

Convergence and Economic Integration in Africa: the Case of the Franc Zone Countries

By

Latif A.G. Dramani
*Agence Nationale de la Statistique et de la
Démographie, Senegal*

AERC Research Paper 200
African Economic Research Consortium, Nairobi
August 2010

THIS RESEARCH STUDY was supported by a grant from the African Economic Research Consortium. The findings, opinions and recommendations are those of the author, however, and do not necessarily reflect the views of the Consortium, its individual members or the AERC Secretariat.

Published by: The African Economic Research Consortium
P.O. Box 62882 - City Square
Nairobi 00200, Kenya

Printed by: Regal Press (K) Ltd
P.O. Box 46166 - GPO
Nairobi 00100, Kenya

ISBN 9966-778-70-5

© 2010, African Economic Research Consortium.

Contents

List of tables	iv
List of figures	v
Abstract	vi
1. Introduction	1
2. Research framework	9
3. The process of integration in the Franc Zone	12
4. Convergence: Sources of the theory and its foundations	17
5. The economic situation of the Franc Zone	25
6. Nominal convergence	27
7. Real convergence	32
8. Conditional convergence	35
9. Taking spatial effects into account	44
10. Conclusion	47
Notes	49
References	50
Appendix A: Basic indicators for Franc Zone countries	53
Appendix B: Variables and test results	55

List of tables

1.	Evolution of the economic structure of the countries in the Franc Zone	25
2.	Absolute convergence 1: GDP deflator	28
3.	Absolute convergence 2: Total public debt incur /nominal GDP	29
4.	Absolute convergence 2: External balance/GDP	30
5.	Absolute convergence looked at in terms of institutions and similarities	33
6.	Conditional convergence in the CFA Zone (optimal model)	36
7.	Rate of economic growth	41
8.	Investment in the two zones	42
9.	Spatial effects in conditional convergence	44
A1.	Basic indicators for 1993	53
A2.	Basic indicators for 1994	53
A3.	Basic indicators for 2000	54
B1.	Sources and availability of variables	55
B2.	Root unit test on panel data	55
B3.	Root unit test on panel data	56
B4.	Long-term relationship within the UEMOA zone	57
B5.	Long-term relationship within the CEMAC zone	58
B6.	Short-term relationship within the CFA zone	58
B7.	The 1970–1979 period	59
B8.	The 1980–1993 period	60
B9.	The 1994–2000 period	60

List of figures

1:	Factor analysis of inflation over the 1970–2000 period	3
2:	Outstanding public debt in relation to the nominal GDP	5
3:	Factor analysis of the ratio of the external outstanding debt to GDP over the 1978–2000 period	6
4:	Per capita income for the Franc Zone countries estimated using the correspondence factor analysis approach	7
5:	Map of member countries of the BCEAO and the BEAC	13

Abstract

Using the convergence theory inspired by models of endogenous growth, this paper analysed convergence in the economies of the Franc Zone countries in Africa. In recent years studies on the convergence of economies using beta- and sigma-convergence theories have been improved by taking into account spatial phenomena that had until then been neglected by specification models. Using an econometric validation based on cross-sectional and panel data, the study tested a number of hypotheses, the main ones being the convergence of the economies of the West African Economic and Monetary Union (UEMOA) and Economic and Monetary Community of Central Africa (CEMAC) zones through certain economic and budgetary variables, the existence of spillover effects, as well as the search for a common growth path for the economies of the two zones. The study's findings show that the convergence process, and hence that of integration, has not been carried out uniformly in the Franc Zone: the process has been given greater emphasis in UEMOA than in CEMAC Zone. Further, the technique used to measure the conditional convergence model made it possible to highlight the existence of key variables that help to maximize the convergence speed. A more refined convergence approach, which used similarities related to production factors and those related to natural advantages made it possible to highlight the presence of a convergence club. The study found a period-related convergence in the cotton-producing countries, coffee-producing countries and coastal countries. This shows that the hypothesis of a common convergence path in the Franc Zone has not been borne out by our study. The analysis of spatial effects has brought to the fore the existence of inhibitor effects on the convergence speed. Taking border effects into account contributed to reducing the convergence speed by half on average over the post-devaluation period, and by one-fifth over the structural adjustment period.

JEL: F15, O12, O47, C31, C32, C33

Key words:

beta convergence, sigma convergence, stochastic convergence, panel data, spatial econometrics, spatial autocorrelation, cointegration, economic integration

Acknowledgements

We are very grateful to the AERC for providing the financial support for carrying out this study and to the Resource Persons during the AERC Biannual Research workshops for providing technical guidance. An anonymous Referee of the paper, including the Research Director of AERC, Prof. Olu Ajakaiye who provided guidance on the interim and final draft of the report. We are also indebted to the Communications Division of the AERC for a very good editing of the report. However, we are solely responsible for all the remaining errors in the paper.

1. Introduction

Economic globalization is a long historical process that accelerated during the 1980s as a result of a number of factors, especially the setting-up of programmes of transition towards a market economy, technological and managerial progress, and deregulation at the world level. The subsequent creation of the World Trade Organization (WTO), and the establishment of integrated regional groupings continued the impetus towards a global economy.

Many observers consider globalization, which imposed itself on African countries with its advantages, disadvantages and attendant systemic risks, as a phenomenon that benefits only developed countries. Consequently, many researchers considered economic and monetary integration is increasingly a necessary strategy to ensure harmonious integration of African national economies into the world economic fabric so as to enable African countries to make the most of the phenomenon. In this respect, a plan to set up subregional and regional economic integration areas was designed to harmonize African economic integration. The goal of these integration areas was to establish viable economic groupings and big common markets to serve as outlets for local firms.

Even before the big push towards globalization in the last decades of the 20th century, some countries in west and central Africa had begun the process of integration, in particular by setting up monetary unions in a common monetary zone – the Franc Zone – as well as establishing economic communities. With these monetary unions, the African countries in the Franc Zone experienced a relatively stable monetary situation for a fairly long period. At the economic level, however, the results were less exciting, especially in the 1980s. During this period the economies of these countries were marked by huge macroeconomic imbalances aggravated by a slowdown in economic activity. To restore macroeconomic balance and stimulate growth, governments set up stabilization policies that were later strengthened by the implementation of structural adjustment programmes recommended by the International Monetary Fund (IMF) and the World Bank.

Several years into the implementation of these programmes, the results were hardly satisfactory. Faced with persistent economic imbalances, the Franc Zone countries decided to devalue the CFA franc, with the aim of improving the competitiveness of their economies by stimulating exports so as to achieve sustainable economic growth. This devaluation, in January 1994, enabled countries in the Franc Zone to see their economies grow once again, strengthen their monetary unions, and speed up the integration process by setting up economic and monetary unions: the West African Economic and Monetary Union (UEMOA) and the Economic and Monetary Community of Central Africa (CEMAC). The organization of the two bodies was greatly inspired by the strengthening of the European Union.

This integration goal is part of a plan of reforms that rests on four main actions: harmonization of the legal and regulatory framework, setting-up of a common market, multilateral monitoring of macroeconomic policies, and coordination of sector-based national policies in the main areas of economic activity. In order to achieve a successful economic integration, however, certain conditions must be met, key among them being the convergence of economic performance and policies. To this end, convergence criteria were devised within the framework of multilateral monitoring envisioned by the Convergence, Stability, Growth and Solidarity Pact set up to facilitate the process of the nominal convergence of the countries in the two zones. As part of this multilateral monitoring, convergence criteria were instituted within the two blocs; if the criteria were observed, it could lead to nominal convergence and it is assumed that this nominal convergence would lead to a real convergence of the economies concerned (Loufir, 1993).

In each zone, the nominal convergence criteria can be grouped into two distinct sets. In the UEMOA zone, the structure of convergence criteria was greatly inspired by the model in force in the Euro zone. There are eight criteria that are classified into first-order and second-order criteria. The first-order criteria have to do with:

- The ratio of the base budgetary balance to the nominal GDP; it has to be positive or zero.
- The annual average inflation rate, which must not exceed 3%.
- The ratio of the outstanding domestic and foreign debt to the GDP; it must not exceed 70%.
- Sub-criteria of non-accumulation of domestic arrears and non-accumulation of foreign arrears.

The second-order criteria comprise the following:

- The ratio of the wage bill to tax revenues must be lower than or equal to 35%.
- The ratio of financed public investment to domestic resources and to tax revenues must be at least 20%.
- The ratio of the current external balance to the GDP must be higher than or equal to 5%.
- The rate of tax pressure must at least be equal to 17%.

In the CEMAC zone, there are nine convergence criteria that are subdivided into basic criteria and indicators. The former are similar to the UEMOA zone's first-order criteria and are expressed as follows:

Criteria	Standards
Basic budgetary balance over the GDP	≥ 0
Average annual inflation rate	$< 3\%$
Ratio of the total outstanding public debt to the nominal GDP	$\leq 70\%$
Running costs arrears- domestic- foreign	< 120 days < 120 days

Through the indicators, the monetary authorities in this zone monitor the evolution of the following five variables:

- Rate of external cover of the currency
- Primary budgetary balance
- Rate of tax pressure

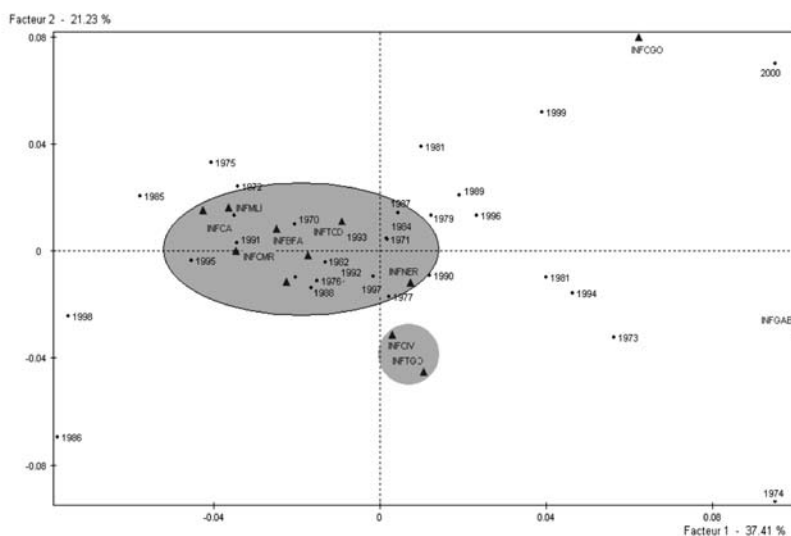
- Wage bill
- Ratio of the current external balance, minus donations, to the nominal GDP

These convergence criteria, which are constantly monitored as part of the multilateral monitoring mechanism, produced mitigated results after several years of being in force. It is necessary to carry out a descriptive analysis of certain variables that determine the nominal convergence of the economies of the countries in the UEMOA and CEMAC zones. This paper conducted a factor analysis of per capita income to show the profile of the convergence of economies.

Analysis of inflation

Factor analysis methods make it possible to study the evolution of inflation in all the countries of the Franc Zone and have shown the beginnings of convergence in almost all the countries in the zone. Indeed, except for Gabon and Congo and, to a lesser extent, Togo and Côte d'Ivoire, the countries in the zone recorded, on average, a similar evolution that is bringing them together (see Figure 1). Congo's position on the fringes of the group stems from the high inflation that it experienced during 1980/81, 1994 and 1999/00. For its part, Gabon's special case has to do with high inflation in 1973/74, 1994 and 2000.

Figure 1: Factor analysis of inflation over the 1970–2000 period



Key: GNI= Per capita gross national income; BEN= Benin; BFA= Burkina Faso; CAF=Central African Republic; CIV= Côte d'Ivoire; CGO= Congo Brazzaville; CMR= Cameroon; GAB= Gabon; MLI= Mali; NER= Niger; SEN= Senegal; TCD= Chad; TGO= Togo

In other words, Gabon and Congo are exceptions for three fundamental reasons:

- The first oil shock (of 1973/74) for Gabon and the second (of 1980/81) for Congo. As the two countries are oil exporters, the oil shocks led to a significant increase in hard currency revenues, but at the same time, the rise in oil prices brought about distortions that led to even higher inflation in the two countries.

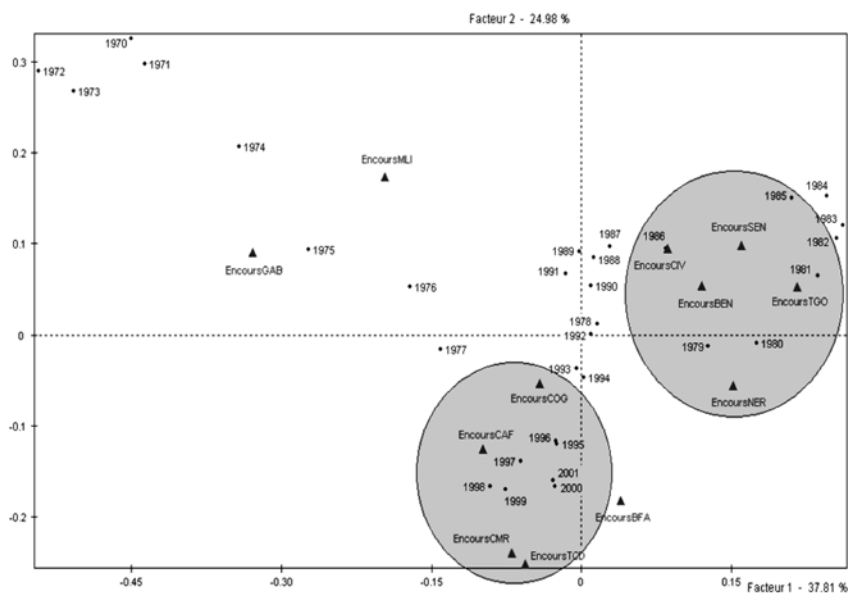
- The negative effects of the CFA Franc devaluation of 1994.
- The economic crisis of the 2000s. With the financial crisis that first hit Argentina and then spread to Asia before having an effect on international financial markets, the world economy experienced a slowdown. As a result, Gabon and Congo saw their exports of raw materials (mainly timber exports to Asia) strongly reduced because of a fall in demand.

