ECONOMIC REFORMS AND REAL COVERGENCE IN WAEMU[1].

Daniel Gbetnkom[2]
Faculty of Economics and Management
University of Yaounde II, and UNECA
Office for West Africa.
E-mail: dagbetnkom@yahoo.com /dgbetnkom@uneca.org

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Abstract.

This paper tests the process of real convergence hypothesis among WAEMU member countries between 1990-2008. Within the period of analysis our findings lend support to the "convergence club" defined according to policy choices rather than initial levels of technology. They show that unilateral and preferential suppression of tariff and non-tariff barriers favor the convergence of per capita GDP and reduce the dispersion of real per capita income levels of partners in the sub-region. These results make the idea of convergence club based on the initial levels of productive technology and GDP per capita relative.

1. Introduction.

The concept of convergence has gained popularity among economists, not only because of the importance of the issue about poor countries catching up with rich ones, but also because this analysis can serve as a way to verify the validity of different growth models. In regional integration groupings, economists are interested in knowing whether intra-differences in income levels tend to disappear or tend to increase over time. If they diminish, then there may be less worry about creating compensation schemes such as the Regional and Cohesion Fund Policies in the European Union. If they increase, some of the member states will continuously benefit from their membership while others will be getting a fair share of gains. Economists are also interested in knowing whether member countries that are relatively poor today are likely to remain poor in the future. All these concerns are related to the empirical phenomenon called convergence.

The main assumption behind the analysis of convergence in regional integration is that similarity in production and trade structures among countries will ease the integration process. Theoretical models predict that countries will trade more between them and obtain higher gains from trade if they are different (in terms of factor endowments in the Hecksher-Ohlin tradition or in terms of technology in Ricardian models), while according to other models (enhancing imperfect competition and intra-industry trade) trade will occur especially among similar countries. In spite of these different approaches, it is generally agreed that adjustment costs are smaller when integration occurs between countries that are relatively alike. The more similar countries are, the more likely they will be exposed to common shocks (Brülhart, 2000) and greater similarity in production structures is likely to increase business cycle correlations (Krugman, 1993; Imbs, 2001). This means that common macroeconomic and industrial policies will be more effective the larger is the similarity among member countries.

Another reason to believe that similar countries integrate more easily is that they are more likely to lie in the same diversification cone, and this allows at least the theoretical possibility to achieve factor price equalization through trade (Deardorff, 1994).

Standard neoclassical growth theory predicts that the elimination of trade barriers and free movement of production factors across countries will result not only in the overall welfare increase in the integrated area, but also cause real convergence of countries in the region. However, many authors (Henner, 2001; Venables, 1999; Dowrick and Nguyen, 1989) demonstrated that convergence seemed to hold among rich countries. Baumol (1986) suggested that there might be a "convergence club", meaning a subset of countries for which convergence applies, while countries outside of the "club" would not necessarily experience convergence vis-à-vis those in the club. According to this author, only countries with an adequate initial level of human capital endowments can take advantage of modern technology to enjoy the possibility of convergent growth (P. 65). A direct implication of this line of reasoning is that regionalism among underdeveloped countries will tend to cause divergence of their income levels, and regional integration among rich countries will tend to cause convergence.

Meanwhile, Sachs and Warner (1995) suggested that poorly managed economies, such as those with the absence of secure property rights, autarkic trade policies, inconvertible currencies, and

so forth are unlikely to experience convergence no matter what the underlying production technology or initial level of human capital. Put another way, these authors lend support to the "convergence club" defined according to policy choices rather than initial levels of human capital. They further suggested that poor policy choices are reversible, and not irrevocably linked to low levels of income (P. 5). In their view, burdensome taxes on foreign trade are particularly harmful, since these not only distort economic incentives, but also cut countries off from international flows of knowledge (p.6). In conclusion, these authors argued that convergent growth can be achieved by all countries that follow a reasonable set of political and economic policies, including civil peace, basic adherence to political and civil rights, and most decisively openness through the absence of trade quotas, export monopolies or inconvertible currencies (p. 23). This conclusion was later confirmed by Varblane and Vahter (2005) who analysed the process of economic convergence in transition economies during 1995-2004 and found that unconditional β- convergence and σ-convergence existed across the countries under consideration within the period of analysis.

Our concern in this paper is to test the "convergence club" hypothesis in WAEMU. We are interested in knowing whether regionalism in WAEMU is bound by the characteristics of African economies to always experience divergence of income levels of member countries.

