

Regional Economic Integration and Incomes Convergence: A Case Study of the Economic Community of West African States

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Abstract

With a view to taking advantage of the region's economic potentials, a group of 15 West African countries signed a treaty in Lagos, Nigeria on 28th May, 1975, leading to the establishment of the Economic Community of West African States (ECOWAS). The principal objective was to promote co-operation and integration in economic, political social and cultural activities in the fifteen West African States. This study, therefore, aims at assessing the extent to which regional integration in West Africa has promoted incomes convergence in the region. The study utilizes two approaches of measuring incomes convergence, namely, sigma and conditional Beta Convergence. The results from the sigma convergence regression indicate no convergence in income per capita but rather growth in income per capita amongst ECOWAS member states. This is because; the coefficient of the trend variable is positive and significantly different from zero. From the Conditional Beta Convergence regression, the results show that the speed of incomes convergence for ECOWAS member states is approximately 17% per annum, implying that any short-run shock that puts the economies of the sub-region into disequilibrium may take a longer period to attain the steady state. This thus calls for further action in accelerating the pace with which member states meet the ECOWAS convergence criteria.

Keywords: regional integration, incomes, convergence, West Africa, economies, criteria

1. Introduction

Achieving the benefits of regional integration, and indeed globalization, remain a critical part of Africa's development strategy. Following the attainment of political independence since the early 1960s, many African countries started advocating for regional integration arrangements with the principal objective of boosting potentials for economic growth through policy coordination amongst strategically located economies. A good number of studies supporting regional integration arrangements argue that regional integration promotes trade flows between member countries and thus encourages resources allocation according to the competitive advantage of a country (Piazolo, 2001; Asante, 1999; and Hitiris, 1991). It is believed that it enhances the productivity of the countries involved; induce more efficient investments which in turn create spill-over effects due to the externalities generated by exports and imports (De Rosa, 1998). Regional economic integration fosters trade amongst member countries by advocating for policies of trade liberalization and systematic dismantling of trade barriers through harmonization of external tariffs, facilitation of free movement of people and co-ordination of fiscal and monetary policies.

In Africa, the predominance of small and often land-locked economies has been an important consideration for regional economic integration. In essence, regional integration is perceived as an important factor that will facilitate economic development and economic convergence. This has been demonstrated through the establishment of the African Union (AU), which adopted the European Union and its institutions as a model, hence the incorporation right at the start of the ambitious vision of an AU central bank, similar to the European Central Bank (McCarthy and Du Plessis, 2001).

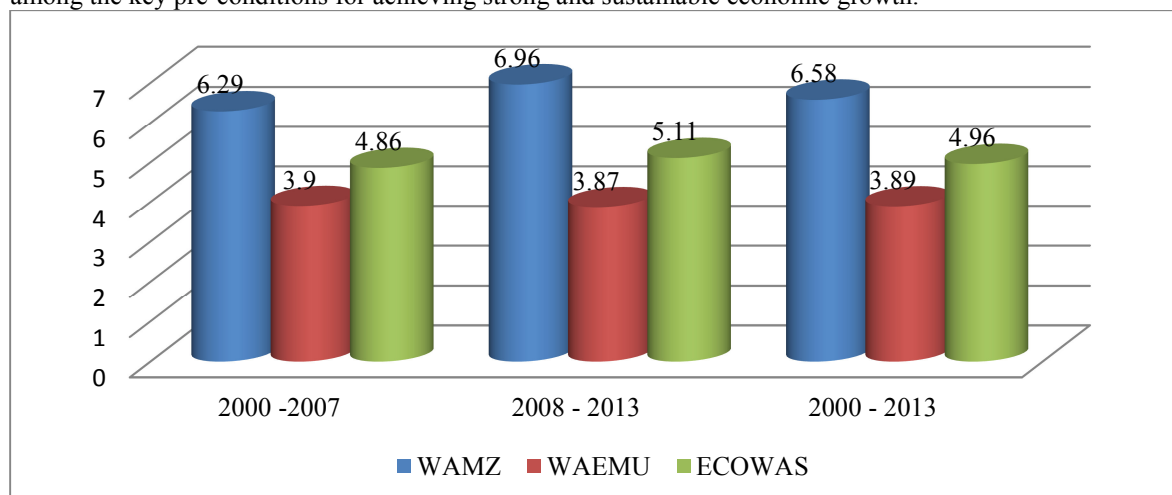
The history of regional integration shows that the ultimate goal is to merge some or all aspects of the economies concerned for purposes of achieving mutual benefits in the form of accelerated growth and development. Regional integration arrangements usually evolve from simple cooperation on and coordination of mutually agreed aspects amongst a given number of countries to full integration or merger of the economies in question. In Africa, a good number of regional integration arrangements have a long history of existence, some of which dating as far back as pre-independence era. Some African countries that have only recently rekindled their interest in economic integration have been partly inspired by the successes of integration efforts in Europe and the Americas.

The formal establishment of the Economic Community of West African States (ECOWAS) in 1975 was premised on the need to promote co-operation and integration in economic, political social and cultural activity in the fifteen West African States of Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, The Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo. In the revised Treaty of 1993, the ECOWAS Community - which comprises of the Authority of Heads of State and Government, the Council of Ministers, the Community Tribunal, the ECOWAS Parliament, the ECOWAS Commission - extends economic and political co-operation among member states, designates the achievement

of a common market and a single currency as economic objectives, while in the political sphere it provides for a West African parliament, an economic and social council and an ECOWAS court of justice to replace the existing Tribunal and enforce Community decisions.

The treaty also assigned the Community with the responsibility of preventing and settling regional conflicts. With a view to maintaining peace and stability within the sub-region so as to fully take advantage of the potential benefits from regional integration, the ECOWAS Summit of December 1999 agreed on a Protocol for the establishment of a mechanism for conflict prevention, management and resolution. Besides, the ECOWAS Commission has put in place a mechanism to gauge macroeconomic performance in member states through the prescription of a set of convergence criteria regularly monitored by the Multilateral and Surveillance Directorate of the Macroeconomic Policy Department. The setting up of a set of convergence criteria for ECOWAS member states was premised on the assumption that no meaningful regional integration can be achievable without policy convergence amongst member countries.

Traditionally, macroeconomic convergence focuses on the maximum allowable levels for a few key indicators that have to do with fiscal discipline and monetary and financial stability, namely: rate of inflation, budget deficit and public debt, as well as external current account balance. In some cases, the primary criteria may be backed by a secondary set of indicators that are derivatives of the primary indicators, and are intended to monitor, for instance, the level of recurrent spending in government finances, external and interest rate stability, the level of foreign currency reserves and central bank lending to government. From the point of view of the economic literature, macroeconomic convergence serves an eligibility test whereby only those countries that attain the convergence benchmarks would qualify for membership to an economic grouping. Other reasons for seeking macroeconomic convergence are the advantages it confers to members, either individually or collectively. These may include attainment of macroeconomic stability through sustainable fiscal deficits and public indebtedness, external current account deficit, as well as low and stable levels of inflation, which are among the key pre-conditions for achieving strong and sustainable economic growth.



Source: World Bank Development Indicator 2014.