Togo and Côte d'Ivoire, suffered the effects of the first oil shock and of the CFA devaluation, both of which led to an increase in the rate of inflation. Unlike the two oil shocks, the change in the exchange parity of the CFA franc in 1994 is the only shock that led to a generalized simultaneous rise in prices within the 12 countries of the Franc Zone. Thus, in that year most of them (8 out of 12) recorded the highest inflation rate for the whole of the 1970–2000 period. The eight are: Benin, Burkina Faso, Côte d'Ivoire, Mali, Niger, Senegal, Gabon and Chad. However, thanks to the intervention of the Bretton Woods institutions (the IMF and the World Bank) and subregional organizations, this rise in inflation was brought under control by 1995.

Moreover, it transpires from analysing the behaviour of all the Franc Zone countries during the post-devaluation period that half of them stood out from the rest, thus starting the process of bringing together their economies. Chad, Gabon, Congo and Côte d'Ivoire recorded the highest rates during that period, while Cameroon and Burkina Faso recorded the lowest rates. Congo's outlying position is more attributable to the very high price increases recorded in 1999 and 2000, with the 2000 price increase being the highest during the entire post-devaluation period (and also the highest recorded during the 1970–2000 period).

Analysis of outstanding debt in relation to GDP

Figure 2 brings to the fore the factor pattern of outstanding debt in relation to the Franc Zone countries' nominal GDP. The figure highlights two distinct groupings of countries: one composed of most of the UEMOA zone countries, and the other composed of the CEMAC zone countries. The fact that two distinct groupings can be observed means that the convergence in the two zones is not identical during the two periods under consideration. The special situation of Gabon and Mali in 1973 and 1976 should also be noted. The years 1973 to 1975 correspond actually to the first oil shock. The special situation of the two countries highlights the fact that during this period they recorded ratios that were higher than the overall average for the Franc Zone.

Figure 2: Outstanding public debt in relation to nominal GDP

Key: BEN= Benin; BFA= Burkina Faso; CAF=Central African Republic; CIV= Côte d'Ivoire; CGO= Congo Brazzaville; CMR= Cameroon; GAB= Gabon; MLI= Mali; NER= Niger; SEN= Senegal; TCD= Chad; TGO= Togo

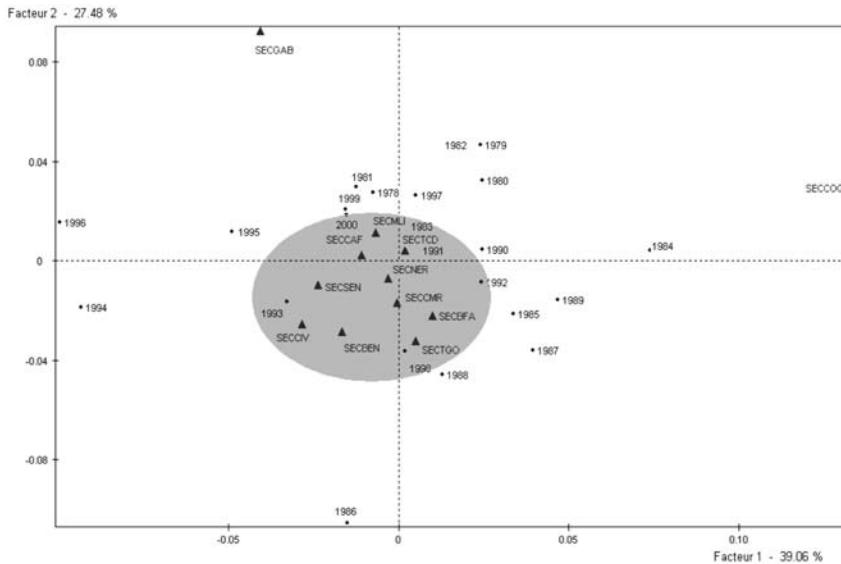
Analysis of the current outstanding debt in relation to the GDP

An analysis of Figure 3, which traces the evolution of the ratio of the current outstanding debt to the GDP over the 1978–2000 period, finds that with the exception of Congo and Gabon, the Franc Zone countries undertook a process of getting together into one grouping. The devaluation of the CFA franc does not seem to have had a significant impact on this indicator. Congo stands out from the rest again, essentially because of the highest debt value in the whole zone (9% of the GDP), which it recorded in 1984. As for Gabon, its particular situation arises from the fact that it did much better on the international market than the other countries by recording the highest trade surplus during the 1978–1982, 1994–1997 and 1999–2000 periods. For instance, in 1996 Gabon recorded its best performance (a surplus of 15% of the GDP), while all the other countries in the zone recorded deficits ranging from 43.65% of GDP (for Congo) to 1.34% (for Côte d'Ivoire).

The post-devaluation period was characterized by less disparity between the countries in the zone, compared with the 1978 to 2000 period, for two main reasons:

- The change in the exchange parity by decreasing the value of the currency boosted exports in the countries of the zone, which, other things being equal, had the effect of reducing the outstanding debt of those countries.
- The establishment in 1994 of the two subregional organizations (UEMOA and CEMAC), which periodically monitored this debt ratio for each of the two zones.

Figure 3: Factor analysis of the ratio of the external outstanding debt to GDP over the 1978–2000 period



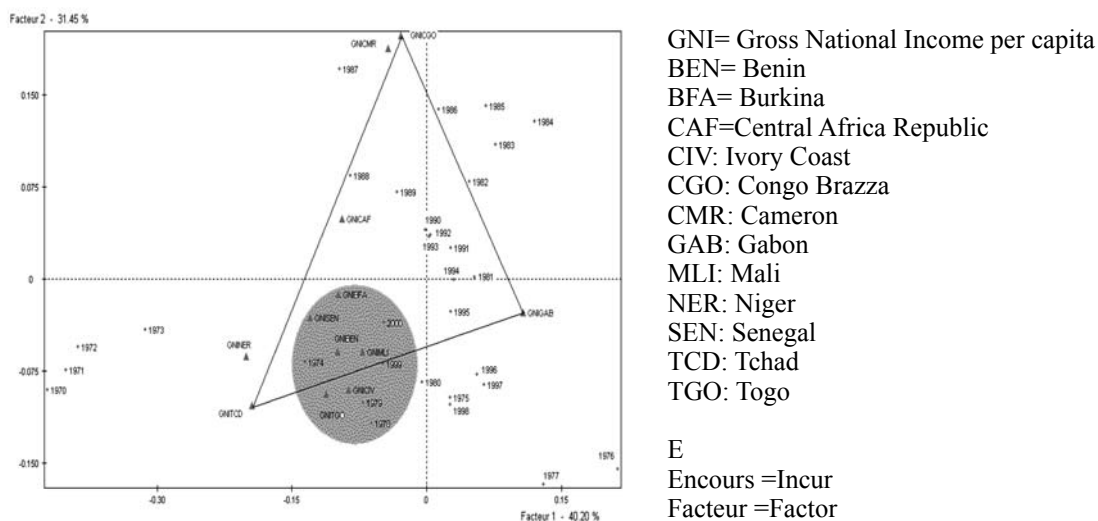
Key: BEN= Benin; BFA= Burkina Faso; CAF=Central African Republic; CIV= Côte d'Ivoire; CGO= Congo Brazzaville; CMR= Cameroon; GAB= Gabon; MLI= Mali; NER= Niger; SEN= Senegal; TCD= Chad; TGO= Togo

Nevertheless, besides Congo and Gabon, whose situation was largely different from that of the others, one can also point the fact that the situation of Benin and Burkina Faso was also somewhat different. These two countries, cotton exporters, along with Gabon, were the only ones to record a surplus in their trade balance (0.71%, 0.85% and 7.57%, respectively, of GDP) in 1994. Gabon, which over the 1994–2000 period experienced a deficit only in 1998, seems to be the most competitive country even though its export products consist essentially of oil and timber.

Analysis of per capita income

The aim of this analysis is to establish whether economies tend to converge towards the same levels of per capita income, and to examine the phenomena that are likely to contribute to this convergence. This section therefore explores the average profile (within one constant) of the Franc Zone countries' per capita incomes over the 1970–2000 period, by using the correspondence factor analysis. The projection, on the first factor pattern of this analysis of the annual distribution of those countries' per capita incomes, enables the zone to capture about three-quarters of the variables of this distribution. In general, the UEMOA countries present a quasi-homogeneous situation that manifests itself in their tendency to form one grouping, while the CEMAC countries present a very heterogeneous structure that manifests itself in the three apexes of the triangle described by the projection of all the countries in the Franc Zone (Figure 4).

Figure 4: Per capita income for the Franc Zone countries estimated using the correspondence factor analysis approach



Key: GNI = Per capita gross national income; BEN= Benin; BFA= Burkina Faso; CAF=Central African Republic; CIV= Côte d’Ivoire; CGO= Congo Brazzaville; CMR= Cameroon; GAB= Gabon; MLI= Mali; NER= Niger; SEN= Senegal; TCD= Chad; TGO= Togo

With regard to the UEMOA countries, their tendency to come together into one grouping has been made possible especially by the similarity of the adjustment of their economies over three periods:

- 1974: The first oil shock, which was characterized by the most notable increase in this ratio in all the countries in the zone.
- 1978/79: The second oil shock, which was much more advantageous for Côte d’Ivoire, Togo and Niger. Thus, in 1978 and then in 1979, Côte d’Ivoire recorded levels in the increase in the per capita income that corresponded to the levels recorded by Burkina Faso and Mali put together in 1978.
- 1999/00: This period, unlike the two preceding ones, was characterized by a fall in this indicator in all the countries of this zone.

As for the CEMAC zone, Congo and Cameroon on the one hand (1985–1987), and the Central African Republic (CAR) on the other (1987–1989), seem to have benefited from the structural adjustment programmes that enabled them to improve their per capita incomes. In the specific case of Gabon, this indicator saw a significant improvement only in one to two years (in 1985, 1980 and 1996/97) after the three major disruptions (the two oil shocks and the 1994 CFA devaluation) that all the Franc Zone countries underwent.

The factor analysis carried out on certain nominal convergence variables shows that the economic integration process launched to back up the Franc Zone’s monetary union fostered a nominal convergence and, as a result, a convergence in the levels of development. This convergence of national or regional economies is one of the dominant subjects that have been dealt with in the macroeconomic literature for about a decade. In addition, the creation of the Franc Zone’s monetary union at the time did not meet

any of the criteria of an optimal monetary zone because of the strongly asymmetrical nature of most of the shocks likely to arise in France and the African countries concerned. The many years of functioning of this zone and the setting-up of economic areas raise questions about the existence of an optimal monetary zone and the spreading of shocks through other countries and their impact on the convergence. Would the possible gains of integration enable a convergence of the integrated economies in the Franc Zone? Indeed, according to Pritchett (1995), in the long term it is rather a general divergence phenomenon that may emerge. However, this means neither an absolute impoverishment of the poorest countries in the zone, nor a lack of a convergence club. Thus, at the time when countries wonder about the future of the CFA franc and anticipate the expansion of the economic and monetary unions by allowing other countries to join them, testing economic convergence and convergence clubs existence within UEMOA and CAEMC is necessary.

2. Research framework

One fundamental question that is often asked in the economic literature is whether economies tend to converge towards the same levels of income or production per capita; in other words, whether there exists a mechanism that allows a given economy to catch up with the level of the per capita income of a more developed economy (Baumol, 1986; Barro and Sala-i-Martin, 1991, 1992). Many empirical studies seeking to test this hypothesis at the international or regional level have had to face econometric difficulties that rendered the interpretation of results very difficult. This issue is more than ever before a topical one for the Franc Zone African countries especially in light of the 1994 CFA franc devaluation and the establishment of UEMOA and CEMAC on the model of the European Union. The Maastricht Treaty, as the underlying reference, provides that participation in the economic and monetary union as well as in the single currency mechanism, is subject to the observance of certain standards. Often known as convergence criteria, these standards are of a monetary, budgetary and financial nature, in order to ensure a nominal convergence of the economies of the member countries. This convergence concerns nominal variables and not real ones.

The principal goal of the Maastricht Treaty is to stimulate growth and economic integration by stabilizing the exchange rate and prices. This implies that countries whose objective is to achieve the same nominal targets will see their economies converge, thus eventually fostering the evolution towards an economic union. The nominal convergence of potential members will thus lead to their real convergence (Loufir, 1993). However, being part of a process of nominal convergence can be very costly for very poor countries that are usually far from the set nominal objectives, but this situation could actually lead to a process of real divergence. It thus clearly appears that the approach used for the Maastricht Treaty has non-negligible limitations, which were actually raised within the European Union, with regard to the costs and benefits that are to be expected from an economic and monetary union. Such concerns are important for the countries of UEMOA and CEMAC, since they want to add an economic union to a monetary union that is already more than 40 years old. It would be legitimate to ask whether the UEMOA zone countries would not gain by following a process that was more in line with the specific nature of their economies, which are classified as poor, instead of trying to copy the exact model of the Maastricht Treaty.