Confronted by the economic crisis of the 1970s and the 1980s, and the mediocrity of the performance of their economies, most WAEMU countries undertook major reforms in the context of S.A.P guided by the Bretton Woods institutions. These reforms in the trade sector aimed to disrupt the protectionist tendencies, which were prevailing in African economies as from 1960s. Thus, apart from the macroeconomic stabilisation measures, other efforts were generally deployed on:
- the strengthening of tax administration, and the reduction of adhoc exemptions,
- the introduction of VAT and the rationalisation of customs duties,

- the reduction in the number of goods exempted from VAT or subject to the reduced rate,

- the reduction of tax evasion and the creation of a large taxpayer`s unit,

- the modernisation of direct and indirect taxes (single-rate VAT at 18%),
- the strengthening of tax collection agencies,
- the progressive elimination of quantitative restrictions and price control, simultaneously (1988-1991)
- the reduction of tariff barriers and their variability.
- the suppression of exemptions
- the easing or abandonment of contingencies,
- the flexibility of the exchange rate,
- the progressive suppression of state monopolies in international trade,
- the privatisation or the reform of public enterprises.
- the reduction or elimination of non-tariff barriers

The unilateral reforms described above were reinforced from 1994 by the devaluation of the CFA franc and the preferential liberalisation, which led WAEMU to the step of customs union in 1998. While the former was designed to improve the external competitiveness of exports of the

sub-region, the later aimed at eliminating all the internal obstacles to cross-border trade among all member countries and simplifying the external tariff. Thus, new tariff structures were introduced to deal with domestic sales, intra-WAEMU trade and trade with the rest of the world.

These reforms, in modifying the incentive structure aimed at reinforcing the openness of WAEMU economies. They have doubtlessly consolidated the importance of the private sector compared to the public one in the economy. They are ingredients of a liberalisation policy, since practically this refers to the liberalisation of imports and / or the trade policy movement towards the neutrality of relative prices and / or the substitution of the forms of state intervention which may create more distortion by those that may create less distortion (Collier et al, 1997). Trade liberalisation can also be considered as an evolution towards multilateralism when it simultaneously associates the elimination of quantitative restrictions to the reduction of tariff barriers to imports and exports. Generally, trade reforms rely on three approaches based on changes in trade policies, prices and quantities.

Theoretically speaking, the above-described reforms positively affect growth policies and favour the openness of the economy. The process of liberalisation creates a regular and judicious environment, which gives to firms the possibility of developing their activities with equal opportunities (Henner, 1996). Thus, we distinguish internal liberalisation, which facilitates the development of the private entrepreneurship, and external liberalisation; both of them assure the better allocation of resources through the market channels. Globally, the liberalisation policy gives high priority to market rules. It allows reducing the distortions in the relative price structure and allocates resources where they are rationally used. This favourably impacts on both the regional as well as the international specialisation and convergence of income per capita levels of member economies.

With respect to the preceding developments, it can be established that preferential and unilateral liberalisation improves the perspective of regional economic integration in SSA (Jebuni 1997, p.364; Collier & Gunning, 1993,p.16) and favours the convergence of income levels of member economies (World Bank, 2000, p. 41; Sachs and Warner, 1995). In connection with this evidence, this paper seeks answers for the following questions: after the wave of economic reforms of the 1980s and the 1990s in West African economies, is there a tendency in the WAEMU for less advanced countries to grow more rapidly than the richer countries, and thereby to converge in living standards or income levels? Or instead, are there tendencies for the "rich to get richer and the poor to get poorer", so that the gap between rich and poor nations tends to widen over time? Is there a tendency for the dispersion of real per capita income across member economies to fall over time? More specifically, the paper examines whether less advanced economies tend to grow faster than wealthy ones within the sub-regional grouping under consideration (β-convergence). It also checks whether the dispersion of real per capita income across member economies tends to fall over time (σ-convergence). These specific objectives rely on the theoretical hypothesis that unilateral and preferential suppression of tariff and non-tariff barriers favour the convergence of per capita revenues and reduce the dispersion of real per capita income levels of partners in the subregion.

The rest of the paper is centred on the literature review (section 2), the methodology (section 3), the empirical results (section 4) and finally the conclusion (section 5).