Figure 1. GDP growth in the ECOWAS Region (1990 – 2013)

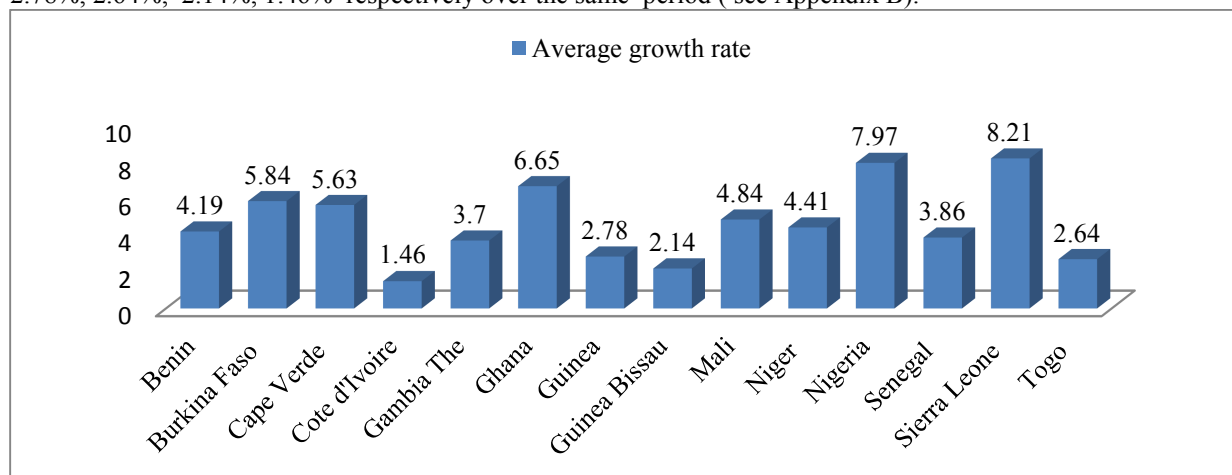
Despite the turbulence triggered by the recent financial crisis, the West African region continues to sustain its growth momentum from an average of 4.86% during the period 2000 - 2007 to around 5.11% between 2008 and 2013. A comparison between the West African Economic and Monetary Union (WAEMU)¹ and the West Africa Monetary Zone (WAMZ)² shows that, whilst WAEMU member states recorded an average growth rate of 3.89% over the period 2000-2013, the WAMZ countries recorded an average growth rate of 6.58% over the same period. A further analysis of growth episodes in the ECOWAS region show that whilst WAEMU growth momentum slightly declined from an average of 3.9% during the period 2000-2007 to around 3.87% during the period 2008 – 2013, that of the WAMZ slightly rose from 6.29% during the period 2000-2007 to around 6.96% during the period 2008-2013. It could be further observed from Figure 1 that whilst the WAMZ region grew on average by 6.58%, the WAEMU region grew on average by 3.89% between 2000 and 2013.

For the period 2000 - 2013, the ECOWAS region as a whole grew at an average rate of 4.96% with Sierra Leone, Nigeria, Ghana, Burkina Faso and Cape Verde leading the growth process in the region at

¹ This comprises of the French Speaking West African countries of Benin, Burkina Faso, Cote d'Ivoire, Mali, Niger, Senegal and the two Portuguese speaking countries of Cape Verde and Guinea Bissau.

² This is made up of the English Speaking West African Countries of The Gambia, Ghana, Liberia, Nigeria, Sierra Leone and one French Speaking country of Guinea.

8.21%, 7.97% , 6.65%, 5.84% and 5.63% respectively. Whilst Mali, Niger, Benin, Senegal and The Gambia managed to sustain medium average growth rates of 4.84%, 4.41% , 4.19% , 3.86% and 3.7% respectively between 2000 and 2013, Guinea , Togo , Guinea Bissau and Cote d'Ivoire had very low average growth rates of 2.78%, 2.64%, 2.14%, 1.46% respectively over the same period (see Appendix B).



Source: World Bank Development Indicators 2014

Figure 2. GDP growth by Member State in the ECOWAS Region (2000 - 2013)

Given the apparent disparity in the growth rates of ECOWAS member countries, this study is aimed at assessing the states of convergence in ECOWAS member countries. Specifically, the study examines the extent to which regional economic integration in West Africa has promoted convergence in per capita income amongst member countries.

The remaining part of this paper is divided into four sections as follows: Section 2 provides a review of the relevant literature. In section 3, the study discussed the methods of analysis. Whilst the estimation results are presented and discussed in section 4, section 5 provides some concluding remarks based on the findings of the study.

2. Literature Review

A good number of authors have attempted to define regional economic integration as the sharing of common aspirations by a group of countries in fostering economic development through formulation of regional policies and designing of rules and regulations for the collective application of such policies in member countries. In particular , Ojo et al ((2004) perceive the concept of regional economic integration as the assignment of responsibility for the formulation of regional policies, development of rules and regulations and the application of these policies to all markets at a regional level superseding national control . According to them, the ultimate goal of regional integration is to foster economic development among a group of countries in the areas of trade, exchange rate, fiscal and monetary policies, and labour market. In many cases, such regional arrangements involve the adoption of a single currency and establishment of a common central bank which conducts a common monetary policy for all member countries of the regional integration.

Historically, regional integration arrangements in Africa started far back in the early 20th Century following the establishment of the Southern African Customs Union (SACU) between South Africa and the separate associated states of Botswana, Lesotho and Swaziland in 1910. According to Antkiewicz and Whalley (2005), the key objective for the establishment of SCUA was to maintain the free interchange of goods in member countries so as to foster economic development and diversification, especially in the less developed member countries of Lesotho and Swaziland, and also to provide to all members equitable benefits arising from international trade. In 1969, the SACU agreement was renegotiated to reflect increases in the regional imports of member countries. After gaining independence in 1990, Namibia became a contracting party to the 1969 agreement, bringing the membership of SACU to five Southern African countries (Kirk and Stern, 2005; Antkiewicz and Whalley, 2005). Though with varying success stories, a plethora of regional integration arrangements (RIAs) including the Common Market for Eastern and Southern Africa (COMESA), the Central African Economic and Monetary Community (CEMAC), the East African Community (EAC), the Southern African Development Community (SADC), the West African Economic and Monetary Union (UEMOA), the Arab Maghreb Union (UMA) and the Mano River Union (MRU) have emerged across Africa alongside the continent's umbrella Organization of African Unity (OAU) - now called the African Union(AU).

Advocates of economic convergence have argued that coordination of economic policies through convergence criteria yields Pareto Optimal outcomes. By cooperating to coordinate policies, each country may

better achieve its specific objectives. The basics of economic integration were propounded by Hungarian Economist Bela Balassa in the 1960s (Zyuulu, 2009). Balassa argues that as economic integration deepens, barriers to trade among countries diminish. It often makes sense for countries to coordinate their economic policies to generate benefits that are not possible otherwise. For instance cooperation in international trade by setting zero tariffs against each other, countries are likely to benefit relative to the case when countries attempt to secure short term advantages by setting optimal tariffs. Benefit may accrue to countries which liberalize labour and capital movements across borders, coordinate fiscal and monetary policies and that coordinate resource allocation (Zyuulu, 2009). Balassa further argue that economic integration tends to precede political integration. He believes that supranational common markets, with free movement of economic factors across national borders, naturally generate demand for further integration.

