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# Creation, Dissolution And Rebirth Of An Economic Union And Business Cycles Length. The Case Of Eac (East African Community) And Lessons For Eu

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## ABSTRACT
This paper is explaining the relationship between EAC foundation and temporary dissolution and business cycles length. Has the participation in a multinational organization changed their frequency? How a breakup of this scheme could affect them? This innovative work can explain the effects of leaving or joining a multinational union. Initially; we used GDP per capita growth annual data for each country (Kenya, Tanzania and Uganda respectively) for 64 years (1950-2013). The data was cut for each country in four pieces one before the 1967 one between 1967 and 1977 and one on the year of integration of 2000 and after. Then we selected their spectral density plots in order to find periodicity eliminating the background noise from a periodogram. The results show that the effects of integration exist in all countries for both cases with the exception of Tanzania for the latter integration. On the breakup case all countries seem to raise their cycle periodicity.

## General Terms
Business cycles, Integration, economic integration.

## Keywords
EAC, developed and developing economies, economic growth.

## 1. INTRODUCTION
The present work is explaining the periodicity of business cycles for the four East African Community (EAC) (Burundi, Kenya, Rwanda and Tanzania respectively) where possible long term benefits of integration are present and obvious given by earlier works(Evangelopoulos and Dapontas (2012), Dapontas and Evangelopoulos (2013)). Have the EAC countries benefitted from this effect? What happens in the case of a union detachment? Do the participating countries notice any business cycles synchronization during the unification period? The cycles treated the same way in both integrations? A sixty four years sample is deployed (1950-2014) for investigating the frequency of the countries' business cycles. In the first part we make a short introduction presenting the arising questions. On the next part we present the past works related to the business cycles synchronization and enlargement through integration. The third part makes a short abstract of EAC history. Methodology and spectrum analysis are presented in forth part. The fifth section presents the results and finally conclusions and further research proposals are given on the last one.

## 2. PAST WORKS RELATED TO BUSINESS CYCLES LENGTH
The importance of the business cycles length examination is significant for the whole economic process. A nation will choose to join a monetary union or association focused around long haul financial, political and social advantage. The bigger business cycles offer

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solidness against worldwide financial turbulence, for example, happened on the 2008 to present European debt crisis and its significance, include political certainty and raise social and financial success and welfare in the taking part nation.

Early spectral analysis research was particularly based on Kondratieff cycles focused around Van Ewijk (1982) where very long term cycles (50 years or more) for the developed nations have been dissected. The econometric outflow which got to be conventional created via Kydland and Prescott (1991) where innovative stuns and the development models were evaluated because of the econometrics blast amid this period.

The development of international trade among the nations helped the monetary relations among them in the 90s and 00's until the worldwide emergency on the end of the decade. Reyes (2003) considered on conventional methodology built a typical premise for contrasting results with diverse nations. In addition to different results he presumed that the inner parts impacts were to a great degree high amid the 1980's. Their cyclical impact must be analyzed and decided. Kose, Meredith and Towe (2004) concede that budgetary linkages have higher level of synchronization of both production and economic output. They also have demonstrated these hypothetical presumptions and the business cycles appear to synchronize. They asserted that the relationships catch just the contemporaneous comovements of macroeconomic variables and not changes connected with leads and lags. To confront these issues they pick latent factor dynamic model. Their sample started in 1980 and end in 2002 (22 years). The results confront that Mexico faced real rivalry from the other taking an interest nations and it needed to alter its creation introduction whether the increment in fares inside zone. In this manner Mexico needs to change keeping in mind the end goal to face the intra-business exchange development, the administrative schema obstructions and the security issues inside the nation.

Cruz (2005) Proposed a corrected variant of Minsky's model incorporated with the three states plan of action of switch administration model proposed by Clements M. and Krolzig (2001), financial liberization impacts the business cycle solidness. In this way when the monetary deregulation procedure dispatches the business cycle length changes as in the economy is prone to last more in the extension stage and recessions may be shorter and declines or upstages stronger and sharper. The years 1980-2000 for Mexico were more insecure than the past and the economy appear to be more vulnerable. The length of the business cycle is shorter than the developed nations of NAFTA and it has been changed to shorter cycles.