Statement of the problem

The results of the factor analysis reported above allowed us to note that as far as the factor patterns of the subperiods studied (the pre-devaluation period), it was not possible to observe the beginning of a convergence process whatever the criterion considered. Those patterns were thus left out of the document. Nevertheless, a look at the three factor patterns presented in the Introduction reveals the existence of a beginning of convergence depending on the criteria taken into account. In the specific case of the ratio of external debt to GDP, however, it was observed that two convergence clubs existed. The other two criteria show a more homogenous convergence. As a result, it would be interesting to test the phenomena of nominal convergence observed in factor analyses by conducting an econometric study, more so because I am not aware of a recent study on the convergence of the Franc Zone countries.

The various elements identified (shocks and specificities of each country) in this study, as well as other structures specific to the economies under study, will be taken into account in the explanatory analysis in order to measure their effect on the convergence speed. Moreover, certain explanatory factors of economic convergence such as the dissemination of technology and the mobility of factors have a strong geographical dimension. Despite this, recent empirical studies do not explicitly include the role of spatial effects, with the exception of those by Rey and Montouri (1999) for the United States and Dillings-Hansen and Smith (1997) for Danish towns. One way of taking into account the role of space is to consider spatial autocorrelation (Cliff and Ord, 1981); Upton and Fingleton (1985), since the geographical distribution of growth phenomena in a given region is rarely random, and yet economic performance of neighbouring regions is often similar. It is such issues that this study was designed to address.

The idea of studying the process of regional adjustment between two points in time only in relation to spatial data is a result of new developments in spatial econometrics. The first such new development is a paper by Fingleton (1999) that introduces the notions of spatial cointegration and models of correction of spatial errors. The author demonstrates that time-related trends as well as spatial ones can lead to fallacious regressions with severe consequences in terms of statistical inference. Lauridsen and Kosfeld (2002) examine the adjustment dynamics based on an autoregressive model spatially delayed on the overall equilibrium. In order to estimate the model, the spatial properties of variables must be identified. This can be done by applying a powerful strategy using tests that were recently proposed by Lauridsen and Kosfeld (2002). This study analyses the evolution of some nominal indicators (inflation rate, the ratio of outstanding debt to GDP, and the ratio of the current external balance to GDP) and a real indicator, especially the level of the per capita income.

Further, the study includes the geographical dimension of data while estimating the convergence of economies. The first part of the study defines the various notions of convergence and underlines the importance of taking into account spatial effects in the analysis of convergence processes. The second part applies the methods that were recently developed for the exploratory analysis of spatial data (Anselin, 1996) in order to refine the description of the geographical dynamics of the zone's growth. This enables the study to shed new light on the usual way of measuring the sigma-convergence that could mask specific geographical patterns that change over time. The study then tests the presence

of a spatial autocorrelation in the beta-convergence models by using the techniques of spatial econometrics (Anselin, 1988; Anselin and Florax, 1995). Doing this will enable a comparative study of the results obtained before and after taking spatial autocorrelation into account with a view to detecting the impact of spatial effects on the speed of countries' convergence.

Objectives and hypotheses

The aim of this study is to examine whether there exists a robust and systematic convergence trend in the levels of income in a homogeneous group of countries in the Franc Zone. Here the term homogeneity refers to similarities in macroeconomic features. Recent theories on growth and development have suggested that the per capita distribution of income in regions and/or countries can serve as a basis for forming convergence clubs. This means a tendency for stationary countries to come together into a small number of growth areas. This tendency could arise from these countries' having similarities in preferences, technology, government policies and strategic production factors.

The study contributes to the various research and analytical studies on various aspects of convergence. To my knowledge, no study has yet taken into consideration the spatial phenomenon in the UEMOA and CEMAC zones. The specificity of the study lies in the fact that it has extended the research field and has addressed the issue of convergence using a new approach – that of using panel data and new tools of spatial econometrics. The study was thus designed to fill a gap in the area of research on convergence in the Franc Zone African countries. Its specific objectives are:

- To conduct a comprehensive study of the convergence of the economies of the zone.
- To study the effect of space on the convergence of economies.

To achieve these objectives, the methodological approach revolves around three main points:

- 1) A theoretical model of convergence that presents the economic and institutional environment in which activities take place.
- 2) An exploratory analysis of trends that involves many indicators of nominal convergence.
- 3) An explanatory approach that consists of estimating and interpreting the results of the convergence models implemented.

The study considers three hypotheses:

- H_1 : The Franc Zone countries follow a level convergence in accordance with the rate of the per capita GNI.
- H_2 : The convergence speed is identical for the Franc Zone countries.
- H_3 : There exists an overall phenomenon of spatial incidence in the convergence phenomenon.

Two series of tests were used to test hypotheses 1 and 2; first, the classical convergence tests based on the beta-convergence were used. In this particular case, models (6) and (7) were calculated for each variable used. Then the models equations 8, 9– 14 were used to test spatial convergence (Hypothesis 3).

3. The process of integration in the Franc Zone

A monetary and economic area that is unique in the world, the Franc Zone historically developed from the evolution and changes in the former French colonial empire. Indeed, after attaining their independence, some countries chose to stay members of homogenous groupings within renewed institutional frameworks. Those countries were aware that their status as micro-states emanating from the balkanization that had come about with colonization would not enable them to achieve, individually, sufficient economic and political visibility because “socioeconomic development demands minimum thresholds that are indispensable in terms of geographical space, population size, natural resources, markets, etc.” (Tété-Adjalo, 1989: 77–8). To this end, several integration initiatives were observed in the Zone. They materialized through the creation of a monetary union, subregional organizations, economic communities and customs unions that eventually culminated in free trade areas. These initiatives were a response to the need to expand markets in view of the small dimension of national markets, and the need to foster growth and factor mobility. In West Africa, six countries (Benin, Burkina Faso, Côte d’Ivoire, Niger, Senegal and Togo) set up the West African Monetary Union (UEMOA) on 12 May 1962. The Economic Community of West Africa (CEAO) was created in 1973, but was dissolved and replaced by the UEMOA in January 1994 following the devaluation of the CFA franc. (See map in Figure 5.)

Like the Franc Zone countries in West Africa, those in Central Africa set up institutions of economic, monetary and customs integration. On 8 December 1964, five Central African countries – Gabon, Cameroon, Congo-Brazzaville, CAR and Chad – set up the Customs and Economic Union of Central Africa (UDEAC). This was replaced by the CEMAC, which was instituted by a treaty signed in March 1994. All these integration processes were strengthened because of the devaluation of the CFA franc and, especially, of the growing phenomenon of globalization.

Integration in the Franc Zone from independence to 1993

During the colonial period, the foundations for a monetary zone were already laid with the creation of private banks not only to facilitate the activities of colonial firms and the export of capital, but also to better manage the growing trade between the colonizing power and its colonies. The Franc Zone was officially instituted by decree in 1939. In April 1959, six West African countries came together to create the Central Bank of West African States (BCEAO).

Figure 5: Map of member countries of the BCEAO and the BEAC

Key:

- UEMOA = West African Economic and Monetary Union
- CEMAC = Economic and Monetary Community of Central African States
- LME = LM error statistic
- DLME = Differentiated LM Error statistic
- SI = Spatially Integrated process
- SCI = Spatially Co-Integrated process
- BCEAO = Central Bank of West African States
- BEAC = Central Bank of Central African States
- PAZF = Franc Zone countries

This replaced the Institute of Issue of French West Africa in order to better respond to the demands of the rules governing the single exchange rate that had been instituted, as well as the pooling of exchange reserves and the free convertibility of currencies. For the same reasons, the five countries of French-speaking Central Africa set up the Central Bank of Equatorial Africa States and Cameroon in 1959. The two zones signed monetary cooperation agreements with France and their central banks to hold transaction accounts at the French Treasury.

New organizations that came into being after independence took integration some steps further. UEMOA aimed to consolidate the benefits already achieved, establish monetary stability, foster intra-regional trade and lay the foundations of a real economic development. The creation of this institution was accompanied by the signing of a cooperation agreement with France that renewed the principles of colonial economic and monetary cooperation, among which were the fixed exchange rate, the transaction account that governs management of exchange reserves and the pooling of foreign reserves. Other principles were the free transfer of capital, the CFA franc guarantee, the limit on monetary advances to the national treasuries and the harmonization of exchange regulations.

The two regional central banks, BCEAO and BEAC, are responsible for implementing the monetary policy of the Franc Zone African countries. The way the two banks are organized has influenced the nature of their monetary policies, which have long been marked by inertia. From 1962 to 1973, for instance, the rediscount rate was fixed at

3.5%. The banks' price-based monetary policies relied on direct financial instruments by resorting to policies of rediscount ceilings, overall assistance and sector-based financing. But governments were later to realize that such a policy of orienting financing had its limitations in terms of effectiveness and that central funds should not finance development but should rather be used to support it. That is why a number of reforms were undertaken in both UMOA and UDEAC. The reforms bore on the financial instruments and thus made it possible to set up monetary markets and liberalize the conditions of subsidiary banks. These monetary unions had positive results: they enabled the preservation of currency convertibility and a coordination of monetary policies aimed at both monetary and economic stability.

At the political and economic level

While the Franc Zone African countries inherited a functional monetary organization from colonization, that was not the case at the political and economic level. Thus, after setting up an integrated monetary framework, these countries recognized the weakness of their small economies and their shrinking national markets, and felt the need to set up a politico-economic framework to facilitate the launch of an economic integration process so as to overcome such obstacles. In contrast to the monetary level, the politico-economic level favoured setting up subregional institutions with independent functioning: The CEAO in West Africa and UDEAC in Central Africa.

The CEAO was charged with putting in place cooperation frameworks in the various sectors of member countries and with fostering trade between these countries to compensate for the lack of markets for emergent local firms in the face. The CEAO recorded some positive results: trade gains with third countries, including ECOWAS countries, reached a 28% level. The Community was also successful in achieving textile-related economic cooperation, total currency convertibility, relative mobility of labour and capital, a level of intra-community trade higher than 10%, and a political will determined to achieve total economic integration. As for UDEAC, its goal was to set up a customs union in order to establish a real free-trade zone that would eventually become a common market. For this to happen, the Union had to also encourage economic cooperation between its member countries so as to achieve enhanced technical and economic efficiency.

UDEAC also brought about some positive results. Over the 1965–1986 period, UDEAC recorded a 34% trade benefit with third countries. However, this figure was deemed partial and below the expected goal. The within-community traffic, which amounted to 1% for UDEAC and 3% for the CEAO, was also considered to be too little. This low performance can be attributed to a lack of proper functioning of these organizations, which in turn is a problem linked to the existence at the same time of a multitude of organizations pursuing the same goals. It can also be attributed to socio-political instability in many countries and to the lack of expansion and economic weight on the part of these organizations.

Economic performance during the period under study

This paper analyses the economic performance of the Franc Zone African countries in comparison with that of the countries that do not belong to this monetary zone. This comparison is possible because monetary organization is one of the distinctive features of the African countries in the Franc Zone. The analysis incorporates certain indicators like inflation, real GDP, national savings and the exchange value. From 1970 to 1975, the real GDP of the countries outside the Franc Zone was higher than that of those in the Franc Zone. From 1975, the trend was reversed and maintained until 1994. That said, the real GDP of the Franc Zone countries stagnated during the period 1987 to 1994. From 1970 to 1977, the exchange value followed the same trend for the two groups of countries, but from 1978 to 1985, the exchange value improved for the Franc Zone countries but deteriorated for the other group of countries. During this period, the Franc Zone countries' real GDP more than doubled. It should be noted, however, that for the same countries the exchange value deteriorated after 1985. During the period under review, the inflation rate was twice lower in the Franc Zone countries than in the others. Nevertheless, inflation was relatively high in the Franc Zone until 1985, when it decreased considerably. From 1975 to 1985, the savings rate followed a switchback evolution in both groups of countries. However, this rate represented, on average, 15% of GDP for Franc Zone countries and only 10% for the other group of countries.¹

Integration since 1994

Macroeconomic imbalances hit the African countries of the Franc Zone between 1985 and 1993; notable among these were the increase in budget deficits and current account balances, which led to the adoption of structural adjustment programmes (SAPs) initiated by the World Bank and the International Monetary Fund (IMF) in collaboration with the governments of the countries concerned. From 1990, the external debt of the Franc Zone countries increased – even doubling for most of them – and by 1993 almost all the countries in the zone experienced a recession, which translated into negative growth rates of the real GDP. During this period, their budgetary deficits were relatively high. In the face of the persistent deficits and the 1993 recession, the IMF and the World Bank advocated an exchange rate adjustment, and the CFA franc was devalued on 14 January 1994. In preparation, the African countries of the Franc Zone undertook a real process of integration aimed at putting in place big economic and development areas. On 10 January 1994, in West African Franc Zone members replaced the CEAO with the UEMOA, and those in Central Africa set up the Economic and Monetary Community of Central Africa, which brings together institutions like the Monetary Union of Central Africa (UMAC) and the Economic Union of Central Africa (UEAC).