Cross-country disparity in technological progress was identified as a key factor leading to the observed divergence in growth rates across countries. Rodriguez-Pose (2000) demonstrates that technological progress could be an important divergence factor by arguing that the differences in strengths to innovate or acquire new technologies can lead to different long-term growth rates. He therefore postulates that technology catch-up is one of the main factors that lead to convergence. The technology catch-up models have argued that backwardness in productivity levels slows ability to grow faster (Abramovitz, 1986; and Barro and Sala-i-Martin 1991).

The neoclassical growth theory which constitutes the basis of the convergence philosophy, predicts that poorer countries of the convergence club must catch up with richer ones as they have an advantage to replicate the existing technological advancement without having to develop their own (Baumol and Sala-i-Martin, 1995). Using the neoclassical models for closed economies, Ramsey (1928), Solow (1956), Cass (1965), and Koopmans (1965) find that the per capita growth rate of a country tends to be negatively related to its initial level of income per capita. Baumol (1986) uses cross-sectional regressions to show that countries and regions are converging, or catching up, as initial poorer economies were found to grow faster than richer ones. Barro and Sala-i-Martin (1991) also employ cross-section regressions and confirm convergence among countries where the poorer countries grow faster to catch up with richer ones.

Dollar and Wolff (199) argue that the philosophy underpinning the concept of the catch-up convergence is associated with diminishing returns to capital. The rationale in this argument is that, the larger the capital gets, the more its marginal productivity declines. The catch-up convergence theory argues that, as labour migrates to the richer countries in search of employment opportunities, productivity in the rich countries falls owing to the decline in capital labour ratio. As a consequence, poorer countries tend to catch up with the richer ones owing to the resultant sluggish growth in the richer countries accompanying productivity declines.

In trying to establish empirical evidence on macroeconomic convergence, researchers have employed various estimation approaches. Meliciani and Peracchi (2004) investigate convergence in GDP Per Capita across the European region for the period 1980 - 2000 using median unbiased estimators of the rate of convergence to the steady state growth path. They find the lower mean rate of convergence to be zero for most regions.

Buseti et al (2006) examine inflation convergence in the European Monetary Union over the period 1980 – 2006. They divided the study period into two separate periods – before and after the use of the Euro. Applying unit root tests on inflation differential for the first sample, they find inflation convergence for the period 1980 -1997. Using stationarity tests for the second sample, they find two separate clusters of diverging inflation behavior: a lower inflation group –Austria, Belgium, Germany, France, and Finland; and a higher inflation group– Portugal, Ireland, Netherlands and Greece.

The use of time series approach in the analysis of convergence has resulted in various conclusions. Bernard and Durlauf (1995, 1996) argue that times series approach is somehow not reliable in terms of convergence analysis as it is most likely inclined to accept the no convergence null for various data set. A good number of researchers have found that time -series measures generate less convincing findings for the convergence hypothesis (Haug, Mackinnon and Michelis, 2000 ; Evans ,1997; D'Amato and Pistorresi ,1996 ; and Quah ,1992).

On the contrary, Weber (2006) employs co-integration tests as well as vector error correction models in analyzing convergence and found evidence of cyclical synchronization and equilibrium relations in several leading economies of the Asian Pacific region. Further developments in the empirical literature have witnessed an increasing use of cross-sectional data in analyzing convergence issues amongst countries in regional integration arrangements. Quah (1993) found that there is coherence between the stable variance in cross-country output and a negative correlation between output growth and the initial level of output.

In another development, Dalgaard and Vastrup (2001) try to examine the existence of sigma (σ) convergence in 121 countries over the period 1960 – 1988 and find that, while the standard deviation of logs of income per capita showed convergence , that of the coefficient of variation showed divergence. A number of studies have resorted to employing panel data approach in testing the convergence hypothesis (Levin and Lin, 1992; Im-Pesaran –Shin, 2003; Islam, 1995; Bernard and Jones, 1996; and Evans and Karras, 1996).

3. Methodology.

This study focuses on analyzing the state of incomes convergence in ECOWAS member states with a view to assessing progress so far made following the establishment of a regional economic body. In this version of the study on incomes convergence for the ECOWAS member states, we try to employ the two most frequently applied conventional approaches to measuring convergence, namely, the conditional beta convergence (β -convergence) and the sigma convergence (σ -convergence), respectively. The first approach (the β -convergence), assesses convergence across countries as a test of the validity of the neoclassical growth model which assumes that the only difference across countries lies in their initial level of capital (Sala-i-Martin 1996). Here, the key argument is that small, poorer economies tend to grow faster than big, richer ones. In most empirical works, conditional beta convergence approach is used to tests for the convergence of countries with different steady states. Barro and Sala-i-Martin (1991) and Mankiw et al (1992) have implemented this approach by holding constant the steady state of each economy and introducing a vector of explanatory variables. If we assume that absolute convergence holds for a group of countries $i = 1, 2, \dots, N$, a standard equation developed in the growth literature (Barro and Sala-i-Martin, 1995) is given as:

$$\log(y_{it}) = \alpha + (1 - b) \log(y_{i,t-1}) + v_{it} \dots\dots\dots 4.1$$

Where y_{it} is the income of the country, α and b are constants, with $0 < b < 1$, v_{it} is a disturbance term and t is time index. The condition $b > 0$ implies absolute convergence since the annual growth rate, $\log(y_{it}/y_{i,t-1})$, is inversely related to $\log(y_{i,t-1})$. If, however, we assume that member countries of a regional integration exhibit different steady-state positions, a vector of explanatory variables is introduced to equation (4.1) above (Islam, 1995) to obtain the conventional growth equation, which uses panel data and given as :

$$\log(y_{it}) = \eta_i + \beta \log(y_{i,t-1}) + \sum_{j=1}^k \pi_j \log(x_{it}^j) + u_{it} \dots\dots\dots 4.2$$

Where y_{it} = income per capita

$\beta = e^{-\lambda}$, λ = rate of convergence, t = time period .

x_{it}^j = control /explanatory variables, $j = 1, 2, \dots, k$

η_i = country specific effect

u_{it} = disturbance term

In this formulation, a group of member countries is said to have attained conditional beta convergence if and only if the condition, $0 < \beta < 1$, is satisfied. That is, for conditional beta convergence to be achieved, the coefficient of the lagged log of income per capita in equation (4.2) must lie between zero and unity.

The second approach, the Sigma Convergence, tests the view that the dispersion of real per capita income across a group of economies tends to fall over time. In the strict sense of sigma convergence, a group of economies are said to converge if the standard deviation of their real per capita income distribution declines over time. It measures the dispersion, for instance, of per capita income and asserts that this dispersion declines over time. In other words, for countries in a regional integration setting, convergence is said occur in a sigma σ (standard deviation) sense if $\sigma_{t+T} < \sigma_t$, where σ_t is the time t standard deviation of $\log(y_{i,t})$ across i . Empirically, a formal test for sigma convergence is done by regressing σ_t with the time trend. In this formulation, convergence in per capita income holds if the coefficient of time is significantly negative. Specifically, if we define the standard deviation of x across countries in the region at time t as σ_t , then one way to assess convergence is to see whether σ decreases over time. A formal test involves estimating the regression:

$$\sigma_t = \alpha + \varphi T_t + \varepsilon_t \dots\dots\dots 4.3$$

Where T is a time trend, ε is a disturbance, and α and φ are the parameters to be estimated. Convergence requires the estimated φ to be significantly negative. Equation (4.3) can be estimated using OLS.

4. Presentation of Results.

In this section, empirical analysis is provided on two aspects of convergence namely; Conditional Beta Convergence and Sigma convergence as discussed in the methodology section.