Comparative studies were additionally distributed for the EU. The instance of EMU nations examination has been broke down by Altavilla (2004). Utilizing a set of econometric methods of union examination and a Hamilton –Markov switching model is utilized to examine Eurozone economies business cycle. The results propose that there are contrasts in the EMU nations cycles size and timing notwithstanding the comparative example and the basic primary recessionary period

On the same subject Bergman (2004) has examined the way that financial joining has influenced the synchronization and the importance of business cycles among the taking an interest nations. In view of bandpass filtered data they infer that they get to be more comparative over the long term. They found that cycles are significantly synchronized particularly on high adaptable exchange rates periods. More synchronization as indicated by Bergman has bigger relative importance.

In a latter work (Benalal et. all 2006) have researched the relationship between the change of the GDP structure and its development and the synchronization of the European nation's business cycles. They assumed that there is no upward or descending pattern in the 1970-2004 period. They have contemplated this soundness to distinctive patterns to demographics and to structural changes that occurred previously. The pattern of synchronizing among the nations has climbed over the 1990's. The level of connection in yearly and quarterly inform.

The European Union is examined by a paper demonstrating the possible synchronization between the existed union and a new member (Bulgaria) cycles (Filis et. Al 2010). Their dynamic model covers 77 quarters without using any lags between the cycles aiming on synchronization especially during stochastic shocks. The results show that both cycles follow the same pattern for all the period under examination.

In a set of studies (Evangelopoulos and Dapontas 2013 and Dapontas and Evangelopoulos 2013) for the EU and NAFTA business cycles, the authors examined the business cycles for 9 EU nations and all 3 NAFTA nations compared to 4 non EU parts for a long time (1950-2012). The results demonstrate that the nations the first years of increase have a tendency to have littler cycles than they used to have changing from 15 to 24 years. On the second stage the cycles had the same span with the ones in the recent past. The cycle length after a measure of years ascends structuring a J curved. The J growth bend alludes to EU got to nations therefore it's an impact of their choice to gain entrance. They checked a set of four non EU part nations the results demonstrate that the cycle on the same period for these nations didn't change. The nations arrived at their past cycles length in a 20-25 years period. Prior got to nations were less inclined to the current worldwide monetary smash than their followers or nonparticipant nation is by all accounts at a historic high.

## 3. A SHORT HISTORY OF EAC

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Countries in the regional area of eastern Africa have long term relations since early 20th century. The custom union between Kenya and Uganda signed in 1917 joined by Tanganyika in 1927. The memorandum of inter-territorial co-operation signed among the three colonies in 1948 formatting East Africa commission. This agreement included a customs union, a common external tariff policy, currency and postage. They dealt with common services in transport and communications, research and education. Following independence, these integrated activities were reconstituted and the High Commission was replaced by the East African Common Services Organization, which was supposed to lead to a political federation among the three founding parts. The new organization ran into difficulties because of the lack of joint development planning and fiscal policy coordination, different political policies and Kenya's dominant economic and resource position. In 1967 the East African Common Services Organization was superseded by the East African Community. This body aimed to strengthen the ties between the members through a common market, a common customs tariff and a range of public services so as to achieve balanced economic growth within the region.