Following the change in exchange parity, there was renewed growth in the various countries although during the first year of devaluation, the inflation rate was naturally very high: 9.9% and 11.1% in UEMOA and CEMAC, respectively. The 1994 devaluation also had a negative impact on debt, as this doubled. The sudden rise in the outstanding debt, which outpaced revenues, worsened the deficits in public finances during the first year of devaluation. Nevertheless, the change in exchange parity had a positive impact

on the current balance as it reduced the deficits and enabled the countries to gain in competitiveness. Senegal, for instance, achieved a 30% competitiveness gain. The final goal was to turn the two organizations into optimal monetary zones that would facilitate a nominal convergence and an economic growth that was further enhanced by macroeconomic stability. Aware of these realities, the Franc Zone African countries put in place a growth and stability pact that defines convergence criteria related to a number of nominal variables. A multilateral monitoring framework made it possible to monitor the observance of the convergence criteria by the countries with convergence prospects.

Integration and convergence: Lessons from the different models

The concept of economic integration emphasizes the optimal allocation of resources. According to the classical theory of international trade, integration gains are related to differences in terms of aptitude, factor endowment, and consumer preferences or collective preferences. There are two types of integration: institutional integration and spontaneous integration. The former rests on binding agreements aimed at reducing and, ultimately, eliminating trading or regulatory obstacles to the trade in goods, services and factors. It imposes a harmonization of regulations that ensure at the least, the viability of this reciprocal liberalization. The latter, for its part, is characterized by the lack of a formal framework of the nature of a free-trade treaty, as well as the lack of a deliberate will to discriminate against non-members. Within the framework of the present study and of the Franc Zone countries, historical facts indicate that it is the institutional integration that is in force. Because of this, it is worth wondering whether regional integration is conducive to the achievement of a real convergence of economies.

The issue of regional integration in French-speaking Africa of necessity involves the integration of countries that have achieved different levels of development. The existence of the Franc Zone links a developed country, France, to developing countries, many of which belong to the category of least developed countries. In addition, the attempts at regional integration, which were given new impetus by the devaluation of the CFA franc, involve African countries that are themselves heterogeneous. The originality of the Franc Zone lies in the fact that the monetary union functioned as the culmination of an “institutional” regional integration. It obviously did not correspond to any of the criteria of an optimal monetary zone, because of the highly asymmetrical nature of most of the shocks that were likely to arise either in France or in the African countries. The countries in the CFA zone thus benefited from a stable, common and totally convertible currency owing to the involvement of France. Until 1985, the economic performance of these countries was better than that of the other African countries in terms of growth and inflation rates (Guillaumont and Guillaumont, 1988; Heidhues and Michelsen, 1995). Actually, research findings by Lelart (2003), which point out the failure of very many regional integration agreements on the African continent, clearly demonstrate that the CFA zone remains an example of successful integration in Africa. Finally, while the type of integration in force in the Franc Zone seems to be very original, both the UEMOA treaty and the CEMAC treaty aim to create an institutional type of integration like that of the European Union. There is little wonder then if Lelart’s criticisms against these reforms remind us of those made in Europe against their monetary union: the too high priority accorded to monetary stability and the insistence on nominal convergence rather than on real convergence.

4. Convergence: Sources of the theory and its foundations

It is considered in this study that the production function in the UEMOA and CEMAC zone is of the Cobb-Douglas type, as shown in Equation 1, where $Y(t)$, $K(t)$, $A(t)$, and $L(t)$ represent, respectively, production, capital, level of technology and the labour of a country considered at time t while AL represents the country's labour input as an efficiency unit.

$$Y(t) = K(t)^\alpha (A(t)L(t))^{1-\alpha} \quad (1)$$

The parameters α and $1-\alpha$ are the elasticities of the production of capital and labour. On competitive markets, production factors are valued at their marginal costs. Labour L and level of technology A are assumed to increase at exogenous growth rates n and g . While the growth rate of technology g is assumed to be constant for all the countries, the growth rate for populations, n , generally differs from one country to another. The accumulation of the factor is described by the following equation:

$$\dot{K}(t) = s_k \cdot Y(t) - k \cdot K$$

(2)

where S_k is the investment ratio and K the rate of depreciation of the stock of physical capital. Finally, level of technology A and labour L change at given exogenous growth rates g and n . The resolution of the per capita stationary state ($y^* = Y/L$) implies that there is under a logarithmic form:

$$y^* = \ln A_0 + gt + \frac{\alpha}{1-\alpha} \ln s_k + \frac{\alpha}{1-\alpha} \ln(n + g + k)$$

(3)

The standard convergence specification is obtained by an approximation of the Taylor series around the stationary state, which finally leads to:

$$\ln y_t = (1 - e^{-\lambda\theta}) \frac{\alpha}{1-\alpha} \ln s_k - (1 - e^{-\lambda\theta}) \frac{\alpha}{1-\alpha} \ln(n + g + k) - (1 - e^{-\lambda\theta}) \ln y_{t-\theta} \\ + (1 - e^{-\lambda\theta}) A_0 + g(t - e^{-\lambda\theta}(t - \theta))$$

(4)

where θ refers to the period of time to which Equation 4 applies, and λ is the convergence rate.

This cross-sectional specification was extended to the case of panels by Islam (1995); it offers several advantages. And even more important, it makes it possible to control the differences in the initial stages of technology A_0 , which are reflected in the countries' specific fixed effects. Thus, the assumptions that n and sk are constant during the period θ are more realistic when they are applied to shorter periods. Finally, a panel approach makes it possible to have a greater number of observations.

By using the conventional notation in the literature on panel data, Equation 4 can be rewritten as:

$$\ln y_{it} = \gamma \ln y_{i,t-1} + \beta_1 \ln s_{it} + \beta_2 \ln(n + g + k) + \mu_i + \eta_t + \omega_{it} \quad (5)$$

with $\gamma = e^{-\lambda\theta}$; $\beta_1 = \frac{\alpha}{1-\alpha}(1 - e^{-\lambda\theta}) = \beta$; $\beta_2 = -\beta$

$\mu_i = (1 - e^{-\lambda\theta}) \ln A_0$ = specific effect “region” (invariant time)

$\eta_t = g(t_2 - e^{-\lambda\theta}t_1)$ = specific effect “time” (invariant region)

ω_{it} = the term of error is habitually assumed to be $IID(0, \sigma^2)$

Imposing restrictions on β_2 in Equation 5 gives the final empirical model:

$$\ln y_{it} = \gamma \ln y_{i,t-1} + \beta \ln x_{it} + \mu_i + \eta_t + \omega_{it}$$

where the regressive variables are illustrated by $x_{it} = s_{it} / (n + g + k)_{it}$

The foundations of convergence

Convergence theory is based on the neoclassical growth model (Solow, 1956; Swan 1956) and implies a tendency over the long term to level the rate of income growth or that of per capita production in different geographical zones. In other words, there is convergence when a “poor” economy tends to increase more rapidly than a “rich” economy, in a way that the “poor” country will in the long term catch up with the level of income or per capita production of the “rich” country. Such a phenomenon is what is referred to as the β - convergence (Barro and Sala-i-Martin, 1995). This type of convergence can be absolute (i.e., unconditional) or conditional. It becomes absolute when it is independent of initial conditions. It becomes conditional when, additionally, the economies concerned are assumed to be identical in terms of preferences, technologies and economic policies.

The absolute β - convergence hypothesis is usually tested on the cross-sectional model given below:

$$(1/T)\text{Ln}(y_{i,t}/Y_{i,0}) = \alpha + \beta \text{Ln}(y_{i,0}) + \varepsilon_i \quad (6)$$

where $y_{i,t}$ is the per capita GDP of region i ($1, \dots, N$) at the date t ; T is the length of the period of study; α and β are unknown parameters to be estimated, and ε_i is a random error term. We say that there is β - convergence when β is negative and statistically significant, because in this case the average growth rate of per capita GDP between the dates 0 and T is negatively correlated with the initial level of the per capita GDP. Estimating β enables

$$\theta = -\frac{\ln(1+\beta)}{T}$$

us to calculate the speed of convergence, and the necessary duration required for the economies to make up for half of the distance that separates them from

$$\tau = -\frac{\ln(2)}{\ln(1+\beta)}$$

their stationary state; this duration is called half-life:

Conditional convergence

The neo-classical model of growth (Solow, 1956) predicts that an economy's growth rate is positively correlated with the distance that separates it from its own stationary state. This is the concept known as the conditional beta convergence. There is beta conditional convergence if the estimation of beta is significantly negative once the X 's are held constant. The test of the hypothesis of a conditional beta-convergence is based on the following model:

$$(1/T)\text{Ln}(y_{i,t}/y_{i,0}) = \alpha + \beta \text{Ln}(y_{i,0}) + \gamma X_i + \varepsilon_i \quad (7)$$

where X is the vector of variables that makes it possible to keep as constant the stationary state of economy i . It can comprise state variables, like stock of physical capital and stock of human capital; or control or environmental variables, like the proportion of public consumption in GDP (Barro and Sala-i-Martin, 1995). We can test the conditional convergence hypothesis in another way, still based on Equation 7, but using subsamples of economies for which the hypothesis of states of stationary equilibrium seems acceptable (setting up convergence clubs, for instance, as in Jean Pierre, 1999). We eventually derive the differential effect on convergence by taking into account, in relation to variable X_i , first the economic structure and second the institutional variables.

Spatial effects

The issue of taking spatial effects into consideration in models of macroeconomic convergence has been much debated. See, for instance, Baumol (1986), Barro and Sala-i-Martin (1991, 1992, 1995), and Mankiw et al. (1992). The convergence hypothesis became more precise thanks to the major contribution by Baumol (1986). Since then, many tools and concepts have been developed in relation to convergence models. Among these are the convergence clubs (Durlauf and Johnson, 1995, 1996; Quah, 1993, 1996). With the use of convergence models econometric issues arose related to heterogeneity, omitted variables, endogeneity and error correction; alternative techniques were also proposed, like the econometrics of panel data, time series and probability matrixes. All this overshadowed spatial effects in the literature, even when the presence of such effects in beta-convergence models engendered major econometric problems.

Introducing spatial effects makes it possible to take into account the major specificity of geographical data – spatial autocorrelation and heterogeneity. The renewed interest in spatial autocorrelation is primarily theoretical, in the sense that the New Geographical Economics stresses spatial externalities, urban economics and other forms of effects of flooding. Spatial econometrics can also take into consideration other types of interaction between factors, such as social levels or proximity effects. This present study follows the definition of spatial autocorrelation proposed by Julie le Gallo in her publication of June 2000a. Spatial autocorrelation is based on the finding that observations that are spatialized in cross-sections are not independent. Spatial autocorrelation is defined as the correlation, whether positive or negative, of a variable with itself that stems from the geographical location of data. On a map,

- 1) A positive spatial autocorrelation is manifested in the closeness of geographical observations that are close to each other: two locations that are near each other are more similar than two locations that are far from each other.
- 2) A negative spatial autocorrelation is manifested in the closeness of observations that are dissimilar: two locations that near each other are more dissimilar than two locations that are far from each other.
- 3) A lack of spatial autocorrelation means that the spatial distribution of observations is random: there is no relationship between the proximity of locations and their degree of resemblance.

Detecting spatial autocorrelation in a spatial series gives additional information about traditional statistics (such as the mean or the standard deviation) on the way in which the different values are geographically located, and makes it possible to describe the nature and degree of the spatial interdependence of the structure (Griffith, 1992).

The statistic that is used to calculate, overall, the autocorrelation of spatial data is the Moran (1948) statistic:

$$S_0 = \frac{1}{n} \sum_{i=1}^n \sum_{j=1}^n w_{ij} x_{i,t} x_{j,t}$$

$$I_t = \frac{n}{S_0} g \frac{\sum_{i=1}^n \sum_{j=1}^n w_{ij} x_{i,t} x_{j,t}}{n^2}$$

and

$$\bar{X} = \frac{1}{N} \sum_{i=1}^n \sum_{j=1}^n W_{ij} X_{i,t} X_{j,t}$$

where W_{ij} is an element of a simple proximity weight matrix, called W , such that W_{ij} equals one if regions i and j share a border and zero otherwise; $X_{i,t}$ is the natural logarithm of the per capita GDP of region i at time t ; n is the number of regions, and S_0 is the standardization factor that is equal to the sum of all the elements of W . The measurement of the spatial autocorrelation is dependent on the weight matrix used, and for this reason the robustness of results is necessarily a function of the choice of the matrix of weight W used in the analysis.

Convergence clubs

In the case of unconditional convergence, there is only one level of equilibrium to which all the economies approximate. In the case of conditional convergence, the equilibrium varies with economies and each economy approximates its own unique state of stable equilibrium. On the other hand, the concept of convergence club is based on models of endogenous growth that are characterized by multiple states of stable, local equilibrium. The follow-up of one of the different types of equilibrium towards which a given economy will converge depends on the level to which its initial conditions belong. In other words, economies converge towards each other if their initial conditions are in “an attraction basin” of the same state of stationary equilibrium. In such a configuration, as Durlauf and Johnson (1995) noted, tests of standard convergence can be faced with several problems of discriminating between the multiple models of stationary states and the Solow model. Durlauf and Bernard (1996) show that a linear regression applied to data produced by economies that are converging towards multiple stationary states can produce an initial negative coefficient for the per capita GDP. The result of the overall standard beta convergence thus seems to be artificial.