2. Literature Review

2.1. Theoretical review.

Broadly speaking, economic convergence in a regional integration grouping is understood to mean the increasing alignment of the economic variables considered, due to more rapid advances in less favoured countries than in the average of the grouping. Two types of economic convergence are usually considered: nominal and real. Nominal convergence refers to the tendency towards a greater uniformity of nominal variables indicative of macroeconomic stability. Real convergence expresses the approximation of the levels of economic welfare, generally proxied by per capita income. Our study focuses on real convergence.

The literature in economic growth has used many definitions of real convergence (Quah, 1993). Meanwhile all the definitions turn around two concepts, β - convergence and σ - convergence. There is β - convergence in a cross-section of economies if a negative relationship is found between the growth rate of income per capita and the initial level of income. In other words, there's β - convergence if poor economies tend to grow faster than wealthy ones. On the contrary, σ -convergence occurs when the trend in the dispersion of the levels of real per capita revenue is falling over time (Sala-i-Martin, 1995). Though different, these two concepts are related. Suppose there's β -convergence in a group of countries i where i = 1,2, …….N. In discrete terms, the real annual per capita revenue for an economy can be defined as follows:

$$\text{Log}(Y_{it}) = a + (1-\beta).\text{Log}(Y_{it-1}) + \mu_{it} \qquad (1)$$

Where "a" and β are constants. $0 < \beta < 1$, and μ_{it} is the error term. The requirement $\beta > 0$ implies β -convergence. The annual rate of growth Log (Y_{it} / Y_{it-1}) is inversely proportional to Log (Y_{it-1}). A higher coefficient β corresponds to a great tendency of convergence. The disturbance term captures temporary shocks on the production function, the saving rate, etc. We assume that μ_{it} has mean zero, the same variance δ^2_μ for all economies and is independent over time and across economies.

In order to measure the cross-sectional dispersion of income, we take the sample variance of the Log of income,

$$\sigma_t^2 = (1/n) \sum_{i=1}^{N} \left[\log(y_{it}) - \mu_t\right]^2 \qquad (2)$$

Where μ is the sample mean of Log (Y_{it}). If N is large, then the sample variance is close to the population variance, and we can use (1) to derive the evolution of σ_t over time :

$$\sigma_t^2 \cong (1 - \beta)^2.\sigma_{t-1}^2 + \delta_\mu^2 \qquad (3)$$

This is a first-order difference equation, which is stable if $0 < \beta < 1$. If there is no β - convergence so that $\beta < 0$, then the cross-sectional variance increases over time. This would simply mean that if there is no β - convergence, there cannot be σ -convergence. In other words, β - convergence is a necessary condition for σ -convergence.

Beside these two concepts, Barro (1991) and Barro and Sala-I-Martin (1991, 1992) introduced the notion of "Conditional Convergence" in which difference between countries is related to their long term per capita revenue levels. These authors also distinguish conditional from absolute convergence. Thus, a set of economies displays conditional β - convergence if the partial correlation between growth and initial income is negative. In other words, in a cross-sectional regression of growth on initial income where a number of additional variables are held constant, if the coefficient on initial income is negative, then the economies in the data set display conditional β - convergence. If the coefficient on initial income is negative in a univariate regression, then the data set displays absolute β - convergence.

In an economy, the wider the initial gap between the level of per capita GDP and the level of long term per capita revenue, the faster the growth of the economy. Formally, if country i has $\overset{\bullet}{Y_i}$ as a long term per capita revenue and Y_i as the level of per capita GDP, the growth rate y_i* is assumed to be a linear function of the gap between $\overset{\bullet}{Y_i}$ and Y_i :

$$y_i* = \beta \ (\overset{\bullet}{Y_i} - Y_i) \qquad\qquad (4)$$

A positive value of β implies a conditional convergence. The level of long term per capita income $\overset{\bullet}{Y_i}$ is here represented by certain structural variables such as the initial level of human capital. Barro (1991) estimated equation (4) and found a positive and significant coefficient for β and significant coefficients for the other structural variables. He concludes that a poor country tends to grow more rapidly than a rich country with the condition of having a certain quantity of human capital.