In 1977, the East African Community collapsed after ten years of existence. Causes for the collapse included demands by Kenya for more seats than Uganda and Tanzania in decision-making organs, disagreements with Ugandan dictator Idi Amin who demanded that Tanzania as a member State of the Community should not harbor forces fighting to drop members government, and the difference between economic systems of Tanzania (socialistic) and in Kenya(Capitalistic). The three member states lost over sixty years of co-operation and the benefits of economies of scale, and integration, favoring Kenya's will. Each of the former member states had to embark its older counterparts, at great expense and at lower efficiency, upon the establishment of services and industries that had previously been provided at the Community level on a country one. Following the dissolution of the former East African Community in 1977, the Member States negotiated a Mediation Agreement for the Division of Assets and Liabilities, signed in 1984.However, as one of the provisions of the Mediation Agreement, the three States agreed to explore areas of future co-operation and to make concrete arrangements for such co-operation.

Negotiations for reestablishment begun in 1993 and the heads of state signed the Agreement for the Establishment of the Permanent Tripartite Commission for East African Co-operation on November 30, 1993. The union became fully operative in 1996 when the secretariat of the Commission was launched at the Headquarters of the EAC in Arusha, Tanzania. In 1997 the initial organization began its transformation to a treatment. The agreement of the treaty has signed after several rounds of public negotiations was signed in Arusha on November 30th of 1999 entering in to force on July 7th 2000. Common legal frameworks of the union as long as customs union become operative in 2005. The enlargement of 2007 included Burundi and Rwanda to the union as full members. Protocol for the establishment of a monetary union in 2013 signed. A set of countries of the region (Sudan, South Sudan and Somalia respectively) applied for being parts of a second wave of a plausible enlargement, but the Union has rejected the applications of Sudan and Somalia and delayed the negotiation process of South Sudan due to ongoing internal conflict.

## 4. METHODOLOGY AND MODEL USED

Spectrum analysis is concerned with the investigation of cyclical examples of information; the reason for the examination is to disintegrate a complex time series with cyclical components into a few of fundamental sinusoidal (sine and cosine) functions of particular wavelengths. By recognizing cyclical parts, we will learn something about the phenomenon. As a consequence of effective examination one may reveal simply a set of repeating cycles of diverse lengths in the time series of interest, which at first looked pretty much like random walk.

The wave length of a sine or cosine function is typically expressed in terms of the number of cycles per unit time (frequency), denoted with f. The frequency in time terms for example yearly, may be monthly (N=12), annual (N=1) or even weekly (N=52). The period T of a sine or cosine function is defined as the length of time required for one full cycle. Thus, it is the reciprocal of the frequency, or: T = 1/f. The monthly cycle expressed in yearly terms, would be equal to 1/12 = 0.083. There is a period length of 0.083 years.

The decomposing issue is casted as a linear multiple regression problem where the dependent variable is the observed time series and the independent variables are sine functions of all possible discrete frequencies. Such a linear multiple regression model may be written as:

$$x_t = a_0 + \sum [a_k * \cos(\lambda_k * t) + b_k * sin(\lambda_k * t)] \ \ (for\ k = 1\ to\ q)$$

From classical harmonic analysis $= 2 * \pi * f_k$ , where the constant π = π = 3.1$\bar{4}$ and $f_k = \frac{k}{q}$ . Cosine and sine parameters are regression coefficients that tell us the degree to which the respective functions are correlated with the data. There are q different cosine and sine functions. The number of functions cannot exceed the number of the data points. There are N data points in the series, there will be $(N/2) + 1$ cosine functions and (N/2)-1 sine functions. If there is a large correlation (cosine or sine coefficient) is identified, we can conclude that there is a high periodicity of the denoted frequency or period in the data.

The sine and cosine functions are mutually independent, thus we sum that the squared coefficients for each frequency obtain the periodogram. It can calculated as:

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$P_k = (sine\ coeff_k^2 + cosine\ coeff_k^2) * \frac{N}{2}$

Where $P_k$ the periodogram value at frequency f and N is the overall length of the series. The periodogram values are noted as the variance of the data at the respective frequency or period. The periodogram values are generally plotted against the frequencies or periods.

The periodogram values are subject to substantial random fluctuation, and they have many chaotic spikes. Spectral density is a smoothed version of the periodogram presented. It eliminates the noise from a periodogram, allowing the underlying structure to be more clearly isolated.