Spatial convergence and econometrics

The method of spatial estimation of econometrics (see Anselin, 1988; Anselin and Florax, 1995; Cliff and Ord, 1981; and Upton and Fingleton, (1985) has been used in this study in order to detect the spatial autocorrelation in the model of absolute beta-convergence and take it out. The study concerns the process of convergence using selected variables in the Franc Zone countries in Africa over the 1970–2000 period. First the simple model of conditional convergence was estimated:

$$\frac{1}{T} \ln\left(\frac{Y_{i,t}}{Y_{i,1970}}\right) = S\alpha + \beta \ln(y_{i,1970}) + \gamma \ln(X_{i,1970}) + \varepsilon_{i,t} \quad e : N(0, s^2 I) \tag{8}$$

Several tests were carried out to confirm the presence of the spatial effects mentioned in the previous section. Using these tests, a specification was chosen that explicitly and adequately takes into account the spatial effects detected. Then the parameters of the convergence model were estimated while taking into account spatial autocorrelation.

Finally, at a third stage the impact of schemes of spatial association on convergence was analysed.

Here, Z is the vector of $N = 12$, where each element of the vector is defined as the proportion of the per capita GDP in 2000 to the per capita GDP in 1970 for each country i . $T=31$, Y_{1970} is the vector that contains the per capita GDP observations for all the regions in 1970; α , β and γ are the unknown parameters to be estimated, while ε is the vector of errors with the usual properties. S is the unit vector.

Application

The methodology given above was used to test the hypothesis of the convergence of the economies of the UEMOA and CEMAC zones. It further applied the techniques of spatial econometrics to analyse chosen variables such as the per capita income in order to study the possible relationships between geographical schemes and the beta convergence hypothesis. Following the principle of tests of spatial autocorrelation, one of the forms of the models below was to be estimated.

Case 1: The spatial error model

The errors follow an order 1 autoregressive process. In this case we have:

$$\frac{1}{T} \text{Ln}\left(\frac{Y_{i,t}}{Y_{i,1970}}\right) = S\alpha + \beta \text{Ln}(y_{i,1970}) + \gamma \text{Ln}(X_{i,1970}) + \varepsilon_{i,t}$$

$$\mathbf{e} = \mathbf{1} \mathbf{W} \mathbf{e} + \mathbf{u} \text{ and } \mathbf{e} : N(0, s^2 \mathbf{I}) \quad (9)$$

where λ is the scalar parameter representing the intensity of spatial autocorrelation between the residuals of the regression. Given that the error terms are serially correlated, the use of the ordinary least squares (OLS) is not very appropriate. In this case we have to resort to the maximum likelihood method for the purposes of estimation.

$\mathbf{e} = \mathbf{1} \mathbf{W} \mathbf{e} + \mathbf{u}$ implies and Equation 9, which becomes. $\mathbf{e} = (\mathbf{I} - \mathbf{1} \mathbf{W})^{-1} \mathbf{u}$

$$\frac{1}{T} \text{Ln}\left(\frac{Y_{i,t}}{Y_{i,1970}}\right) = S\alpha + \beta \text{Ln}(y_{i,1970}) + \gamma \text{Ln}(X_{i,1970}) + \varepsilon_{i,t} \quad (10)$$

This equation implies that an unpredictable shock in a specific country not only affects this country's growth rate but also, through spatial transformation, has an impact on the growth rate of other countries. In addition, even if a given country is bordered by few neighbours, the inverse operator in spatial transformation defines a covariance of errors that send out specific shocks not only to neighbouring countries but to the entire system as well.

Case 2: The spatial autoregressive model

In this model, the spatial correlation of observations is taken care of by the spatial lag of the endogenous variable $W[(1/T)ln(z)]$:

$$\frac{1}{T} Ln(z) = S\alpha + \beta Ln(y_0) + \rho W\left[\frac{1}{T} Ln(z)\right] + u \tag{11}$$

where z is the vector ($n \times 1$) of the dependent variable in the model of the absolute β -convergence, that is, the vector of the per capita GDP ratio for each region i between dates T and 0 ; $(1/T)ln(z)$ is the vector of the average growth rate for each region i between dates T and 0 ; Y_0 is the vector ($n \times 1$) of the per capita GDP for each region i at date $t=0$; u is the normal vector ($n \times 1$) iid of the terms of error; S is the vector of the sum; and β , α and ρ are the unknown parameters to be estimated. ρ is the spatial autoregressive parameter which indicates the magnitude of the interaction between observations following the exogenous link of the spatial model incorporated into the standardized weight matrix. The lag of the endogenous spatial variable $W[(1/T)Ln(z)]$ is a vector that consists of the growth rates multiplied by the weight matrix. Thus, for region i of vector $(1/T)ln(z)$, the corresponding line of the vector of the spatial lag comprises the spatially weighted average of the rates of growth of the neighbouring regions.

Estimating this model using the OLS produces non-robust estimators because of the presence of a stochastic regressor, Wz , which is always correlated with u even if the residuals are independently and identically distributed (Anselin, 1988). That is why the model has to be estimated using the Maximum Likelihood Method or the Instrumental Variables Method. This specification can be interpreted in two ways: with regard to convergence, it offers certain information on the nature of convergence through parameter β once spatial effects are controlled. With regard to economic geography, it can help to highlight a spatial spillover effect since it shows how the growth rate of per capita GDP in a given region is affected by those of neighbouring regions through parameter ρ . It should also be underscored that this model can be rewritten as follows:

$$\begin{aligned} (I - \rho W) [(1/T)Ln(z)] &= \alpha S + \beta Ln(Y_0) + u \\ [(1/T)Ln(z)] &= \alpha (I - \rho W)^{-1} S + \beta (I - \rho W)^{-1} Ln(Y_0) + (I - \rho W)^{-1} u \end{aligned} \tag{12}$$

This expression indicates that on average, the growth rate of a given country is affected not only by its own initial per capita GDP but also by those of all the other regions through the inverse spatial transformation $(I - \rho W)^{-1}$. However, this interpretation is rather troubling when this specification is considered from the point of view of pure convergence: it is difficult to say whether it is really consistent with the notion of the basic β -convergence. To say the least, I think that this specification should be interpreted with caution with regard to the convergence process. Regarding the error process, this expression means that a random shock in a specific region affects not only this region's growth rate but also has an impact on the growth rate of all the other regions through the same inverse spatial transformation.

Case 3: The spatial cross-regressive model

In this case we bring in the lagged exogenous variable in the model. Thus Equation 2 becomes:

$$\frac{1}{T} \text{Ln}\left(\frac{Y_{i,t}}{Y_{i,1970}}\right) = S\alpha + \beta \text{Ln}(y_{i,1970}) + \gamma W \text{Ln}(X_{i,1970}) + \varepsilon_{i,t} \quad (13)$$

Here, the influence of these spatially lagged exogenous variables is reflected in the vector of parameter γ . This general specification makes it possible to explicitly take into account the spatial spillover effects and can be interpreted as a conditional convergence model which includes spatial environmental variables that would probably influence the growth rate. The set of explanatory variables may or may not include $\text{Ln}(Y_{i,1970})$. This model can be estimated using the OLS. An interesting special case is obtained when X includes only (Y_{1970}) , which would then give us the following:

$$\frac{1}{T} \text{Ln}\left(\frac{Y_{i,t}}{Y_{i,1970}}\right) = S\alpha + \beta \text{Ln}(y_{i,1970}) + \gamma W \text{Ln}(y_{i,1970}) + \varepsilon_{i,t} \quad (14)$$

In this specific case the initial spatially lagged per capita GDP has an effect on the growth rate. This model can be interpreted as a minimum specification that allows a spatially delayed exogenous effect in the model of the conditional β -convergence. It offers estimations of a direct effect and a spatially delayed effect of the level of the initial per capita GDP on the growth rate.

5. The economic situation of the Franc Zone

Covering a total area of 6,529,271 sq km, the Franc Zone had a population of 112.27 million people in 2000. In total, these countries represent close to 22% of Africa's total area and a little over 12% of its population. On its own, UEMOA covers 53.7% of the area and shelters about 70% of zone's population. Climatic and geographical conditions vary across the region from Sahelian to forest and equatorial areas. These climatic conditions have a big influence on the economic activities of the countries in the zone.

The economic structure of the Franc Zone (see Tables A1, A2 & A3 in the Annex)

Basic commodities such as agricultural products, oil, ore and timber, are the main exports of the countries of the Franc Zone, with the first two taking the lion's share. Agriculture represents a little less than one-third of the zone's GDP (30% in 1994 and 2000) and in some countries of the zone is largely dependent on rainfall. In countries like Congo-Brazzaville and Gabon, the share of agriculture in overall GDP was below 10% in 2000. For many countries, however, especially Mali and the CAR, the share of the agricultural sector is greater than one-third, representing 41.2% and 55.2%, respectively, in 2000 (see Table 1).

The zone's manufacturing sector is relatively weak: it represents a quarter of its GDP (25% in 1994 and 26% in 2000%). In countries like Benin and Chad, the sector is still at an embryonic stage, as it represents only about 14% of GDP. However, the oil subsector is growing in some countries of the zone: oil production reached 370 million barrels in 2000, which represented 21% of the total oil production in sub-Saharan Africa. Most of this production comes from Gabon, Congo-Brazzaville and Equatorial Guinea. The growth of this subsector accounts for the relatively high share of the industry in Gabon's and Congo's GDP: 53.2% for the former and 72.2% for the latter.

Table 1: Evolution of the economic structure of the countries in the Franc Zone

	Share of agriculture (in %) of the GDP			Share of the manufacturing sector (in %) of the GDP		
	1993	1994	2000	1993	1994	2000
Benin	33.8	33.5	36.5	13.4	14.7	13.9
Burkina Faso	34.0	35.0	39.7	21.4	27.5	19.1

Central A R	45.6	44.9	55.2	21.5	22.0	20.0
Côte d'Ivoire	34.9	27.7	24.2	20.7	18.5	22.2
Cameroon	27.9	39.6	42.6	24.6	23.5	19.7
Congo Brazzaville	11.2	10.2	5.3	35.3	45.5	72.2
Gabon	8.5	9.1	6.4	43.0	51.4	53.2
Mali	44.5	46.4	41.2	16.3	18.9	21.3
Niger	38.5	40.8	37.8	17.9	17.3	17.8
Senegal	19.0	18.8	18.2	19.1	21.0	26.9
Chad	32.5	37.8	39.2	14.1	11.9	
		13.8				
Togo	44.1	34.9	37.8	20.7	21.2	22.1

Evolution of the Franc Zone's growth rate

Year	1993	1994	2000
Growth rate (in the CFA Franc Zone)	-1.4	1.8	2.3

Overall economic weight and socioeconomic indicators **(see Table A3 in Annex)**

Following a period of deep macroeconomic imbalances characterized by deficits in their budgets, trade balance and outstanding debt. The CFA devaluation of January 1994 was designed to boost export and economic growth. Even though this devaluation did not bring about very satisfactory results, it enabled the Franc Zone to experience growth once again. Indeed, in 1994, the growth rate in the zone rose to about 2%. This was maintained until 2000, and rose further to 3.2% in 2001. The zone's trade balance deficit was absorbed from 1995. However, the level of certain social indicators is an indication that the results were not sufficient overall.

The balance of current transactions remained negative during the post-devaluation period. The level of per capita GDP, which was US\$459 in 2000, is still very low, well below that of the USA (US\$31,843), East Asia (US\$946) and sub-Saharan Africa (US\$563). But behind this average figure there are big disparities: In 2000, Gabon, Congo-Brazzaville, Côte d'Ivoire, Cameroon and Senegal recorded a per capita GDP higher than the zone's average. Gabon (US\$4,378) and Equatorial Guinea (US\$1,599) have the highest per capita GDPs. Guinea Bissau, Chad and Niger have the lowest GDPs of the Zone. With regard to social indicators, the illiteracy levels are generally very high. They are highest in Niger and Burkina Faso, with rates of 84% and 76.1%, respectively. Equatorial Guinea and Congo-Brazzaville have made notable efforts to improve literacy levels: They have managed to reduce illiteracy levels to relatively low rates of 16.8% and 19.3%, respectively.

This rather average growth recorded in the zone after the CFA franc devaluation remains lower than the threshold recommended by the World Bank for a substantial reduction of poverty – which has now reached worrying proportions in the zone. To eradicate poverty, higher growth rates must be targeted as part of a strategy for accelerated growth and poverty reduction, and the integration process must be deepened so as to achieve a better convergence of economies.

6. Nominal convergence

In this study the focus is on three criteria that are generally followed in the two zones within the framework of multilateral monitoring. The three are: inflation, as approximated by the GDP deflator; the total outstanding debt in relation to the nominal GDP estimated by foreign debt as a ratio of the nominal GDP; and the ratio of the external balance in relation to GDP. According to the criteria in force in each of the two zones, the first two indicators, referred to as “first-order” criteria in the UEMOA zone and as “basic” in the CEMAC zone, must be at levels lower than 3% and 70%, respectively, while the third criterion, which is a second-order one in the UEMOA zone, must be higher than or equal to -5%. The choice of these convergence indicators was dictated by the availability of data.

The nominal convergence was studied over three subperiods:

- 1965–1979,² which corresponds to the existence of the UMOA and UDEAC monetary unions.
- 1980–1993, which corresponds to the coexistence of structural adjustment policies and the two monetary unions.
- 1994–2000, which corresponds to the coexistence of economic policies such as the CFA devaluation and the establishment of institutions charged with implementing economic and monetary policies in the Franc Zone countries (UEMOA and CEMAC).