Concerning the theoretical link between regional economic integration and real convergence, the implications of traditional theories of trade are very clear. Let's consider the impact of market integration. The Hecksher-Ohlin model demonstrates that countries export goods rich in factors, which are abundant in their economies and import goods rich in factors whose endowment is weak. In abstraction to transport costs, liberalisation tends to equalise prices of goods traded. Thus countries will export the more products that exploit their best factor endowment. The demand for abundant and less expensive factors increases while that of limited and expensive factors falls. The convergence of prices of goods tends to bring about convergence of factor prices. In peripheries where labour is abundant, real salaries will fall while at the centre where labour is limited, they will increase, everything being equal. Capital or labour mobility is made possible between the two poles in conformity with the predictions of Mundell (1957). Labour will migrate from periphery to centre in search of high salaries. The consequence is an increase in wages in the periphery and a fall in wages in the centre. As for capital, it will move from the centre to the periphery in search of better returns. This movement reduces the wages of the centre and increases those of the periphery. The whole movement favours the alleviation of the

difference in factor prices between regions and ends up in the convergence of income levels of member countries.

2.2 Empirical Review.

During the past two decades, there has been a significant increase in concerns about convergence. Overviews of the convergence literature are found in Durlauf and Quah (1999), and Temple (1999). The reason for the sudden increase was twofold. First the existence of convergence across economies was proposed as the main test of the validity of modern theories of economic growth and as a distinguishing feature between the earlier (Solow, 1956) model and endogenous growth models. The second reason for the evolution of the convergence debate was the ready availability of international comparable GDP data, which permitted the comparison of GDP across a large number of countries and its evolution over time.

The familiar studies of the convergence hypothesis at international level build on early contributions by Baumol (1986), Lucas (1988) and Romer (1986). Today there is a large literature drawing on neo-classical and endogenous growth models, whilst employing a range of empirical techniques. The more recent tests for convergence include Barro and Sala-I-Martin (1991), Carlino and Mills (1996), and Bernard and Jones (1996) for the US. Coulombe and Lee (1995) examine regional convergence processes for Canadian provinces. Mallick and Carayannis (1994) look at Mexican states and Chatterji and Dewherst (1996) at British countries. The consensus from all these studies is that income convergence has been strong on a regional level.

Based on the European Union experience, it is evident that preferential reforms within regional integration groupings lead to the convergence of levels of income of member countries. This is observable through the improving economies of Ireland, Spain and Portugal who have made enormous progress in reducing the gap in growth, which formerly separated them from the more advanced nations of the EU. The analysis of the dispersion of income levels in this group was done by Ben-David (1993) for the period covering the 1980s. The results obtained clearly show a progressive convergence in income levels as from 1947 (creation of Benelux), through 1951 (formation of CECA), 1957 (creation of the EEC), 1962 (elimination of all quotas), 1968 (elimination of all internal tariffs of the EEC) to 1981. As a whole, the difference in the levels of income dropped by two-third during the above period, due especially to the more rapid growth of less advanced economies of the community. As illustration, during the 1980s, the per capita GDP of Ireland, Spain and Portugal were 61%, 49% and 27% of the per capita GDP of the larger countries of the EU respectively. During the 1990s, these figures rose to 91%, 67% and 38% respectively (World Bank, 2000). Meanwhile this convergence did not include Greece though she joined the EU long before Spain and Portugal. The main reason put forth is the absence of the necessary reforms in Greece. Thus even though regional integration is potentially beneficial, deep reforms are necessary in the less advanced economies in order to materialise the potentially beneficial effects. This is why we are proposing to test this convergence hypothesis in the WAEMU sub-region at the down of waves of reforms of the 1980s and 1990s.

In WAEMU, studies on convergence are rather sparse. Nearly two decades have passed since WAEMU countries undertook the economic reform program and efforts made so far to study the likely effects of the policy measures on target variables such as, whether less advanced

economies tend to grow faster than wealthy ones within the sub-regional groupings under consideration (β - convergence), and whether the dispersion of real per capita income across member economies tends to fall over time (σ - convergence) are rare. The work of Jones (2002) in this area concentrated on ECOWAS, and was done before the expected influence of the economic reforms. However, for the purpose of economic policies, the WAEMU authorities need to know to what extent poor member countries are caching up to wealthy ones as a consequence of economic reforms within the subregion. They also need to know by how much will the real income dispersion within the grouping fall over time. It is on account of this vacuum that the current paper has specific relevance.

3. Methodology approach.

The specialized literature on real convergence has come up with a wealth of different measures and openly debated on their relative merits[3]. The simplest indicator for assessing real convergence between countries (regions) within an area is to test whether the per capita GDP of a country (region) or a set of countries is approaching the average of the area. The two most popular measures are the beta-convergence and sigma-convergence. The former is generally tested by regressing the growth in per capita GDP on its initial level for a given cross-section of countries. In turn, this beta-convergence covers two types of convergence: absolute and conditional (on a factor or a set of factors in addition to the initial level of per capita GDP). In contrast, sigma-convergence designates the reduction in the dispersion of per capita GDPs within a sample of countries.