Due to the problem of incomplete data set on GDP Per Capita for some ECOWAS member countries, data spanning the period 1990 – 2009 was collected from eleven member countries of Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, The Gambia, Ghana, Liberia, Mali, Nigeria, Senegal and Sierra Leone. The requisite analysis was carried out and the results presented in the appropriate sections as follows. In the analysis that follows, the key variable of interest is y_{it} , denoting the GDP per capita for country i over time period t . As the thrust of the analysis focuses on establishing the extent of incomes convergence amongst member countries of the ECOWAS sub-region, data on GDP per capita is being collected alongside some control variables for which the summary statistics are presented in Table 1.

Table 1: Summary Statistics.

Variables	No. Obs	Mean	Std.Dev	Min	Max
GDP per Capita	280	488.02	328.4	149	1763
CR	280	15.80	10.85	0	64
FDI	280	2.47	3.18	0	33
HUM	280	24.69	12.34	7	67

As shown in Table 1, GDP per capita averaged approximately \$488.02 in ECOWAS member countries over the period under review with a standard deviation of \$328.40. The lowest GDP per capita of \$149.00 ever attained in the region was recorded by Guinea Bissau in 2002 whilst Cape Verde recorded the highest GDP per capita of \$1,763.00 in 2009. A careful examination of the data on GDP per capita further revealed that Cape Verde has also consistently recorded the highest GDP per capita over the period. On the other hand, Guinea Bissau, Mali, Niger and Sierra Leone recorded very low GDP per capita over the period under review. Here, credit to the private sector is the percentage of total domestic credit that goes to the private sector.

For the control variables, we considered credit to the private sector (CR), foreign direct investment (FDI) and Human Capital (HUM) since they all influence GDP growth in one way or the other. From the summary statistics presented in Table 1 above, credit to the private sector averaged around 15.8% for the region as a whole with a standard deviation of 10.85. The highest credit provided to the private sector of 64% was recorded in Cape Verde in 2009. On the whole, credit to the private sector seems relatively high in Cape Verde when compared to other countries in the sub-region. This is followed by Cote d'Ivoire where credit to the private sector averaged around 30.1 percent of total domestic credit. Similarly, the mean values for the other control variables are 2.47 and 24.69 with standard deviations of 3.18 and 12.38 respectively.

4.1: Results from the Conditional Beta Convergence Regressions

In this section, the status of convergence in the ECOWAS region is explored by carrying out a cross-sectional analysis of the relationship between the growth rate of income per capita and the initial level of the same variable over time. The objective is to be able to compare whether poorer economies in the region tend to grow faster than their richer counterparts as postulated by proponents of the convergence hypothesis (Barro and Sala-i-Martin, 1992; and Mankiw et al., 1992). The conditional Beta convergence is being adopted in this study because a good number of studies use this approach in testing for convergence amongst countries with different steady states as demonstrated by ECOWAS member countries. By introducing control variables in the standard convergence equation and using an appropriate estimation technique, the result for the conditional Beta convergence is presented below:

$$\mathbf{Log}(y_{it}) = \mathbf{0.0411} + \mathbf{0.844log}(y_{it-1}) + \mathbf{0.091log}(CR_{it}) + \mathbf{0.0533log}(FDI_{it}) + \mathbf{0.251log}(HUM_{it})$$

(0.18)
(20.8)**
(1.92)*
(0.46)
(4.14)**

Where t-values are in parenthesis and (**) and (*) implies significance at the 1% and 5% level respectively.

From the estimation result as presented above, it could be noted that the value of the Beta coefficient is 0.844, implying the existence of Beta conditional convergence amongst ECOWAS member states. Since $\beta = e^{-\lambda}$, where λ is the speed of convergence. Given $\beta = 0.844$ as obtained in the regression results above, then $\lambda = 0.1696$, implying that the speed of convergence in the ECOWAS region is approximately 17 percent per annum. This implies that it will take approximately six years for short-run departure from the steady growth path of the various economies to come back to their long-run growth path. This implies that any short-run shock that triggers disequilibrium amongst the economies of the sub-region may take a longer period to revert to their steady state path.

4.2: Results from Sigma Convergence Regression

In this section, the study endeavours to analyse the possibility of convergence in the region by examining the behavior of cross-sectional levels of income per capita using measures of dispersion. In the strict sense of sigma convergence, a group of economies are said to converge if the standard deviation of their real per capita income distribution declines over time. In other words, for member countries in a regional integration arrangement, convergence is said to be attained in a sigma σ (standard deviation) sense if $\sigma_{t+T} < \sigma_t$, where σ_t is the time t standard deviation of $\log(y_{i,t})$ across i . As noted earlier, a formal test of sigma convergence is carried out by regressing σ_t with the time trend. In this formulation, convergence in per capita income holds if the coefficient of the trend variable is significantly negative. The result from the sigma convergence test for the ECOWAS countries under consideration is shown below:

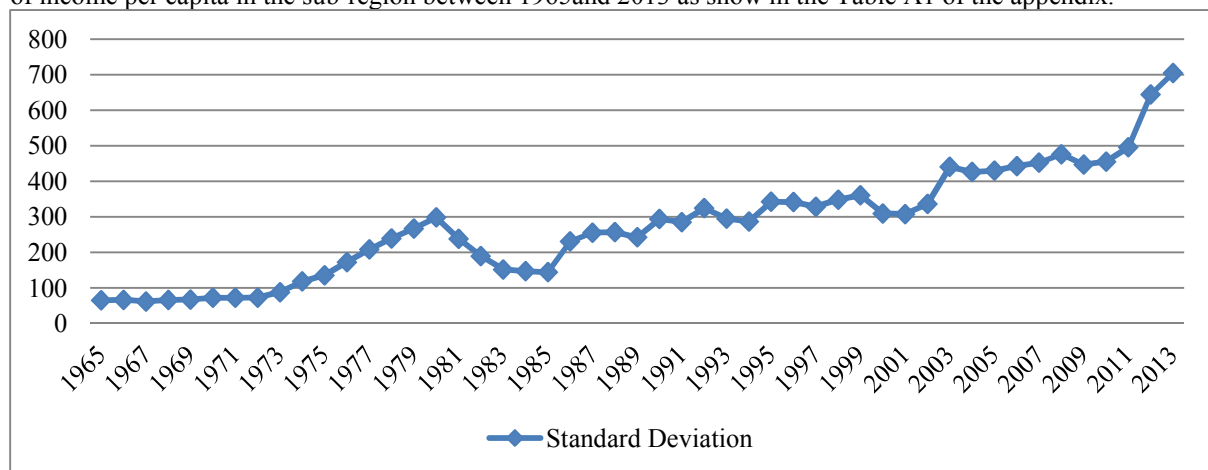
$$\sigma_t = 38.83 + 9.142T_t$$

(3.12)
(19.4)

$$R^2 = 0.8976, \bar{R}^2 = 0.8952$$

Where figures in parenthesis are t-values.

From the regression results presented above, the coefficient of the trend variable (T_t) is positive and significant, implying the non-existence of sigma convergence in income per capita amongst ECOWAS countries. For there to exist sigma convergence in income per capita, the coefficient of the trend (T_t) in the above equation should be negative and significant. This finding can be corroborated by the distribution of the standard deviation of income per capita in the sub-region between 1965 and 2013 as show in the Table A1 of the appendix.