Analysis of inflation using an econometric approach

An econometric study was carried out for each variable. From the results obtained about each of the subperiods studied, it can be concluded that there is nominal convergence in the countries concerned both at the level of the Franc Zone in general and at the subregional level (the CEMAC and UEMOA zones). An analysis of the speeds of convergence recorded for the 12 Franc Zone countries shows that the highest speed (32.9%) was achieved for the post-devaluation period, which corresponds to the period when each of the member countries undertook to ensure that the inflation rate did not exceed 3%. That was almost 1.5 times the speed (21.19%) recorded over the 1970–1979. The half-life saw a similar evolution: from 5 years (5.04 years during the post-devaluation period) to 8 years (7.53 years during the pre-devaluation period). There was a 4.7% increase in the convergence speed from the SAP period to the post-devaluation period, although still with a half-life that fell from 14.33 years to 5.04 years.

During the different subperiods, the CEMAC zone experienced an evolution of convergence speeds that was identical to that for the entire Franc Zone. For the UEMOA zone, the highest speed was recorded during the post devaluation period (1994–2000): it was almost three times that of the preceding subperiod (1970–1979) when there existed only one monetary union set up to facilitate the integration of the countries in the zone. The SAP period recorded the second highest speed (29.63%) in the UEMOA zone. This is more than double that recorded during the 1970–1979 period. With regard to the CEMAC zone, the speed recorded during the 1970–1979 period (40.80%) is about 2 and 1.5 times respectively the speed recorded during the SAP and the post-devaluation period. These results show the considerable impact of economic policies on the convergence speed in the different zones to the extent that during the two subperiods marked by a combined effect of monetary and economic policies the convergence speed was at least double what it was when there was only one monetary union.

Table 2: Absolute convergence 1: GDP deflator

$1/T * \ln(\text{INFLAT}_{i,t} / \text{INFLAT}_{i,0})$	Countries of the Franc Zone				
	1970– 2000	1970– 1979	1975– 1993	1980– 1990	1994– 2000
$\ln(\text{INFLAT}_{i,0})$	-0.031	-0.088	-0.047	-0.087	-0.129
Constant	0.144	0.412	0.220	0.404	0.599
Wald χ^2	39.01	13.64	190.62	61	91.1
Prob > χ^2	0	0	0	0	0
Convergence speed (%)	9.95	21.19	11.97	28.15	32.89
Half-life (years)	22.17	7.53	14.33	7.63	5.04
	UEMOA				
$\ln(\text{INFLAT}_{i,0})$	-0.029	-0.075	-0.048	-0.094	-0.136
Constant	0.136	0.350	0.223	0.440	0.633
Wald χ^2	19.17	5.19	176.23	38.94	62.09
Prob > χ^2	0	0.023	0	0	0
Convergence speed (%)	7.54	13.69	12.72	29.63	42.71
Half-life (years)	23.44	8.95	14.11	6.99	4.75
	CEMAC				
$\ln(\text{INFLAT}_{i,0})$	-0.037	-0.098	-0.041	-0.080	-0.120
Constant	0.175	0.460	0.191	0.375	0.555
Wald χ^2	15.57	6.72	15.22	19.01	31.14
Prob > χ^2	0	0.01	0	0	0
Convergence speed (%)	5.92	40.80	7.91	19.73	25.92
Half-life (years)	18.18	6.7	16.59	8.26	5.44

Analysis of the absolute convergence of outstanding debt/ GDP using an econometric approach

Absolute convergence has been observed in the 12 countries of the Franc Zone irrespective of the subperiod. The lowest convergence speed was observed between 1994 to 2000. This low speed was partly due to the lack of convergence in Central African countries and partly to the fact that even in West African countries the convergence speed was relatively low in relation to the values recorded for the other subperiods in the same zone. The value recorded during the 1970–1980 period was about 2.6 and

3.4 times those for the sub-periods 1980-1993 and 1994-2000, respectively, when, in addition to the already existing monetary policy, economic policies were brought to bear as well. These results tend to show that the economic policies applied during the two decades in the countries did not lead to an increase in the convergence speed, contrary to the results obtained concerning inflation. Nevertheless, the policies put in place after the devaluation (which led to a speed equal to 3%) seem to have been not effective than those that were in force during the SAP, as the convergence speed recorded during the post-devaluation period is twice lower.

Table 3: Absolute convergence 2: Total public debt incurred /nominal GDP

$(1/T)*\text{Log}(\text{Encours}/\text{Encours } i,0)$	Total public debt value / Nominal GDP					
	Franc Zone countries					
	1970–1980	1970–1993	1970–2000	1980–1994	1980–2000	1994–2000
Log(incurso)	-0.019	-0.018	-0.015	-0.008	-0.007	-0.006
	-3.65	-9.29	-12.81	-2.11	-3.88	-0.70
Constant	-0.01	-0.000	0.006	0.021	0.019	-0.022
	-1.78	-0.00	2.25	4.14	7.98	-7.03
Convergence speed (%)	2.13	2.38	2.04	0.83	0.72	0.63
Half-life (years)	37	39	46	89	100	113
	UEMOA					
Log(Encours0)	-0.019	-0.020	-0.017	-0.008	-0.012	-0.019
	-3.03	-9.03	-12.16	-2.11	-4.65	-1.26
Constant	-0.009	-0.001	0.003	0.029	0.018	-0.031
	-1.25	-0.34	1.35	10.30	10.23	-9.25
Convergence speed (%)	2.15	2.75	2.51	0.88	1.34	2.02
Half-life (years)	36	35	40	84	56	37
	CEMAC					
Log(Encours0)	-0.016	-0.011	-0.007	-0.005	0.001	0.004
	-4.10	-4.34	-4.78	-0.85	0.33	0.75
Constant	-0.007	0.009	0.015	0.010	0.022	-0.009
	-1.11	1.82	3.73	1.17	3.66	-2.15
Convergence speed (%)	1.8	1.24	0.84	0.58	No	No
					conver	conver
					-gence	-gence
Half-life (years)	42	65	94	126		

The values in italics are Student's *t* values.

For all the periods put together, the countries in the UEMOA zone show a pattern of convergence speed that is similar to that observed overall. On the other hand, the CEMAC countries did not experience any convergence during the 1980–2000 and 1994–2000 periods. Moreover, it can be observed that for all the subperiods considered, the convergence speed for the UEMOA countries is higher than that for the CEMAC ones. This means that the economies of the former converge more quickly than those of the latter. If one takes as a reference point the SAP period, the convergence speeds recorded before and after the SAPs are higher than those recorded during the SAP period.

This is further evidence that the SAPs were not effective in bringing about a process of convergence in the Franc Zone.

Analysis of the ratio of the current external balance to the GDP using an econometric approach

Regression analyses carried out on the ratio of the external balance to GDP enable us to accept the existence of absolute convergence. Overall, the highest convergence speed was recorded during the 1980–1990 period, when there was coexistence between SAP measures and monetary policies being implemented by UMOA (West Africa) and by UDEAC (Central Africa). The speed in question, estimated to be 5.46%, was higher by about 1.32% than that recorded for the post-devaluation period when economic and monetary policies were jointly implemented by UEMOA and CEMAC, with a half-life of either group of countries estimated to be 19 years. The same trend in speeds was observed during each sub-period studied for the CEMAC countries. As for the UEMOA ones, the convergence speed recorded during the post-devaluation period is about 1.4 times higher than that for the 1980–1990 period, which means a decrease of 5 years in the duration of the half-life for the post-devaluation period (14.86 years for the 1980–1990 period compared to 10.05 years for the 1994–2000 period).

Table 4: Absolute convergence 2: External balance/GDP

$1/T \cdot \ln(\text{SEC}_{i,t} / \text{SEC}_{i,0})$	Franc Zone countries			
	1978–2000	1978–1993	1980–1990	1994–2000
$\ln(\text{SEC}_0)$	-0.025	-0.033	-0.041	-0.036
Constant	0.113	0.150	0.187	0.162
Wald χ^2	116.94	74.45	30.51	11.73
Prob > χ^2	0.000	0.000	0.000	0.000
Convergence speed (%)	3.68	4.65	5.46	4.14
Half-life (years)	27.59	20.78	16.53	18.95
	UEMOA			
$1/T \cdot \ln(\text{SEC}_{i,t} / \text{SEC}_{i,0})$ 1994–2000	1978–2000	1978–1993	1980–1990	1994–2000
$\ln(\text{SEC}_0)$	-0.038	-0.048	-0.046	-0.067
Constant	0.173	0.216	0.207	0.300
Wald χ^2	155.46	64.45	19.07	19.14
Prob > χ^2	0.000	0.000	0.000	0.000
Convergence speed (%)	18.66	9.03	6.33	8.98
Half-life (years)	17.82	14.16	14.86	10.05
	CEMAC			
$1/T \cdot \ln(\text{SEC}_{i,t} / \text{SEC}_{i,0})$ 1994–2000	1978–2000	1978–1993	1980–1990	1994–2000
$\ln(\text{SEC}_0)$	-0.023	-0.037	-0.050	-0.046
Constant	0.104	0.167	0.225	0.211
Wald χ^2	13.89	20.56	8.25	4.74
Prob > χ^2	0.000	0.000	0.004	0.029
Convergence speed (%)	3.21	5.50	7.08	5.56
Half-life (years)	30.17	18.60	13.74	14.70

Partial conclusion about nominal convergence

With regard to factor patterns for the pre-devaluation period, no beginning of convergence process was observed irrespective of the criterion considered. These schemes were thus not included in the document. The three factor patterns observed above illustrate the existence of the beginning of convergence in relation to the criteria considered. In the specific case of the ratio of the external debt to the GDP, however, the existence of two convergence clubs can be observed (see Figure 2). The other two criteria show a convergence that is more homogeneous. At an econometric level, a comparative analysis of the convergence speeds obtained with each of the three target variables over the 1980–1993 and 1994–2000 periods gives, in ascending order, inflation, the ratio of the current external balance to GDP, and the ratio of the external debt to GDP. As an example, the convergence speed recorded after the devaluation with inflation as a variable (25.75%) is equal to about six times that recorded with the ratio of the current external balance to GDP as a variable (4.14%) and nine times that recorded with the ratio of the external debt to the GDP as a variable (3%).

In other words, a policy designed to keep inflation under control will have a greater impact on the convergence of the Franc Zone countries than a policy aimed at the other two variables. This highlights the fact that keeping inflation under control is a key determinant of economic integration in the various zones. That is why the UEMOA zone countries rightly and successfully instituted the Harmonized Consumer Price Index (IHPC). But while a combination of institutional effects and economic effects led to a higher convergence speed with inflation as a variable, the result is different when the ratio of external debt to GDP is taken as a variable. Does this nominal convergence of the Franc Zone countries imply a real convergence on their part or are there additional requirements that would need to be met for this convergence to be achieved?

7. Real convergence

Here the paper mainly looks at the behaviour of per capita income under different angles: absolute convergence and conditional convergence. All in all, the analysis reveals that the Franc Zone countries experienced absolute convergence only after the post-devaluation period. This period was characterized by a cohabitation of a monetary union and an economic one within the same organization, as well as the existence, within this organization, of convergence clubs.

Econometric analysis of the phenomenon of absolute convergence based on per capita income

One of the objectives of this study is to examine whether economies tend to converge towards the same levels of per capita income and another is to examine the phenomena that are likely to contribute to this convergence. The results of the various econometric estimations carried out for the four subperiods show that the Franc Zone countries experienced this type of convergence only during the post-devaluation period, even though neither of the two blocs (CEMAC and UEMOA) that compose the zone experienced such a convergence. Table 5 summarizes the findings.

The 1970–2000 period

During this period, convergence was recorded only in the UEMOA member countries and the cotton-producing countries, with the convergence speed in the latter group being seven times higher than that in the former. This high speed linked with cotton stems from the special position that this product occupies in the economy of most of the Franc Zone countries. For instance, cotton is one of the main export products for Mali, Burkina Faso and Benin, while cotton farming is a source of employment for a big proportion of the population.

The 1970–1979 period

Only cotton-producing countries converged at a speed (of 2.60% per year) that is clearly lower than that (of 3.28%) recorded during the 1970–2000 period. In other words, the establishment of economic unions had less impact on these countries' convergence in the sense that not only was cotton production still in its initial stages, but also, and most importantly, because it is dependent upon climatic conditions and the largely fluctuating cotton prices on the world market.

The 1980–1993 period

Not all the Franc Zone countries experienced the convergence phenomenon, even though either bloc did. In the West African CFAF countries there was greater convergence: their convergence speed (1.22%) was three times higher than that recorded in the CFAF countries of Central Africa. In such conditions, the SAP-related economic measures, in conjunction with measures recommended by the CEAO, had a greater impact on reducing disparities within the Franc Zone of West Africa than in those of Central Africa. Moreover, the oil-producing countries of the Franc Zone and cotton-producing countries experienced convergence, with a higher speed in the latter countries. These results seem to provide evidence for the importance of the role played by the two export products in bringing about convergence in terms of similarities of economies.

The 1994–2000 period

This is the period during which, unlike the other three subperiods, coastal countries, coffee-producing countries and Franc Zone countries in general all experienced convergence. This was highest in the coffee-producing countries, where the convergence speed (1.81%) was more or less three times those recorded in coastal countries (0.67%) and in Franc Zone countries (0.58%). This high performance achieved by coffee-producing countries could be partly attributed to the CFAF devaluation and to the economic measures recommended by UEMOA and CEMAC with a view to promoting exports and the free movement of goods and services which made coffee very competitive on the markets of the two blocs as well as on those outside.