In practice, when analyzing actual data, it is crucial to identify exactly the frequencies for its particular sine or cosine functions. The smoothing is accomplished through weighted moving average transformation. The moving average window is of width *m* (which must be an odd number).

The most popular is the Tukey – Hanning window. Its weights are:

$W_k = 0.54D_p(2\pi f_k) + 0.25D_p(2\pi f_k + \frac{\pi}{p}) + 0.23D_p(2\pi f_k - \frac{\pi}{p})$ *where k=0...p.*

P is the integer part of number of the spans divided by 2, $W_k$ is Diriclet kernel of order *p*.

We have also checked whether the series are normally distributed. We used the Jarque-Bera test for normality which measures the difference of the skewness (*S*) and Kurtosis (*K*) of the series with those from the normal distribution. The statistic is computed as:

$$Jarque - Bera = \frac{N}{6}(S^2 + \frac{(K-3)^2}{4})$$

Additionally, we have checked for autocorrelation which is critical because the only variable we have is autocorrelated GDP per capita. We use the ADF test to control null hypothesis $H_0$ which in our case is the random walk of the series. Consider a simple AR (1) process:

$$Y_t = \rho Y_{t-1} + e_t$$

If $\rho$ is equal larger than 1 then the series is non-stationary and the variance of Y increases with time and approaches infinity, otherwise Y acts as a trend- stationary series. Thus the null hypothesis is rejected if $\rho$ is less than 1. Under the ADF test:

$$Y_t = aY_{t-1} + e_t$$

Where $\alpha = \rho - 1$ two hypotheses can be written as:

$$H_0: \alpha = 0$$

$$H_1: \alpha < 0$$

And estimated using the conventional t-ratio for α:

$$t_a = \frac{\hat{a}}{se(\hat{a})}$$

Where $\hat{a}$ the estimation of α and se ((a)) is the coefficient standard error. Under the null hypothesis the statistic doesn't follow the student's t distribution and they derive asymptotic results and simulate critical values for various samples and results. The hypothesis is tested under the t- ratio.

## 5. THE MODEL RESULTS

We selected a sample of the 3 EAC old (before 2009) members (Kenya, Tanzania and Uganda respectively).GDP per capita series is of course non stationary, so we used GDP per capita growth annual data for each country for 63 years (1950-2012) in order to check the length of the business cycles. The sample was cut for each country in four pieces one before the year of EAC foundation (1950-1966), the second one refers to the years of its first operation (1967-1977) the third lays on the period (1977-2000) and finally the last covers the years of reconstruction (2000-2013) in order to see the periodicity change over the years. We used the Conference Board and Groningen Growth and Development Centre, Total Economy Database, as it was on December 2014 report. We had also quarterly data for all these countries, but when we checked its ability to find periodicity was overlapped by series noise. We used the statistic software SPSS™ for this analysis and its tool of spectral analysis with weight Tukey – Hanning and span 3 the closer odd integer higher than the smallest period (One year for this sample). We plotted spectrograms comparing the changing periodicity. The spectrograms results are given to the table below.

**Table 1: Spectral analysis results for EAC**

| Country | 1950-1966 | 1967-1977 | 1977-2000 | 2000-2013 |
|---|---|---|---|---|
| **Kenya** | 33 | 48 | 7.5 | 10.75 |
| **Tanzania** | 11 | 21 | 6 | 6 |

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| | | | | |
|---|---|---|---|---|
| **Uganda** | 24 | 38 | 8 | 19 |

As we can see Kenya had very large cycle compared to other counterparts due its stronger financial position. After the first integration its cycle enlarged to 48 years reaching a Kondratieff level cycle. After dissolution its cycle frequency raised to 7.5 years as an effect of this division and finally the remake of the union lowered the periodicity slightly to 10.75 years. In the case of Tanzania the cycle was initially smaller than Kenya's with the effect of unification it almost doubled its years to 21. The 1977 divorce caused a periodicity raise to 6 years only. The result of the latter unification hasn't been detected yet following the dissolution period cycle of 6 years. Finally Uganda had a 24 year period initially stepped up to 38 years during first merge following by an 8 year cycle during separation period until 2000 union recreation where periodicity lowered to 19 years.