Source : World Bank Development Indicators and Author's calculation

Figure 3: Standard Deviation of Income Per Capita in ECOWAS countries (1965 – 2013)

As shown in Table A1 of the appendix and Figure 3, the standard deviation of income per capita for ECOWAS member countries generally was rising over time, implying an increasing tendency for divergence in income per capita amongst ECOWAS member states. As can be observed in Figure 3, the dispersion in income per capita between 1965 and 1973 was generally very low, with a standard deviation of about \$ 70.00. However, between 2003 and 2013, the dispersion in incomes amongst ECOWAS countries became very high, with a standard deviation of about \$ 447.10 in 2009. The high disparity in income GDP capita in the region was largely due to the recent discoveries of natural resources in some member countries. Secondly, the outbreak of civil conflicts in some members states like Sierra Leone, Liberia, Guinea Bissau, Cote d'Ivoire during the past two decades severely affected GDP per capital in these countries to the extent of further widening gap. For instance, whilst income per capita in Cape Verde, Ghana, Senegal, Nigeria and Benin recorded a significant jump, countries like Sierra Leone, Liberia, Guinea and The Gambia struggle to improve their income per capita in the midst of severe economic challenges. The rising dispersion in income per capita in the ECOWAS region is reflected by a rising standard deviation of income per capita over time.

Since we cannot establish convergence in income per capita using the sigma convergence approach, we proceed further as to whether we can establish convergence in terms of growth in real per capita income amongst member states. Following the same approach but using the standard deviation of growth in per capita income, we re-estimate the sigma convergence regression and obtain the following results.

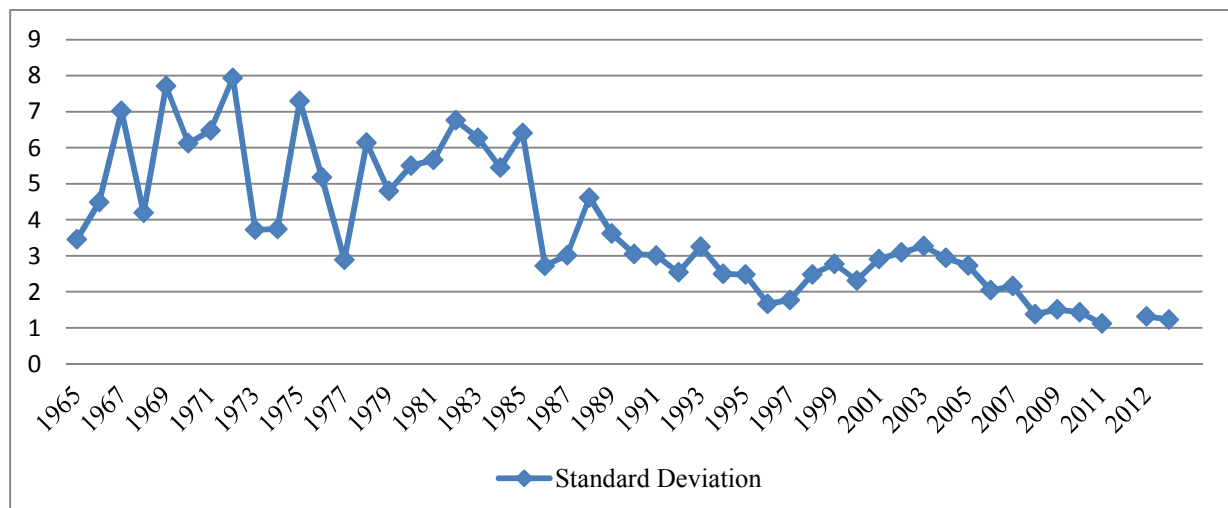
$$\sigma_t = 6.381 - 0.1025T_t$$

$$(16.59) \quad (-7.04)$$

$$R^2 = 0.8134, \bar{R}^2 = 0.8012$$

Where figures in parenthesis are t-values.

From the regression results presented above, the coefficient of the trend variable (T_t) is negative and highly significant, implying the existence of sigma convergence in terms of growth in income per capita amongst ECOWAS countries. This is because, the coefficient of the trend variables (T_t) in the above equation turned out to be negative and statistically significant. This finding is corroborated by the distribution of the standard deviation of growth in income per capita between 1965 and 2009 as shown in Figure 4. As can be observed in Figure 4, the standard deviation of growth in income per capita amongst ECOWAS member countries shows a declining trend over time, implying the existence of sigma convergence.



Source : World Bank Development Indicators and Author's calculation

Figure 4: Standard Deviation of Growth in Income Per Capita for ECOWAS countries (1965 – 2013)

The results shown above demonstrated the existence of sigma convergence in terms of growth in real income per capita amongst ECOWAS member states. Thus, despite apparent absence of convergence in the levels of income per capita amongst member states, the existence of convergence in terms of the growth rate of real income per capita has been confirmed by sigma convergence test. This therefore implies that the region's integration efforts have strong potentials in terms of narrowing down incomes inequalities amongst member states as growth in real per capita income converges over time.

5. Conclusion

Following their attainment of political independence in the early 1960s, many African countries started advocating for regional integration arrangements with a view to boosting economic growth potentials through policy coordination between a clusters of strategically located economies. With the ultimate aim of promoting regional economic integration in an effort to take advantage of the region's economic potentials, a group of 15 West Africa countries signed the treaty for an Economic Community of West African States (in Lagos, Nigeria on 28th May , 1975). The revised treaty of 1993, which was to extend economic and political co-operation among member states, designates the achievement of a common market and a single currency as economic objectives. For this to happen, there is need for the enhancement of favorable macroeconomic conditions amongst member states, which led to the prescription of convergent criteria by the ECOWAS Commission. Besides, the integration arrangement also aims at narrowing down the disparity in per capita income amongst member countries. Thus, this study aims at assessing the extent to which member states have converged with respect to income per capita.

The study adopted two approaches of the measurement of incomes convergence, namely, sigma and conditional Beta Convergence. Though the Beta-Convergence regression results support the existence of convergence, those from the Sigma-Convergence estimation indicate no convergence in income per capita per se, but rather in the growth rate of real income per capita amongst ECOWAS member states. This is because; the coefficient of the trend variable is positive and significantly different from zero when we consider the levels of income per capita. For convergence in the levels of income per capita to have occurred, this coefficient should be significantly negative. This is also demonstrated by the increasing standard deviation of income per capita across member states. From the Conditional Beta Convergence regression, the results show that the speed of incomes convergence for ECOWAS member states is approximately 17% per annum, implying that any short-run shock that puts the economies of the sub-region into disequilibrium may take a longer period to attain the steady state . To ensure long run incomes convergence in the region there is an urgent need to enforce member states' compliance with the convergence criteria set by the ECOWAS Commission. This, therefore, calls for further action to accelerating the pace with which member states comply with the ECOWAS convergence criteria.