The basic neo-classical beta-convergence model, as proposed by Barro and Sala-I-Martin (1991,1992) for the evaluation of convergence or divergence trends across countries or regions adopts the following form:

$$\frac{1}{T}\ln(\frac{Y_{i,t}}{Y_{i,t-T}}) = \alpha + \ln Y_{i,t-T}(\frac{1-e^{\beta t}}{T}) + \varepsilon_{i,t-T} \tag{5}$$

Where $Y_{i,t}$ represents the GDP per capita of the country or region i; T is the period of analysis; β is the coefficient and ε is the error term. A negative value for the slope coefficient β indicates convergence of GDP per capita across territorial units of analysis, in a given time period, while a positive value indicates divergence.

This methodology to test beta-convergence has been criticized for producing biased results. Quah (1993, 1995, and 1996) argues that this methodology largely neglects the dynamics of changing national (regional) income distributions and proposes the use of a complex method based on the use of Markov chains to capture the dynamics of the entire cross-country distribution. Boyle and McCarthy (1997, and 1999) have suggested the use of the Kendall index of rank concordance, referred to as *gamma*-convergence in addition to *sigma*-convergence in testing *beta*-convergence. More recently Petrakos et al (2001) re-examined from a critical theoretical and empirical viewpoint the convergence literature and provided a new dynamic framework of analysis, which allows for a better understanding of the forces in operation described by the two sides involved in the debate.

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[3] Barro and Sala-i-Martin (1995), Quah (1993, 1996), and Grossman (1996)

Unfortunately, its application to the measurement of disparities in the European Union yielded results that were difficult to interpret (Idem).

In general, none of the existing measurement procedures mentioned above is accepted as inherently superior to the others in any circumstances. Probably because of its intuitive appeal, the first approach (beta-convergence) remains the most commonly used. It is also the one to which we refer in our paper.

3.1. Model specification.

We develop an empirical model that will be applied to WAEMU to test for absolute and conditional convergence. This model tries to capture the main immediate determinants of the growth of income per capita. Following the usual procedure in the literature (De la Fuente, 1998), we derive an empirical convergence equation from a log-linear approximation to a simple growth model. We assume that the production side of the economy can be described by a reduced-form aggregate production function of the form:

$$Y_{it} = \theta^{\gamma} K_{it}^{\alpha_k} H_{it}^{\alpha_h} R_{it}^{\alpha_r} (A^g_{it} L_{it})^{1-\alpha_k-\alpha_h-\alpha_r} \tag{6}$$

Where Y_{it} is aggregate output in country i at time t, L the level of employment and A_{it} an indicator of the level of technical efficiency, which grows at an exponential rate g. The variables K, H and R denote, respectively, the stocks of physical, human and technological capital, and θ is an indicator of the relative weight of the government sector in the economy.

This formulation is not completely standard since it allows national output to be a function of the relative size of government. The indicator of the weight of the government sector in the economy is meant to capture in the simplest possible way the fact that public activities may affect productivity in a variety of ways other than through infrastructure investment, which contributes directly to factor accumulation.

From equation (6), we can derive a convergence equation[4] of the form :

$$GYPC_{it} = g + \beta a_{it} - \beta^* \ln YPC_{it} + \gamma(\ln\theta_{it} + (\delta + g + n)\ln\theta_{it}) +$$

$$\tag{7}$$

$$(\delta + g + n)\left[\alpha_k \ln\frac{sk_{it}}{\delta + g + n_{it}} + \alpha_h \ln\frac{sh_{it}}{\delta + g + n_{it}} + \alpha_r \ln\frac{sr_{it}}{\delta + g + n_{it}}\right]$$

Where $GYPC_{it}$ is the growth rate of income per capita in country i during the subperiod which starts at t. $\ln YPC$ is the log of income per capita at the beginning of the sub-period, sj_{it} the fraction of GDP invested in capital of type j (j = k, h, r), n_{it} the rate of population growth, a_{it} the

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[4] From equation (6), we first subtract from both sides the income per capita of the beginning of the subperiod. We secondly introduce the logarithm and make necessary transformations.

log of the indicator of technical efficiency (A_{it}), θ the log of government's share in GDP, and δ the rate of depreciation of capital. β measures the rate of convergence towards a pseudo-steady state, which would be attained asymptotically if the rate of population growth, the share of government expenditures in GDP and the different investment rates remained constant over time. The value of the convergence coefficient will depend on the degree of returns to scale in the reproducible factors (in the different types of capital), with convergence being faster the faster diminishing returns set in .