At the point when a nation joins a global association its production orientation is not clear enough on essential stages. The needs change and they lead creation to specialization, in light of the fact that the nations can now import less expensive and larger amount of innovation from abroad partners bringing higher engineering level to a union through trade union's components simpler that information import made some time recently. Conventional businesses in minor nations close as a result of higher rivalry level subventions can't be compelling enough because of absence of past experience on taking care of them. The entire economy framework particularly in lower improvement nations needs to change to meet the union's higher benchmarks. The nations move being developed times trusts from possible primary sector activities such as farming and crude materials creation to the assembling division where the cycles have a tendency to be littler and costs instability higher.

High putting resources into innovation from abroad impacts essential equalization of the import nation, raising its shortage. The entire production can't be completely customized because of the creating nature of the economy's future structure, so the businesses that the nation will be particular are under recreating and economy's stroll to further improvement is arbitrary in light of the fact that the introduction is not all that reasonable on the first stage. (Stage I).

This turbulences to the economy that brought on littler recurrence cycles end when the economy thinks that its introduction in the union's structure. Basic Balance shortfalls decrease and economy enters a period of high improvement utilizing the base and the early years ventures (Stage II).

On the third Phase the economy has restored it's adjust and the cycles length is equivalent to the preunion's ones. The early impacts of the joining passed and economy from now on can prompt an effective way of accepting settling advantages from the union.

On the fourth stage makes participation on a union beneficial after the first years of interest. Specialization had impact on making a solid and strong economy and the long haul speculation that made were fruitful. In this manner, the nation has now greater and smoother cycles than in the recent past. For the majority of the countries despite their economic development or freedom level such an integration is favorable. The early difficulties don't discourage many neighbor countries from creating similar unions where trade effects are obvious and long term cooperation seem to follow its successful path.

But sometimes dissolution incentives are high. Especially in possible differences in trade and economic policy as older political system differences have been dissolved in the later years. Whenever a political disintegration occurs leaving countries face major problems on competitiveness decline among the members of the union and their trading partners. Tariffs to national level of wages will be implied as an effect to this drop in order to maintain a possible level of international trade and possible FDI attract. Citizens' freedom will also be restricted. Monetary effects are also present. International markets hit severe possible weak links of the union. Lending cost rises and country risk becomes higher. In the case of early EAC all of these disadvantages led latter these countries to reform their community latter on a new stronger basis.

## 6. CONCLUSIONS

The results of the unification or the dissolution seem to be different from country to country. Kenya as a country in stronger economic position seem to have and enlarge its cycle frequency in both unifications periods while during breakup its cycle frequency raised to a level higher than Ugandan one (7.5 to 8 respectively). Uganda had a smaller cycle than

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Kenya lowered its frequency as expected in both integration eras noticing a raised periodicity during separation period leaving the effects of unification. Tanzania as the least economic strong partner surprisingly didn't manage during the second EAC period to lower its cycle periodicity although it had achieved this community advantage on the first union era. Present work could also be useful lesson for EU countries and especially the weaker ones. In a plausible dissolution they will have to extend their production base to many industries by decreasing their imports and their citizens' economic and political freedom leaving specializations and trying through national production to create their own products or alternatively find possible partners through countries that weren't parts of the existing union. Nations that were in stronger economic position such as Kenya will face less problems than their weaker counterparts in creating the path for their future. In any case they will hit severe in a breakup case. This work presented the effects of integration which were known of other cases confirming the rule of the cycle's enlargement effect having major advantages on economic stability and dissolution which were unidentified and as shown are connected to economic activity discouragement, cycle frequency raise and economic underachievement.

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