AFRICA COMMUNITY: SOME EMPIRICAL EVIDENCE

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Abstract

This paper examines GPPP and business cycle synchronization in the East Africa Community with the aim of assessing the prospects for a monetary union. The univariate fractional integration analysis shows that the individual series exhibit unit roots and are highly persistent. The fractional bivariate cointegration tests (see Marinucci and Robinson, 2001) suggest that there exist bivariate fractional cointegrating relationships between

## 1. Introduction

This paper aims to assess the prospects for a monetary union in the East African Community (EAC), a group of six countries intending to achieve a common monetary policy and currency by 2024, by considering some of the conditions for an Optimal Currency Area (OCA). More specifically, it applies fractional cointegration methods to test whether Generalized Purchasing Power Parity (G-PPP) holds in the EAC. In addition, it examines business cycle synchronisation by using the Hodrick-Prescott (HP) filter to decompose GDP into trend and cyclical components and measure the degree of correlation between the latter in this set of countries. Because South Sudan joined the EAC only in April 2016, and therefore very few observations are available for this country, the analysis focuses on the other five members of the union only.

Unlike earlier studies on the EAC based on the classical I(0)/I(1) dichotomy

Kenya, Tanzania and Uganda have

labour, persons, services and capital. Recently, in April 2016, South Sudan also joined the EAC.

The process of creating a monetary union started early, but proceeded slowly. Thus, in 2007 the EAC member countries decided to fast-track it, with the intention of signing a protocol to establish the East African Monetary Union (EAMU) in 2012; this was finally signed in 2013, while its actual implementation, initially planned to be completed by 2015, is now expected to take several years, at least until 2024. The experience of other monetary unions clearly shows that it is a complex project, with non-negligible risk of failure, and therefore it is essential to ensure that the requirements for a successful EAMU are met.

## 3. Generalized Purchasing Power Parity and Optimal Currency Areas

Generalized Purchasing Power Parity (G-PPP) for m countries in a world of n countries requires that there exists a long-run equilibrium cointegration relationship between the m-1 bilateral real rates. When G-PPP holds, the real exchange rate between two countries can be expressed as a weighted average of the other real rates in the currency area. These weights reflect not only trade linkages, but also technology transfers, immigration and financial flows.

G-PPP can be interpreted in terms of an Optimum Currency Area (OCA), that is, a group of regions or countries with economies closely linked by trade in goods and services and by factor mobility for which it is ideal to adopt a single currency or a group of currencies pegged to each other and fluctuating together vis-à-vis other currencies. According to Mundell (1961), under the assumption of short-run rigidity of prices and wages and no factor mobility, a group of economies can be considered an OCA if they experience the same types of real disturbances. The volume of intra-regional trade

models with unit roots were normally specified. However, the I(0)/I(1) dichotomy is a rather restrictive assumption, since the differencing parameter required to obtain stationarity is not necessarily an integer but could be any real value as in the case of fractionally integrated or I(d) processes belonging to the long-memory category.

Long memory implies that observations which are far apart in time are highly correlated, and this property can be captured in a fractional integration framework. A fractionally integrated, or I(d) model, , can be expressed in the following form:

(1)

where d can be any real value, L is the lag-operator ($Lx_t = x_{t-1}$) and $u_t$ is I(0), defined as a covariance stationary process with a spectral density function that is positive and finite at the zero frequency. The polynomial in equation (1) can be expressed in terms of its binomial expansion, such that, for all real,

and thus

In this context, plays a crucial role since it indicates the degree of dependence of the time series. The higher the value of is, the higher the level of association between the observations will be. Specifically, if d = 0, $x_t$

external shocks disappear in the long run, in contrast to the case G • hen Z they persist indefinitely.

There are several methods for estimating and testing the fractional differencing parameter d. Some of them are parametric while others are semi-parametric and can be and Robinson (2001) as well as multivariate tests as in the Fractionally Cointegrated Vector AutoRegressive (FCVAR) model introduced by Johansen (2008) and further expanded by Johansen and Nielsen (2010, 2012). This is a generalization of Johansen´s (1996) Cointegrated Vector AutoRegressive (CVAR) model which allows for fract processes of order d with cointegrating order d-b. Consider first the well-known, non-fractional, CVAR model. Let $y_t$, t = 1, 2, …, T be a p-dimensional I(1) time series. The CVAR model is specified as

(4)

The simplest way to derive the FCVAR model is to replace the difference and lag operators and in (5) with their fractional counterparts, and ,

respectively. We then obtain

(5)

which is applied to such that

(6)

where is p-dimensional independent and identically distributed with mean zero and covariance matrix . The parameters have the usual interpretations from the CVAR model. Thus, . and are matrices, where . The columns of are the cointegrating relationships in

Nielsen and Morin (2016) provide Matlab computer programs for the estimators and test statistics.

## 5. Empirical Results

We employ monthly data on real exchange rates from 1990 up to 2015 obtained from the IMF’s International Financial Statistics. These series are shown in F

The estimated coefficients imply that external shocks have opposite effects in the case of the former British territories compared to Burundi and Rwanda

Finally, we analyse business cycle

independence. Although theoretically different, the CFA currencies from each of the two regions are effectively interchangeable and have a fixed exchange rate to the euro.