The results obtained for this subperiod corroborate those found by Pritchett (1995): indeed, during the other, relatively long subperiods the Franc Zone countries did not experience convergence, even though the poorest countries in the zone saw their level of per capita income increase. As Pritchett has pointed out, these periods saw the formation of convergence clubs, even if all the countries experienced no convergence. That is the case, for instance, of cotton-producing countries (1970–2000 and 1980–1993) and the Franc Zone countries of West Africa (1970–2000 and 1980–1993).

Table 5: Absolute convergence looked at in terms of institutions and similarities

	(1/31)*Log(Gnitete)	1970–2000					
		Franc Zone	Geopolitical situation			Similarity in terms of goods	
		UEMOA zone	CEMAC zone	Coastal countries	Oil-producing countries	Cotton-producing countries	
Log(Gnitete0)	0.005*	-0.004**	0.015*	0.012*	0.01*	-0.021*	0.002

Continued next page

Table 5: Continued

Constant	0.001	0.047*	-0.046*	-0.034*	-0.018	0.121*	0.019
Wald Chi(2)	11.17	5.00	43.25	32.83	8.90	52.42	0.41
Prob(Chi2)	0.0008	0.025	0.000	0.0000	0.0029	0.000	0.52
Convergence speed (%)	No convergence	0.46	No convergence	No convergence	No convergence	3.28	No convergence

(1/14)*Log(Gnitete) 1970–1979

	Franc Zone	Geopolitical situation			Similarity in terms of goods		
		UEMOA zone	CEMAC zone	Coastal countries	Oil-producing countries	Cotton-producing countries	producing countries
Log(Gnitete0)	0.011	-0.006	0.036*	0.025**	0.029	-0.023***	0.017
Constant	-0.013	0.073	-0.138**	-0.078	-0.100	0.149**	-0.033
Wald Chi(2)	1.98	0.39	7.71	3.72	2.44	2.64	1.00
Prob(Chi2)	0.1595	0.5330	0.01	0.054	0.118	0.1041	0.32
Convergence speed	No convergence	No convergence	No convergence	No convergence	No convergence	2.60%	No convergence

(1/10)*Log(Gnitete) 1980–1993

	Franc Zone	Geopolitical situation			Similarity in terms of goods		
		UEMOA zone	CEMAC zone	Coastal countries	Oil-producing countries	Cotton-producing countries	producing countries
Log(Gnitete0)	0.000	-0.011*	-0.004*	0.000	-0.011*	-0.023*	-0.006
Constant	-0.006	0.055*	0.036*	-0.005	0.085*	0.127*	0.044
Wald Chi(2)	0.10	15.16	7.56	0.02	25.89	16.61	1.61
Prob(Chi2)	0.75	0.000	0.006	0.89	0.0000	0.000	0.204
Convergence speed	No convergence	1.22%	0.42%	No convergence	1.15%	2.82%	No convergence

(1/7)*Log(Gnitete) 1994–2000

	Franc Zone	Geopolitical situation			Similarity in terms of goods		
		UEMOA zone	CEMAC zone	Coastal countries	Oil-producing countries	Cotton-producing countries	producing countries
Log(Gnitete0)	-0.006*	0.000	0.000	-0.006**	0.004	-0.000	0.000
Constant	0.028**	0.001	-0.020	0.035***	-0.042	0.000	0.002
Wald Chi(2)	7.72	0.00	0.01	5.00	0.80	0.00	5.80
Prob(Chi2)	0.01	0.99	0.918	0.025	0.37	0.96	0.02
Convergence speed	0.58%	No convergence	No convergence	0.67%	No convergence	No convergence	1.81%

8. Conditional convergence

Generally, for all four periods studied, the behaviour of the Franc Zone in terms of speed of optimal convergence is similar to that of the CEMAC zone. UEMOA's specificity stems from the fact that, contrary to the CEMAC response and that of the zone as a whole, the convergence speed recorded during the pre-SAP period (1970–1979) was higher than that recorded during the SAP period.

The 1970–2000 period

During this period the conditional convergence phenomenon, estimated on the basis of its speed, was the least perceptible. Thus, the optimal convergence speed, of 0.63% per year, is 0.1% lower than that of the CEMAC zone (0.73%) and half than that recorded in the UEMOA zone (0.34% per year). This optimal speed is also 5.7% and 2.7% lower than speeds recorded before and during the SAP period (1970–1979 and 1980–1993), respectively. This optimal speed is achieved by successively bringing to bear the per capita aid, the stock of labour, the investment rate, the exchange value and the rate of exports. Of the optimal model's significant variables (at the 15% threshold), the exchange value and the stock of labour have a negative impact on the per capita income, while per capita aid, the export rate and the investment rate contribute to its improvement.

In addition to having a positive impact on income, per capita aid seems to be one of the model's key variables, as it is the only one that influences convergence. This finding seems to be corroborated by one of the five conclusions extracted from a study “*Assessing Aid: What Works, What Doesn't and Why*”, carried out by the World Bank in 1998. The conclusion in question suggests that aid has a positive effect only in the context of a good policy environment. However, the positive effect obtained with this variable seems not to be in line with the findings of other studies such as Naudet (1994), which demonstrated that there was a negative relationship between development aid and per capita GDP and, hence, per capita income. If we put this disagreement aside, the issue is to clearly specify the nature and quantity of aid so as to avoid:

- An administrative disorganization through its negative impact on public expenditure and receipts (Gang and Khan, 1991 and Khan and Hoshino, 1992).
- A negative impact on agricultural production if it is in the form of food aid.
- Various distortions that would arise from making available “capital without costs”.

With regard to the export rate, on the one hand its increase by 1% leads to a 1.52% increase in the per capita income, while, on the other hand, its absence from the model, with the other conditions remaining unchanged, gives to the model thus obtained a convergence speed of 0.22% per year, which corresponds to about one-third of the speed of the optimal model. This conclusion is in line with that generally drawn in the literature. Indeed, an increase in this rate means competitiveness on the part of the exports from the Zone, which brings about a significant earning of foreign currency and leads to an improvement in the per capita wealth. Since such an increase in exports is possible only by diversifying and/or increasing the quantity and quality of exports, one can easily understand the positive effect of the investment rate on the per capita income. When this investment aims at capacity building, it can lead either to a redeployment of labour and hence a direct enrichment of the working population, or to a mechanization of production which, in addition to boosting exports, will improve production and, as a result, the per capita income. During the 1970–2000 period, the investments made led to an additional increase in per capita income of 3.2%. Moreover, its absence from the optimal model raises the convergence of the new model, everything else being equal, to 0.44% per year, which represents a 30.2% reduction compared with the speed of the optimal model.

The positive effects brought about by the variables per capita aid, export rate and investment rate were clearly weakened by the effect of the exchange value, which was unfavourable for the Franc Zone countries. This variable is actually the one that has the most significant impact (in absolute value) on the per capita income. A 1% decline in this ratio leads to a fall that is three times that of the per capita income (2.67%). This finding seems to confirm the hypothesis formulated by Prebisch and Singer (Prebisch, 1950) during the 1940s–1950s that the countries that are specialized in the export of primary products – as is the case for almost all the Franc Zone countries – would suffer a deterioration of the exchange value, which would in the long run lead to a fall in their per capita income. In terms of impact on the convergence speed, the absence of this ratio from the optimal model, with all the other conditions remaining unchanged, reduces the convergence obtained by more than one-third (i.e., by 36.4%) of the optimal convergence speed. The stock of capital, which is the second significant variable having the same effect on individual wealth as exports, makes it possible to increase the optimal model's convergence speed by 28.5%. Refer to Table 6 for the details.

Table 6: Conditional convergence in the CFA Zone (optimal model)

Student's	CFA Zone		CFA Zone	
	Overall period		Pre-SAP period	
	Coeffi- cient	Student's t	C o e f f i - cient	t
Gnitete0	-0.0057291	-3.52	Gnitete0	-.03041 -5.08
Aid	0.0164757	20.02	AID	.0569796 17.86
LAB	-0.0016	-1.64	CAP	.0318069 5.33
CAP	0.0132	9.37	QLAB	.0052354 0.57
EDU	-0.0004	-0.18	DPU	-.039509 -5.33
INF	-0.005	-0.84	EXP	.0462327 4.73

Continued next page

Table 6: Continued

CFA Zone			CFA Zone		
Overall period			Pre-SAP period		
Student's	Coeffi-	Student's	C o e f f i -		
	cient	t	cient	t	
TRADE	-0.0267	-6.04	TRADE	-.06471	-4.66
EXP	0.01517	4.86	CONS	.1449885	3.43
CONS	0.0729	2.04	Wald(Chi-2)	498.49	
Wald(Chi-2)	524.43		Prob Wald(Chi-2)	0.000	
Prob Wald(Chi-2)	0.000		Log Likelihood	303.3353	
Log Likelihood	1177.564		Convergence speed	3.63%	22years
Convergence speed	0.63%	120 years			
SAP period			Post-devaluation period		
Gnitete0	-.014944	-6.70	Gnitete0	-.013649	-6.28
AID	.0022304	-6.74	PRE	.002338	1.06
CAP	.011847	8.97	AIDE	.013450	4.66
INF	-.0224809	-1.65	CAP	.021859	7.11
SEC	-.057696	-3.63	DPU	-.013272	-2.21
EXP	0.069863	9.87	TRADE	.003561	0.71
TRADE	-.0949636	-10.65	SEC	.05253	2.72
DETTE	-.0193055	-7.89	EDU	-.03276	-5.45
CONS	.5969676	5.45	CONS	-.133564	-1.56
Wald(Chi-2)	270.82		Wald(Chi-2)	108.99	
Prob Wald(Chi-2)	0.000		Prob Wald(Chi-2)	0.000	
Log Likelihood	484.9978		Log Likelihood	248.817	
Convergence speed	1.68%	46 years	Convergence speed	1.43%	51years
CFA Zone					
Overall period					
	Log (Gni per cata Half-life speed (%) No Conv	Convergence		Diminution of speed (%)	the
	(years)				
LAB	-0.0042113	0.50	0.20	164.2	
CAP	-0.0041024	0.40	0.20	168.6	
EDU	-0.0056883	0.60	0.00	121.5	
INF	-0.0056331	0.60	0.00	122.7	
TRADE	-0.0037736	0.40	0.20	183.3	
EXP	-0.0021883	0.20	0.40	316.4	
DPU	-0.0055235	0.60	0.00	125.1	
DEBT	-0.0023557	0.20	0.40	293.9	
SEC	NO CONV				
SAP period					
AID	-0.0100482	1.10	0.006	68.6	
CAP	-0.007099	0.70	0.90	97.3	
INF	-0.0141554	1.60	0.10	48.6	
SEC	-0.014421	1.60	0.10	47.7	
EXP	NS				
TRADE	-0.0061105	0.60	1.00	113.1	
DEBT	-0.0124789	1.40	0.30	55.2	
PRE	-0.0147469	1.70	0.00	46.7	

Continued next page

Table 6:
CFA Zone

Continued

Overall period				
Log(Gni per cata No Conv	Convergence speed (%)	Diminution of the speed (%)	Half-life (years)	
DPU	-0.0141994	1.60	0.10	48.5
EDU	-0.0078761	0.80	0.80	87.7
Pre-SAP period				
AID	-0.0025824	0.30	3.40	268.1
CAP	-0.0219899	2.50	1.10	31.2
QLAB	-0.0300066	3.60	0.10	22.8
DPU	-0.0282128	3.30	0.30	24.2
EXP	-0.0181981	2.00	1.60	37.7
TRADE	-0.0242549	2.80	0.80	28.2
PRE	-0.0303697	3.60	0.00	22.5
INF	-0.029769	3.50	0.10	22.9
EXD	-0.0242745	2.80	0.80	28.2
SEC	NO CONV			
Post-devaluation period				
PRE	-0.0133035	1.40	0.00	51.8
AID	-0.0124554	1.30	0.10	55.3
CAP	-0.0116457	1.20	0.20	59.2
DPU	-0.0130244	1.40	0.10	52.9
TRADE	-0.0128685	1.30	0.10	53.5
SEC	-0.0090682	0.90	0.50	76.1
EDU	-0.0116297	1.20	0.20	59.3
INF	-0.0134694	1.40	0.00	51.1
EXD	-0.0132291	1.40	0.00	52
EXP	-0.007398	0.80	0.70	93.3

The 1970–1979 period

Unlike the preceding period of 1970–2000, during these years the optimal convergence speed was the highest. This observation also applies to the case of CEMAC and that of UEMOA even though their respective speeds were about 3 times and 11 times higher, respectively. The model is arrived at through the combined effect of six macroeconomic aggregates: per capita aid, rate of investment, quality of labour estimated using the student-teacher ratio at primary school level, public expenditure-GDP ratio, export rate and exchange value. As in the preceding period, three of these variables (per capita aid, export rate and investment rate) had a positive effect on per capita income with a much higher incidence. The most significant of these variables is per capita aid, because a 1% increase in it leads to a sixfold increase (5.7%) in the level of income. Its absence from the optimal model, with all other conditions remaining unchanged, takes away from the limited model thus obtained 92.8% of the speed of the optimal model.