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Appendix A

Table A1. Standard Deviation of Income Per Capita among ECOWAS Countries (1965 – 2009)

Year	Benin	Burkina Faso	Cape Verde	Cote D'Voire	Gambia	Ghana	Liberia	Mali	Nigeria	Senegal	Sierra Leone	Standard Deviation
1965	118.4	82.3	187.0	201.7	101.5	262.7	208.1	54.3	126.4	223.1	148.0	65.4
1966	121.6	83.0	189.3	216.7	106.5	267.3	213.8	56.1	133.3	224.4	152.0	66.7
1967	120.6	84.6	190.3	220.6	109.5	214.2	222.1	55.1	106.1	218.6	138.7	62.0
1968	126.6	85.3	191.5	252.5	93.9	201.9	229.8	67.6	103.2	224.9	128.9	66.3
1969	125.2	86.7	191.9	257.3	100.2	232.7	245.8	65.2	128.1	207.6	156.8	67.4
1970	122.8	81.0	193.5	262.7	112.7	256.8	251.8	67.4	235.8	209.1	163.6	72.5
1971	120.3	83.5	196.4	274.0	116.3	273.3	257.3	78.9	167.9	209.5	155.0	72.4
1972	144.7	98.9	195.3	308.9	119.5	232.0	271.0	87.3	218.3	247.4	168.6	72.7
1973	173.9	113.3	196.2	402.8	146.7	261.7	277.7	99.3	262.2	276.7	204.2	88.2
1974	186.7	123.7	236.0	473.4	180.7	299.2	337.9	93.0	417.6	302.8	225.7	118.2
1975	222.2	151.6	258.9	576.4	210.2	283.5	385.2	140.7	453.6	396.6	231.8	135.9
1976	223.9	154.0	217.5	663.6	198.1	272.9	392.6	155.7	575.9	390.8	199.0	173.0
1977	234.6	174.5	208.1	857.9	236.3	308.9	436.6	170.3	555.0	388.9	226.9	208.6
1978	283.3	222.4	237.7	1040.9	284.9	348.3	457.7	194.0	545.9	422.1	308.9	239.5
1979	352.4	257.3	264.7	1159.2	333.2	374.2	501.7	247.5	685.1	511.0	349.7	267.5
1980	406.2	277.0	369.3	1241.7	376.1	402.5	508.3	271.2	902.4	539.3	340.1	298.4
1981	362.9	248.9	362.0	990.8	331.2	370.5	482.4	221.9	816.2	435.2	337.7	238.5
1982	346.1	239.8	363.0	856.2	317.5	342.1	478.1	193.0	656.7	440.9	384.6	189.9
1983	290.2	213.4	353.3	745.4	304.4	331.4	440.0	183.9	446.8	411.5	289.5	152.0
1984	270.0	189.9	336.4	718.6	244.7	346.9	437.6	181.9	349.2	377.1	310.0	147.2
1985	260.4	204.8	344.3	706.4	300.2	340.8	426.4	177.8	341.5	404.5	239.2	144.4
1986	322.3	260.7	676.6	894.0	237.1	418.4	412.3	221.4	235.8	574.0	134.0	230.9
1987	365.1	294.0	807.7	949.9	271.2	359.0	423.5	248.2	265.6	682.1	176.6	255.5
1988	366.7	316.9	890.0	932.0	314.2	357.0	442.9	243.6	251.5	718.3	276.1	256.8
1989	329.3	307.4	882.3	856.1	320.4	351.5	329.0	244.2	255.0	649.1	238.7	242.8
1990	391.7	351.4	992.1	914.9	341.5	385.3	157.9	286.2	296.0	777.8	162.5	293.9
1991	386.5	346.9	1009.2	859.5	327.1	421.6	140.1	278.6	275.9	735.7	190.6	285.6
1992	323.0	242.1	1107.3	883.8	344.8	399.3	88.0	318.7	321.1	787.2	167.1	324.3
1993	406.5	246.2	998.0	847.2	350.5	361.4	61.7	292.2	203.6	690.9	190.2	295.5
1994	280.5	202.2	1102.0	617.8	335.8	320.3	49.6	187.7	219.1	451.0	228.1	286.7
1995	367.3	246.6	1284.3	792.5	342.6	368.8	49.3	256.4	252.6	539.4	218.6	342.6
1996	393.7	271.2	1282.3	849.3	340.6	384.7	56.8	265.9	308.3	543.6	236.9	341.6
1997	374.8	248.5	1260.7	797.6	344.8	372.9	102.7	245.3	307.9	498.3	212.6	328.6
1998	395.4	260.4	1308.8	847.2	339.4	395.9	121.5	251.3	266.1	515.0	166.3	348.6
1999	394.0	255.7	1378.4	811.9	340.5	400.4	145.1	242.9	280.7	511.6	162.8	360.5
2000	362.4	230.7	1222.1	669.7	320.8	254.1	173.0	223.5	331.6	458.9	150.4	309.8
2001	371.4	243.6	1232.5	663.6	309.1	266.3	166.3	236.8	369.2	472.0	184.6	307.7
2002	411.3	270.8	1345.4	708.1	266.3	303.5	170.5	293.9	350.7	503.3	206.7	336.2
2003	520.6	245.4	1697.6	829.5	257.9	363.9	131.1	373.0	422.3	633.3	209.4	440.8
2004	532.2	384.4	1683.9	822.5	271.6	414.6	134.2	422.3	639.7	732.7	223.5	426.3
2005	545.4	395.7	1698.2	850.3	302.4	489.4	135.7	448.6	797.7	771.3	243.4	429.9
2006	583.5	406.2	1696.4	883.6	324.8	910.7	145.3	484.2	1018.4	810.9	270.7	442.9
2007	661.3	460.6	1701.2	984.2	403.9	1077.8	147.4	576.4	1123.3	953.1	307.3	452.4
2008	771.5	528.5	1703.1	1137.7	495.1	1222.4	150.3	686.6	1370.6	1079.4	352.6	476.4
2009	745.3	517.2	1700.2	1106.8	430.3	1098.6	156.4	691.3	1118.2	1023.3	341.9	447.1
2010	710	600	1706	1210	580	1260	270	660	1460	1040	470	455.6
2011	720	620	1720	1140	510	1420	330	670	1710	1030	500	495.4
2012	750	670	1723	1220	520	1580	370	660	2460	1030	530	644.3
2013	790	670	1730	1380	510	1760	410	670	2710	1070	680	704.5

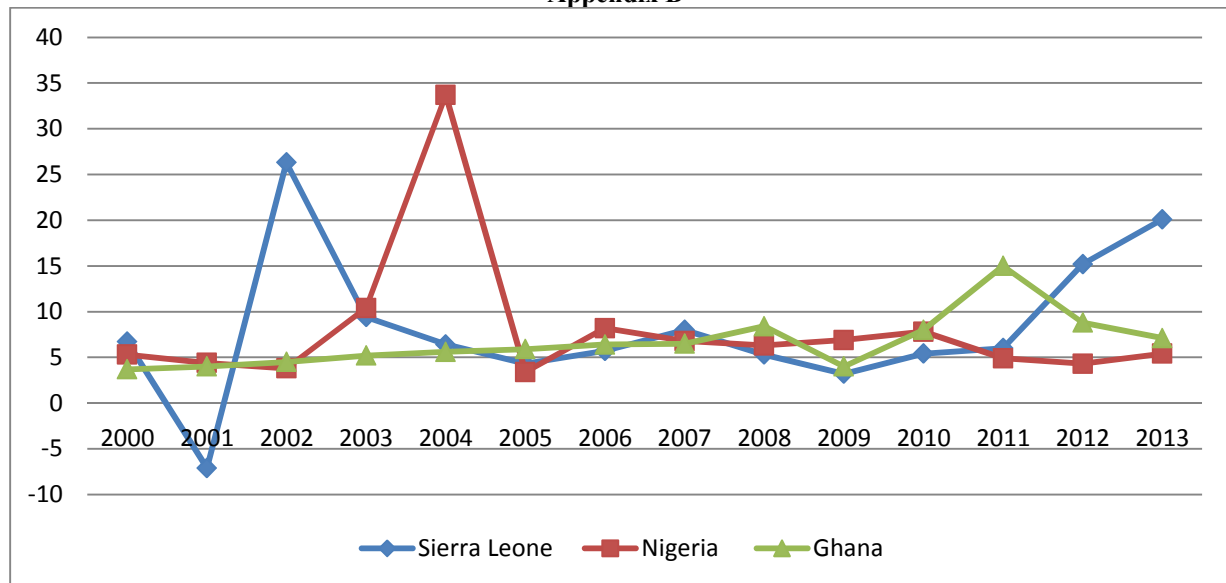
Source : World Bank Development Indicators and author's calculation

Table A2. Standard Deviation of Growth in Income Per Capita among ECOWAS Countries (1965 – 2013).