Equation (3) can be extended to incorporate some important determinants of growth not considered by the theoretical model from which we started. Since we work with data on income per capita rather than output per worker, we control in a simple way for a technological catch-up effect. De la Fuente (1995) argued that, if technology diffuses across countries at a sufficiently rapid pace, those economies which are technically less advanced at the beginning of the period should, other things equal, grow faster than the rest. This effect, however, will gradually exhaust itself as each country approaches an equilibrium level of relative technical efficiency, which is determined by its own research and Development effort and the speed of diffusion. To try to capture this effect we include a dummy for initially backward countries in WAEMU.

After extension, we get a new equation that will be estimated to test for conditional convergence in the regional integration scheme taken into consideration.

$$\ln \Delta Y_{it} = \beta_0 + \beta_1 \ln Y_{iit-k} + \beta_2 \ln G + \beta_3 PMA + \beta_4 INV + \mu_{it} \quad (8)$$

ΔY_{it} is the GDP per capita growth rate in time t in country i. Y_{it-1} stands for GDP per capita at the beginning of the period that determines either convergence or divergence ($\beta_1 >< 0$) G is total government expenditure as a fraction of GDP ($\beta_2 > 0$). PMA is a dummy that takes 1 for initially backwards countries in the grouping. A positive relationship is expected between PMA and the GDP per capita growth rate ($\beta_3 \succ 0$). INV is capital investment, and μ_{it} is the error term.

3.2. Estimation techniques.

Equations (1) and (8) above are estimated for a panel of member states in the grouping under consideration to test for absolute and conditional beta-convergence respectively. Secondly, we compute the standard deviation of the GDP per capita of member countries in the sub-region at the beginning and at the end of the period. The comparison of the two values of this inequality measure sheds light on whether the dispersion of real per capita income across member economies tends to fall over time (σ-convergence).

We have chosen the estimation procedure that doesn't tend to overlook the relative size or importance of each country, treating all observations as equal (cross section weights). This is justified by the disparity that exists among member states in West Africa. Finally, in order to take into consideration the fact that business cycles are not synchronized across member countries, we first cover the whole period 1990-2008, and after we divide it into sub-periods.

3.3. Data collection.

The period of analysis starts in 1990 and ends in 2008. We first of all estimate our models for the entire period, and after we also estimate them for 1990-1994, 1995-2002, and 1998-2008.

Our data are obtained essentially from the following sources: the World Bank, the IMF, the African Development Bank publications, and the headquarter of the integration grouping. These are related to per capita GDP, total government expenditure as a fraction of GDP, and total investment as a share of GDP.

4. Empirical results.

4.1. Absolute convergence.

Tableau 1 : Results of the regression of the absolute β-convergence.

		C	$Log(Y_{it-k})$	R^2	$\overline{R}^2$
	Coeff	0.42	0.0875		
1990-2008	t-stat	0.415	0.537	0,233	0,219
	Prob	0,589	0,543		
	Coeff	9.145	- 1.58		
1990-1994	t-stat	1.98***	-1.97***	0.239	0,175
	Prob	0,07	0,072		
	Coeff	0.4835	0.089		
1995-2002	t-stat	0.545	0.613	0,206	0,187
	Prob	0,59	0,543		
	Coeff	0.205	0.141		
1998-2008	t-stat	0.106	0.433	0,107	0,062
	Prob	0,92	0,67		

Note: *, ** and *** imply significance at the 1, 5 and 10% levels respectively

We have considered 1975 as the starting period. In this year, the integration accords within the framework of West African Economic Community (WAEC), which was later transformed to give birth to WAEMU was just enacted. Equation (1) was first estimated for the time interval of 1990-2008, then for 1990-1994, 1995-2002 and finally 1998-2008. During these periods, our variable of interest, the level of GDP per capita at the beginning of the period has the expected sign and is significant at 10% only between 1990-1994. This means that by examining the global tendency in this time interval, there has been a weak economic catch-up between the less advanced and the more advanced economies of the grouping. In the remaining time intervals, it doesn't have the expected sign and is not significant. These results denote the importance of the unilateral as well as multilateral reforms in the integration zone. The Member countries of WAEMU effectively engaged in the unilateral liberalization in the framework of SAP. However, though the process of market integration was relatively advanced in this grouping compared to other integration zones in Africa, the delay in the preferential reforms retarded the closing-up process of the standards of living of member states. It is only as recent as 1998 that WAEMU instituted a common external tariff, thus getting to the stage of customs union. The estimation results also denote the effect of non-synchronized economic cycles. The entire period 1990-2008 hides the diversity in the results of the sub-periods.