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Figure 1: Real Exchange Rates of the member countries of the EAC

Figure 2: EAC Trend and Business Cycles from 1960 up to 2011 obtained with the Hodrick -Prescott filter

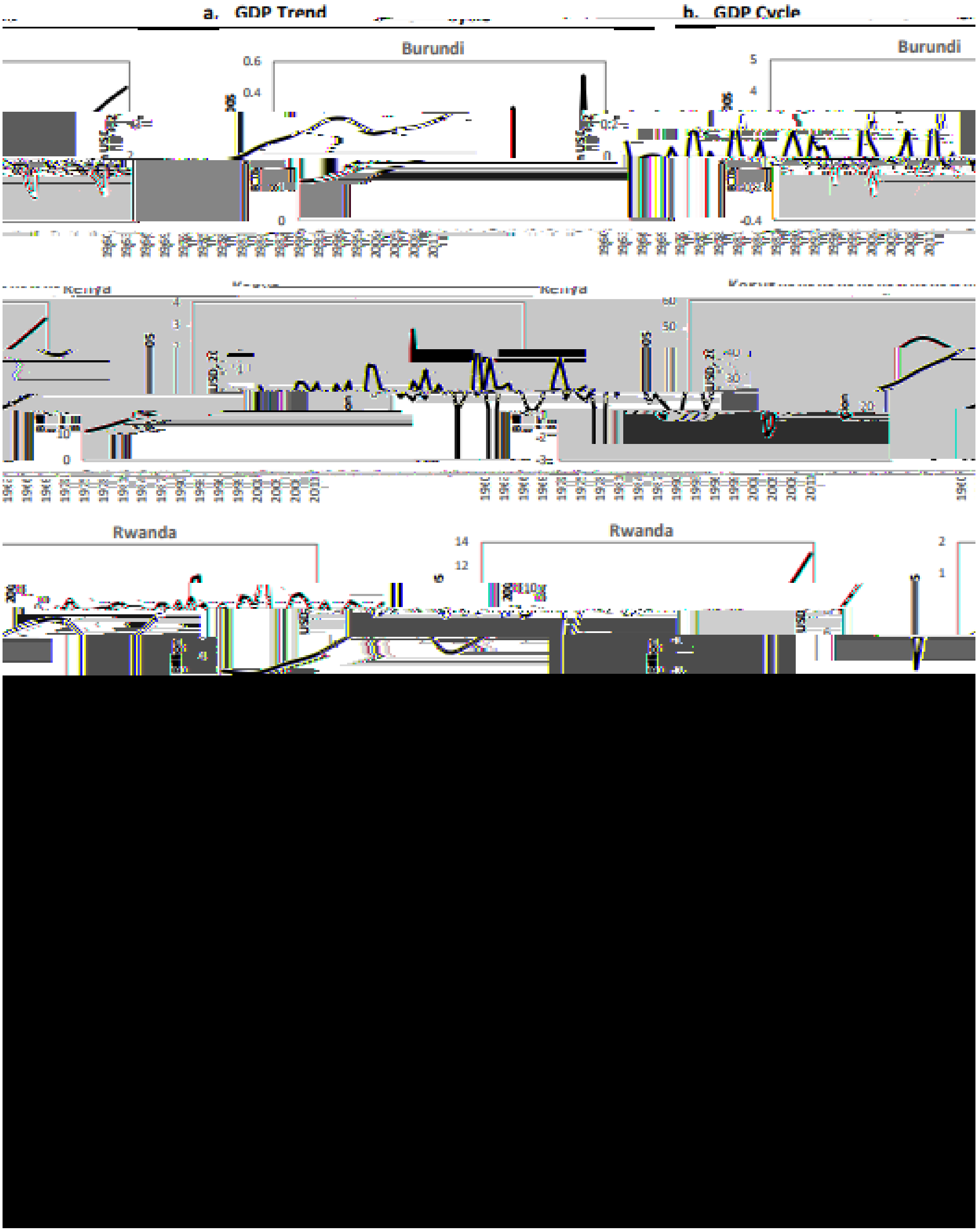

Table 1: Unit root test results (level)

| Regions | Countries | ADF | | KPSS | | ERS | |
|---|---|---|---|---|---|---|---|
| | | Intercept | Trend | Intercept | Trend | Interceptpt | Trend |
| EAC | Burundi | -12.02117*** | -12.26035*** | 0.633800** | 0.066219 | 0.460858*** | 1.319934*** |
| | Kenya | -12.87034*** | -12.97026*** | 0.285753 | 0.099174 | 0.213165*** | 0.796350*** |
| | Rwanda | -16.41462*** | -16.66984*** | 0.465540** | 0.129004* | 0.269527*** | 0.995164*** |
| | Tanzania | -13.82535*** | -14.02910*** | 0.488859** | 0.065768 | 0.141447*** | 0.515228*** |
| | Uganda | -19.73215*** | -19.70431*** | 0.066046 | 0.037295 | 0.217988*** | 0.810317*** |

Table 2: Estimates of d using a parametric approach

| | Countries | Differencing parameter |
|---|---|---|
| East African Community | Burundi | 0.98 (0.88, 1.11) |
| | Kenya | 0.94 (0.82, 1.07) |
| | Rwanda | 1.01 (0.91, 1.15) |
| | Tanzania | 0.74 (0.65, 1.06) |
| | Uganda | 0.85 (0.75, 1.01) |

Table 3: Bivariate cointegration relationships within the EAC

| | Burundi | Kenya | Rwanda | Tanzania | Uganda |
|---|---|---|---|---|---|
| Kenya | 0.127<br>0.938<br>0.987 | --- | --- | --- | --- |

RwandaRwanda

Table 5: GDP Business Cycle Correlation 1960-2014