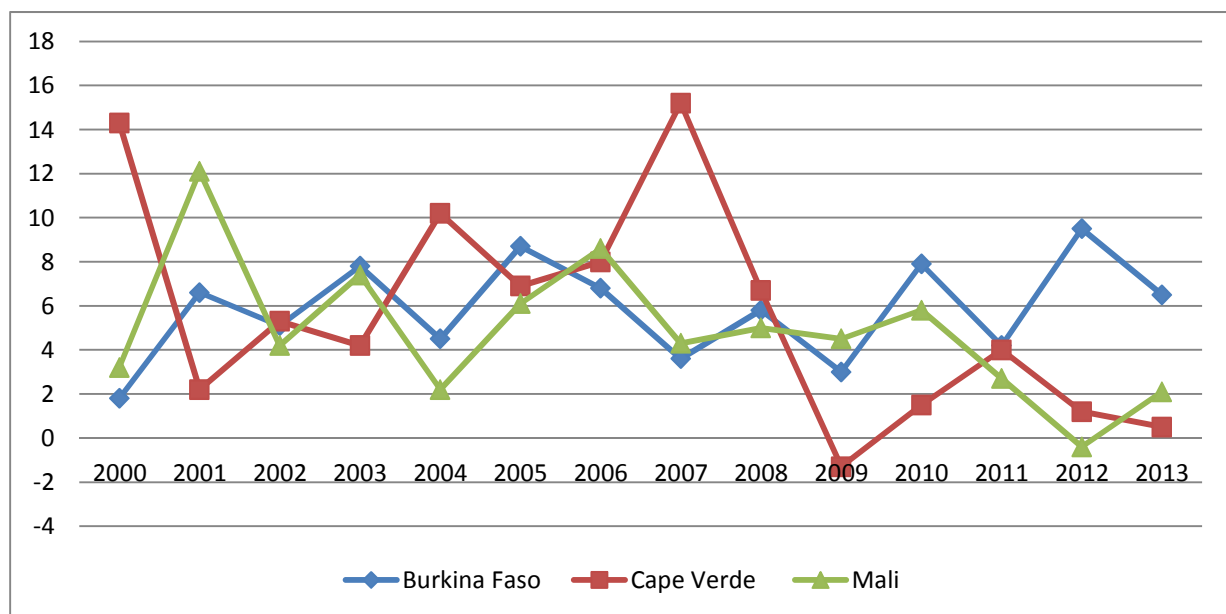
Year	Benin	Burkina Faso	Cape Verde	Cote D'Ivoire	Gambia	Ghana	Mali	Nigeria	Senegal	Sierra Leone	Standard Deviation
1965	3.61	0.00	2.19	8.62	2.12	-0.49	0.23	2.14	-1.30	-4.51	3.459
1966	-7.29	-1.43	0.67	7.37	0.89	-5.92	1.25	-6.77	0.17	-0.03	4.483
1967	6.46	6.69	3.21	0.59	-2.69	1.26	1.09	-17.97	-3.86	-1.70	7.017
1968	7.66	1.05	-1.67	8.18	6.61	-1.52	1.30	-3.88	3.42	0.21	4.194
1969	5.29	0.03	2.89	5.24	-0.38	3.81	-2.10	20.87	-9.11	6.56	7.708
1970	5.65	-1.84	1.98	6.01	3.15	7.22	3.80	21.63	5.56	6.62	6.120
1971	-13.98	-0.49	2.56	5.10	-3.20	2.06	0.40	11.13	-2.96	1.50	6.475
1972	23.59	0.43	1.57	0.06	-3.06	-5.35	3.67	0.54	3.34	-1.06	7.936
1973	0.67	-1.41	1.23	1.70	5.57	0.01	-3.42	2.48	-8.30	0.24	3.720
1974	4.24	6.20	-3.34	0.19	2.35	4.07	-3.45	8.05	1.21	1.46	3.742
1975	1.87	0.90	2.57	4.01	8.76	-14.55	9.47	-7.92	4.48	-0.33	7.297
1976	5.12	6.19	-0.63	8.58	3.91	-5.63	11.23	5.93	5.86	-2.40	5.177
1977	2.09	-1.87	-0.07	3.22	0.20	0.38	4.05	2.94	-5.41	-1.91	2.888
1978	5.93	2.21	9.84	6.71	3.05	6.52	-3.63	-8.55	-6.64	0.40	6.138
1979	4.23	1.23	10.05	-1.46	-4.31	-4.61	7.97	3.55	4.02	2.46	4.797
1980	-2.26	-1.61	3.33	-14.29	3.09	-2.24	-6.42	1.03	-6.00	2.78	5.504
1981	-0.16	1.72	3.10	-0.35	0.26	-6.50	-6.41	-15.80	-3.93	0.85	5.656
1982	3.09	6.87	4.08	-3.50	-3.65	-10.09	-6.70	-3.35	12.14	2.70	6.760
1983	2.08	-2.13	9.25	-7.43	7.62	-8.02	2.44	-8.25	-0.65	-4.06	6.277
1984	2.23	-4.19	8.70	-6.25	0.13	4.58	1.91	-7.75	-6.67	1.98	5.450
1985	0.5	5.88	6.10	0.72	-4.39	1.14	-13.53	6.41	0.90	-7.27	6.410
1986	-2.4	5.89	0.68	-0.43	0.16	1.56	5.70	-0.50	1.63	-0.89	2.723
1987	-3.46	-3.70	0.70	-3.87	-1.59	1.49	-3.10	-3.57	1.14	4.94	3.014
1988	-3.61	4.11	3.94	-2.40	0.17	2.61	-1.23	6.76	2.18	-9.10	4.616
1989	1.78	-1.43	3.61	-0.61	1.35	2.40	8.70	4.17	-4.10	-1.50	3.616
1990	-1.75	-3.79	-1.30	-4.47	-1.06	1.00	-4.61	5.16	1.07	1.02	3.050
1991	-3.59	6.18	-0.54	-3.30	-1.20	2.76	-1.15	1.81	-2.39	0.00	3.007
1992	-0.63	-2.03	1.06	-3.50	-0.64	1.24	5.48	-0.01	-0.19	-2.90	2.538
1993	-4.37	2.17	4.62	-3.38	-0.70	2.03	-4.62	-0.73	-4.75	-1.03	3.251
1994	-3.07	-1.35	4.40	-2.34	-3.17	0.37	-1.55	-2.79	0.11	-4.31	2.500
1995	1.71	2.16	4.90	3.86	-2.18	1.01	3.71	-0.50	2.36	-2.26	2.476
1996	2.26	4.62	1.45	4.61	-0.93	1.75	0.79	1.36	2.29	2.52	1.663
1997	-0.57	2.70	2.76	2.82	1.60	1.62	4.24	-0.08	2.07	-1.46	1.769
1998	3.45	-1.42	4.65	2.04	0.19	2.37	3.53	-0.77	2.74	-2.95	2.483
1999	1.67	4.12	5.77	-0.89	2.93	2.35	4.21	-1.41	2.14	-3.00	2.774
2000	0.93	-0.91	3.77	-4.50	2.00	1.92	0.76	1.73	2.89	1.76	2.314
2001	2.1	3.35	1.10	-2.05	2.66	2.39	9.44	0.64	3.00	3.30	2.906
2002	1.85	1.94	1.94	-3.58	-5.74	2.65	1.68	-0.88	-1.27	4.23	3.091
2003	2.21	4.05	2.40	-3.97	4.27	3.31	4.88	8.04	4.03	7.23	3.269
2004	-0.15	1.64	-2.15	0.21	3.92	3.92	-0.95	7.90	3.06	2.69	2.938
2005	-0.28	3.29	1.45	-0.37	-3.73	-3.73	2.82	2.82	2.80	2.99	2.731
2006	0.95	2.45	2.90	-0.99	-1.35	-1.35	2.08	3.60	-0.20	3.78	2.040
2007	1.49	0.58	7.58	-0.04	2.26	2.26	1.12	3.83	2.07	3.51	2.159
2008	2.04	1.93	5.25	0.50	2.56	2.56	1.81	3.39	0.59	3.02	1.379
2009	0.83	0.46	2.67	1.80	3.28	3.28	1.35	4.35	-0.48	0.91	1.510
2010	-4.73	16.01	0.34	9.32	34.78	14.69	12.14	-4.52	3.12	1.21	1.432
2011	1.41	3.33	0.82	-5.78	-12.07	12.69	4.65	1.52	4.54	3.12	1.12
2012	4.17	8.04	0.17	7.02	1.96	11.26	5.78	-1.42	3.45	4.2	1.32
2013	5.33	0.12	0.41	13.11	-1.92	11.39	4.54	1.52	4.12	4.23	1.23