4.2 Conditional beta-convergence.

Equation (8) is estimated for the same periods as mentioned above to observe conditional convergence of development levels within the economic grouping.

Tableau 2: Results of the conditional β-convergence.

		C	Ln(Y_{it-k})	Log(G)	Log(INV)	PMA	R^2	$\overline{R}^2$
1990-2008	Coeff	-0.888	0.072	1.21	-0.89	0.25		
	t-stat	-0.333	0.26	2.44**	-1.5	0.623	0.505	0.457
	Prob	0.74	0.796	0.02	0.143	0.54		
1990-1994	Coeff	-7.855	0.483	2.406	-0.817	0.12		
	t-stat	-0.316	0.119	1.02	-0.312	0.0674	0.32	0.22
	Prob	0.76	0.91	0.34	0.76	0.94		
1995-2002	Coeff	6.175	-0.43	0.96	-1.94	0.07		
	t-stat	2.59**	-1.74***	2.05**	-3.39*	0.284	0.636	0.586
	Prob	0.02	0.09	0.05	0.002	0.778		
1998-2008	Coeff	10.684	-0.839	0.466	-2.194	0.0299		
	t-stat	3.84*	-3.354*	1.15	-3.22*	0.088	0.939	0.9244
	Prob	0.005	0.006	0.27	0.008	0.935		

Note: *, ** and *** imply significance at the 1, 5 and 10% levels respectively

The results in table 2 show no tendency of conditional beta-convergence during the periods 1990-2008 and 1990-1994. The GDP per capita of the beginning of the period doesn't have the expected sign and isn't significant. Meanwhile, in the time intervals of 1995-2002 and 1998-2008, there is conditional convergence towards a steady state. Our variable of interest is significant at 10% and 1% respectively.

With respect to other variables, the size of the public sector has the expected sign in all the periods, but is only significant at 10% during 1990-2008 and 1995-2002. Investments do not have the expected sign in all the periods and are significant at 1% in 1995-2002 and 1998-2008. In terms of sign, this result is surprising.

The dummy variable, which captures technological catch-up has the expected sign in all the periods, but is not significant. This result shows that technological diffusion was not of great importance in the growth of the less advanced countries of the grouping even during the time intervals where there was a conditional convergence tendency.

As a whole, our two models have helped highlight the importance of economic cycles and unilateral and preferential reforms on absolute and conditional convergence expressed in terms of economic catch-up within the integration zone. We have also highlighted the contribution of technological diffusion within the grouping, of capital accumulation and of the weight of the public sector to economic growth of the less advanced economies.

However, judged on the basis of the adjusted $\overline{R}^2$, the performance of our models isn't very good. Meanwhile, in the case of conditional beta-convergence, the values of $\overline{R}^2$ we obtained aren't far from those in the literature.

4.3 Sigma-convergence.

The main objective here is to know whether the economic catch-up phenomenon observed in some sub-periods in the WAEMU sub-region has enhanced the closing-up of development levels of member states in the grouping. In this respect, we have chosen a measure of inequality, which is the standard deviation of GDP per capita in the grouping. It helps highlight the importance of the dispersion of development levels during the period 1990-2008 with respect to the year considered as the beginning of the period of the analysis.

The results of the calculation show that the trend of the closing-up of the standards of living of the different member countries of the sub-region was not constant. The integration accords of the WAEC were followed by a widening of the dispersion of development levels of Member States. The level of inequality widened at a speed of about 55.5% yearly between 1975-1980. From 1985, the closing-up of the levels of development has been done at a rhythm of 12.15% up to 1990. Between 1990 and 1994 the reduction of dispersion was remarkable at a speed of 13.44%. This period corresponds to the time interval during which there was an economic catch-up within the WAEMU. After 1994, there was first a divergence trend up to 2000, then a closing–up at a rhythm of 5.94% till 2002. It appears that the closing-up speed was rapid in the sub-period where there has been economic catch-up between the poor and the rich countries of the group. This confirms the fact that beta-convergence is a condition for sigma-convergence

5. Conclusion.

This paper aimed at testing the "convergence club" hypothesis in the WAEMU at the down of waves of reforms of the 1980s and 1990s. It has investigated whether regionalism in WAEMU is bound by the characteristics of African economies to always experience divergence of income levels of member countries. An empirical model to test for absolute and conditional convergence was developed, and two convergence equations from a log-linear approximation to a simple growth model were derived. This model tries to capture the main immediate determinants of the growth of income per capita. The two equations were estimated for a panel of member states in the grouping under consideration.

With respect to absolute convergence, the results show that over the periods of analysis, our variable of interest, the level of GDP per capita at the beginning of the period has the expected sign

and is significant at 10% only between 1990-1994, which is indicative of a weak economic catch-up between the less advanced, and the more advanced economies of the grouping. In the remaining time intervals, it doesn't have the expected sign and is not significant. These results denote the importance of the unilateral as well as multilateral reforms in the integration zone. The Member countries of WAEMU effectively engaged in the unilateral liberalization in the framework of SAP. However, though the process of market integration was relatively advanced in this grouping compared to other integration zones in Africa, the delay in the preferential reforms retarded the closing-up process of the standards of living of member states. It is only as recent as 1998 that WAEMU instituted a common external tariff, thus getting to the stage of customs union. The estimation results also denote the effect of non-synchronized economic cycles. The entire period 1990-2008 hides the diversity in the results of the sub-periods.

As far as conditional convergence is concerned, the results in table 2 show no tendency of conditional beta-convergence during the periods 1990-2006 and 1990-1994. The GDP per capita of the beginning of the period doesn't have the expected sign and isn't significant. Meanwhile, in the time interval of 1995-2002 and 1998-2008, there is conditional convergence towards a steady state. Our variable of interest is significant at 10% and 1% respectively.

With respect to other variables, the size of the public sector has the expected sign in all the periods, but is only significant at 10% during 1990-2008 and 1995-2002. Investments do not have the expected sign in all the periods and are significant at 1% in 1995-2002 and 1998-2008. In terms of sign, this result is surprising.

The dummy variable, which captures technological catch-up has the expected sign in all the periods, but is not significant. This result shows that technological diffusion was not of great importance in the growth of the less advanced countries of the grouping even during the time intervals where there was a conditional convergence tendency.

As a whole, our two models have helped highlight the importance of economic cycles and unilateral and preferential reforms on absolute and conditional convergence expressed in terms of economic catch-up within the integration zone. We have also highlighted the contribution of technological diffusion within the grouping, of capital accumulation and of the weight of the public sector to economic growth of the less advanced economies.

However, judged on the basis of the adjusted $\overline{R}^2$, the performance of our models isn't very good. Meanwhile, in the case of conditional beta-convergence, the values of $\overline{R}^2$ we obtained aren't far from those in the literature.

With regard to sigma convergence, the standard deviation of the GDP per capita of member countries in the sub-region at the beginning and at the end of the period was computed. The comparison of the two values of this inequality measure sheds light on whether the dispersion of real per capita income across member economies tends to fall over time (σ- convergence). The results of the calculation show that the trend of the closing-up of the standards of living of the different member countries of the sub-region was not constant. The integration accords of the WAEC were followed by a widening of the dispersion of development levels of Member States.

The level of inequality widened at a speed of about 55.5% yearly between 1975-1980. From 1985, the closing-up of the levels of development has been done at a rhythm of 12.15% up to 1990. Between 1990 and 1994 the reduction of dispersion was remarkable at a speed of 13.44%. This period corresponds to the time interval during which there was an economic catch-up within the WAEMU. After 1994, there was first a divergence trend up to 2000, then a closing–up at a rhythm of 5.94% till 2002. It appears that the closing-up speed was rapid in the sub-period where there has been an economic catch-up between the poor and the rich countries of the group. This confirms the fact that beta-convergence is a condition for sigma-convergence

In general our findings in this paper lend support to the "convergence club" defined according to policy choices rather than initial levels of human capital. They confirm our theoretical hypothesis that unilateral and preferential suppression of tariff and non-tariff barriers favours the convergence of per capita GDP and reduces the dispersion of real per capita income levels of partners in the sub-region.

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