Source : World Bank Development Indicators and author's calculation

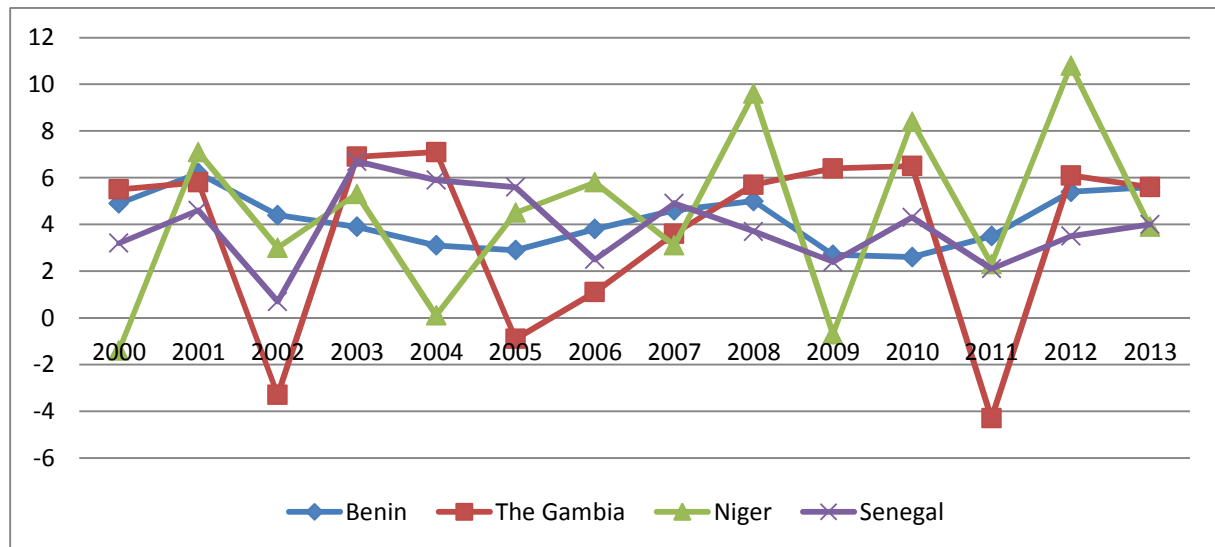
Appendix B



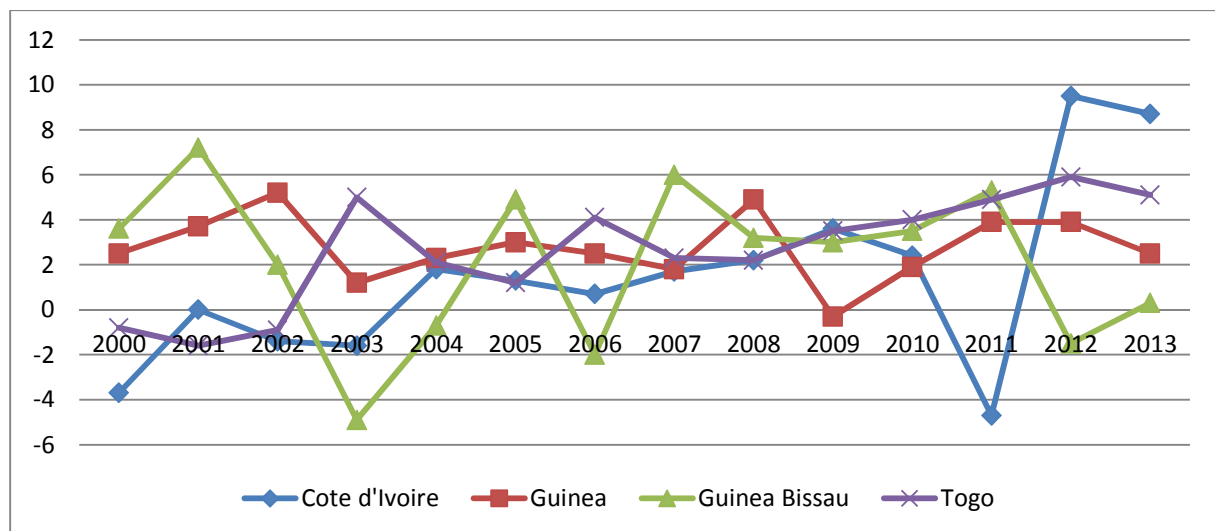
Source : World Bank Development Indicators and author's calculation
 Figure B1: GDP growth rates for Nigeria , Ghana and Sierra Leone (2000 – 2013)



Source : World Bank Development Indicators and author's calculation
 Figure B2: GDP growth rates for Burkina Faso , Cape Verde and Mali (2000 – 2013)



Source : World Bank Development Indicators and author's calculation
 Figure B3: GDP growth rates for Benin, The Gambia, Niger and Senegal (2000 – 2013)



Source: World Bank Development Indicators and author's calculation
 Figure B4: GDP growth rates for Cote d'Ivoire, Guinea, Guinea Bissau and Togo (2000 – 2013)

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