All other conditions remaining unchanged, the respective effect on the convergence speed of the export rate and the investment rate – two of the optimal model’s variables that have significantly positive effects on per capita income – is about half (44.6%)

and about one-third (31.5%), respectively, of the impact of the per capita aid ratio. These three variables seem once again to indicate the dynamism of the production that materialized in an increase in quantity and/or quality (through investment and aid, the two main forms of financing the Franc Zone economies) and an increase in the effect of exports on the populations' standard of living. These encouraging results were partially due to the quality of labour, even though this is not significant.

On the other hand, as during the 1970–2000 period, the exchange value is the main variable that reduced the level of individual incomes. However, its incidence (23.4% of the optimal model's speed) on the optimal convergence speed was weaker than those of each of the three variables having a positive influence on per capita income. For instance, this incidence was about one-fourth that of the per capita aid variable. Regarding the public expenditure–GDP ratio, a 1% increase in it led to a fall of 3.95% in per capita income. The negative effect of this variable on income would stem from an excessive increase that would arise from the abundance of investments needed for social sectors such as education, health (the funding for which was higher for demographic reasons than the wealth created) and infrastructure on the one hand, and, on the other hand, from the government take-over of the manufacturing sector, which was suffering from a progressive withdrawal of foreign investors. These findings corroborate those from empirical studies on African countries by Savvides (1995) who showed that the growth of the ratio of public expenditure to GDP had a significant and negative impact on economic growth and, hence, on per capita income.

In sum, during this period the optimal model, whose convergence speed was about three times that of the 1994–2000 period and six times that of the 1970–2000 period, is characterized by three variables (per capita aid, export rate and investment rate) with a significant and positive effect on per capita income, and two variables (exchange value and the share of the public expenditure in the GDP) with a positive effect on the endogenous variable.

The SAP period (1980–1993)

Convergence speed reached its second highest level during this period. Seven variables account for the maximal speed estimate at 1.68% per year for a half-life of 46 years. Three of the seven – per capita aid, the investment rate and the export rate – had a significant and positive effect on per capita income, while the other four had a negative effect. As during the 1970–1979 period, the export rate had a positive effect on the endogenous variable. In the SAP model, a 10% increase in export leads to a 0.7% increase in revenues. This increase in the effect of the export rate on income followed from the implementation of adjustment policies that were oriented towards boosting exports and reducing imports in order to restore the competitiveness of the countries in the Zone.

As for inflation, it behaved the way it did during the 1970–2000 subperiod. Nevertheless, the effect of this variable was greater during the SAP period than during the overall period: a 1% increase in inflation led to a 0.02% fall in per capita income. In relation to the other periods, the effect of the variables per capita aid and rate of investment on income deteriorated in this model. The drastic cutback in public spending led to a reduction in public investment. The exchange value deteriorated once again during the

SAP period, and the negative effect on income became greater, as it did in the preceding periods. A 1% fall in the exchange value led to a 0.09% decline in income. This period was actually characterized by a lack of competitiveness on the part of the countries in the zone, which explains the results obtained. Furthermore, the public expenditure–GDP ratio was not taken into account in obtaining the optimal model.

The post-devaluation period (1994–2000)

This is the subperiod with the third highest convergence speed. During these years the speed of the maximal (conditional) convergence was achieved by successively bringing in the variables of relative working population, per capita aid, investment rate, share of public expenditure in the GDP, exchange value, current external balance and pupil–teacher ratio in primary school. With the exception of quality of labour and public expenditure, which in this model maintained a negative sign, the other five variables tended to increase the level of income. In this respect, it should be noted that during this sub-period the share of public expenditure in GDP variable had a sign that was the opposite of the one expected. However, its effect during this period substantially diminished. An increase in this ratio came with a more than proportional reduction in per capita income (a 1% increase in the ratio led to a 0.01% reduction in the income). Is this not a positive outcome from the various multilateral monitoring measures envisaged by UEMOA and CEMAC as part of the criteria for nominal convergence following the devaluation? Indeed, two of the second-order criteria in force in the UEMOA bloc, for instance, define a certain margin in the management of public expenditure. The first criterion stipulates that the ratio of the wage bill to the tax receipts must be 35% at most. The second stipulates that the ratio of the public investment financed with domestic funds to the tax receipts must be at least 20%.

As in the case of public expenditure, the quality of labour (estimated using the pupil–teacher ratio in primary school) had a negative impact on per capita income: A 1% increase in this ratio led to a 0.03% fall in the income. This finding is contrary to those reported in studies by Horowitz and Sherman (1980), Mairesse and Sassenou (1989), Sevestre (1990), and Bensaïd and Guyton (1997), which showed that an increase in the quality of labour, when looked at from a different angle, had a strongly positive impact on overall factor productivity and thus on the per capita income. This unexpected finding may have arisen from policies of mass layoffs that were the order of the day during the SAP period, leading to a reduction in the number of teachers and the emergence of new forms of teaching, such as using part-time and voluntary teachers.

Unlike the case of the other subperiods, here the exchange value had a positive effect on income even though the results were not significant. A 1% increase in the exchange value led to a 0.003% increase in income. This was due to the effects of devaluation, which enabled products from Franc Zone countries to be more competitive on foreign markets. With regard to inflation, it was not used as an explanatory variable during this subperiod because its contribution – in the form of a positive effect generally less than that of the public expenditure–GDP ratio in each of the models used for this subperiod – was not, like the results of the pre-SAP period (of 1970–1979), in line with the conclusion reached by Savvides (1995) on this variable.

Partial conclusion

A look at the results highlights consistency in the presence of certain variables during sub-periods, notably the level of per capita aid, the investment rate, the stock of labour and inflation. In other words, it seems intuitive to argue that economic policy decisions aimed to strengthen integration can essentially bear on these variables. Furthermore, the findings are very explicit both about their order of importance and about their impact on per capita income, something that is necessary for the development of policies that are likely to enable the beginning of a successful integration in the CFA zone. The fact that per capita aid remains a key variable as observed in the findings underscores the fact that integration in the Franc Zone is more of an external nature. In other words, development aid is an essential factor for integration in the CFA zone. In view of the determining nature of this ratio in the convergence process, should the Franc Zone countries not look for other sources of financing that are more sustainable and more suitable for their economies?

Discussion on conditional convergence

A quick glance at Table 7 shows that the performance achieved by UEMOA countries is strongly linked to the economic growth in this zone, compared with CEMAC. On the other hand, a closer analysis of the table reveals the importance of intra-regional trade and a net increase in the share of intra-regional trade in UEMOA over the 1996–2005 period, corresponding to 12.3% compared with CEMAC, which recorded only 1.56% over the same period. Likewise, the percentage of intra-zone exports was denser in UEMOA (10%) than in CEMAC (7%).

Table 7: Rate of economic growth (%)

Country	1980–85	1986–1990	1991–1995	1996–2000	2001–2005
Benin	4.7	0.9	4.3	5.4	4.1
Burkina Faso	4.2	2.6	3.8	4.3	5.1
Cote d'Ivoire	0.3	1.2	1.5	3.2	0.1
Mali	-2.3	3.9	3.0	5.2	6.4
Niger	-2.3	2.6	0.8	2.9	4.0
Senegal	3.2	3.2	1.5	4.4	4.7
Togo	-0.2	2.5	0.6	4.5	2.5
Average	1.1	2.4	2.2	4.3	3.8
Chad	9.2	1.9	2.4	2.7	13.8
Cameroon	9.4	-2.2	-1.9	4.8	3.7
CAR	2.3	0.0	1.1	2.4	-0.7
Congo	10.6	-0.3	0.7	2.5	4.4
Gabon	2.6	1.7	3.1	1.8	1.7
Average	6.8	0.3	1.1	2.8	4.6

Table 8 shows that foreign direct investment is more present in CEMAC than in UEMOA. For instance, in 1998 FDI represented 4.82% of UEMOA's GDP on average; but three times more, almost 16%, in CEMAC. However, the economic performance

recorded in terms of convergence is not necessarily linked to the dynamics of FDI flows in the different zones. If that was indeed the case, one would expect the convergence in the UEMOA to have gone in the same direction as the FDI flows. The performance in the UEMOA zone is to be linked to other types of investment. In this respect, it can be observed that on average private investment rose from 32.5% of the GDP in the UEMOA zone over the 1980–1985 period to 77.25% on average over the 1996–2000 period, while in the CEMAC zone it rose from 48% over the 1980–1985 period to 70.7% over the 1996–2000 period. Public investment also rose: it fluctuated around 45% during the 1980–2000 period in the UEMOA zone and was at 31.7% in the CEMAC zone.

Table 8: Investment in the two zones

Zones	1985	1990	1995	1998
Foreign direct investment as a percentage of GDP				
UEMOA	4.54	0.88	2.14	4.82
CEMAC	7.23	10.58	6.81	15.98
Gross private investment as a percentage of GDP				
UEMOA	32.56	54.12	62.17	77.25
CEMAC	47.96	57.20	56.65	70.72
Gross public investment as a percentage of GDP				
UEMOA	40.55	49.38	44.28	47.43
CEMAC	22.86	37.60	31.19	35.06

Source: Author's calculations.

Beyond these conclusions, a number of constraints to convergence can be considered:

- Sachs and Warner (1995) referred to the possibility that the low convergence observed among African countries was due to their slow economic growth. The authors maintain that this stems from limited investment, which in turn is reflected in a weak accumulation of capital. Empirical studies have demonstrated that productive activity in Africa depends more on the work factor than on the capital factor or total factor productivity. Baumol (1986) observed that the least developed countries received relatively little in terms of public investment and investment innovations from other countries.
- The weak growth is considered to be one of the possible explanations for Africa's slow convergence. But the slowness of growth is dependent upon the evolution of the capitalistic intensity of factors and upon the contribution of total factor productivity. Using the results of growth accounting, Ben Hammouda et al. (2006) demonstrate that in each of the regional economic zones there was a weak deepening of capital and employment, as well as a weak growth of the total productivity of factors. The effect of this has been weak output, reflected in the lack of dynamism in the convergence of per capita incomes. Moreover, the contribution of total factor productivity to production was weak, an indication of inefficient production technology.
- The slow convergence of income can also be attributed to the failure of both UEMOA and CEMAC to improve their intra-regional trade. Not only is sub-Saharan Africa's contribution to world trade minimal, the intra-zone trade in Africa is also

marginal. Regional integration finds it difficult to increase the volume of products to be traded within the region. This comes from a wrong focusing on trading poor quality manufactured products that are essentially produced from crude processing of raw materials. Thus, trade within the region is made more difficult by the minimal value-added of the products traded, products that are still non-finished.

- The limited level of FDI flows in the Franc Zone restricts accumulation of capital and the accompanying spin-off effects, notably the acceleration of growth.

In view of these constraints, the success of regional integration and of the narrowing of differences in income seems to hinge on the way in which the countries in the region would improve trade by opening up borders with neighbouring countries, given the marginal contribution of the region's trade to the world trade. There is no doubt that the institutional framework in place has an important role in facilitating regional integration. However, spontaneous and rapid integration that is firmly in keeping with market phenomena and a sustained economic will are needed in both the UEMOA and CEMAC zones in order to attract foreign direct investment, development aid and more investment in education, all of which are key variables in the strengthening of integration and boosting of member countries' economies.

9. Taking spatial effects into account

As look at Table 9 highlights the robustness of development aid and the positive effect of exports on per capita income during the SAP period. The convergence speed was low over this period, about 0.33% per year. Taking border effects into account led to many variables being non-significant. This can be explained by the fact that these variables did not significantly contribute to the spillover effects the paper sought to capture. The convergence speed that does not take spillover effects into account was higher than the one that does. It can thus be deduced that spillover effects have an inhibitor effect on the convergence phenomenon and, indirectly, on the phenomenon of economic integration.

Table 9: Spatial effects in conditional convergence

SAP PERIOD	AFTER DEVALUATION PERIOD			AFTER DEVALUATION PERIOD	
	Coefficients	Student's t		Coefficients	Student's t
Lngni80	-0.0032	-0.88	Lngni94	-0.006842	-2.63
Waid	0.0007	1.73	Wpre	-0.000626	-2.16
Wcap	-0.0008	-1.55	Waid	0.0020633	2.25
Winf	0.00026	0.04	Wdpu	0.0071973	7.25
Wsec	-0.0008	-0.13	Wcap	-0.0003426	-0.68
Wexp	0.0012	3.22	Wtrad	0.0071973	-1.71
Wtrad	-0.0000727	-0.08	Wsec	-0.001065	-3.19
Wexd	-0.0003015	-0.51	Wedu	-0.0033832	-8.03
_cons	0.030551	1.46	_cons	0.0356932	2.18
Log likelihood	483.4019		Log likelihood	251.766	
Wald chi2(8)	228.15		Wald chi ₂ (8)	133.88	
Prob > chi2	0.0000		Prob > chi ₂	0	
Convergence speed	0.33%	216	Convergence speed	0.70%	101

W: indicate the spatial effect

The post-devaluation period

It should be noted that over this period, most of the variables were significant and the convergence speed was higher than in the preceding period. However, this speed was half that recorded over the same period without taking into account spillover effects. The overall inhibitor nature of these effects is once again brought to the fore for the period studied. Except for the investment rate, which had a non-significant negative sign, all the variables had the expected sign. However, taking the spatial effects into account highlighted certain specificities for certain variables. It can thus be noted that for variables like public aid per capita the impact of the spatial model was about seven times higher than that of the normal model.

Discussion on spatial effects

An analysis that takes into account the border effects captured by the existence of common frontiers between countries highlights a doubling of speed from the pre-SAP period to the post-devaluation period. In the same vein, an analysis was done that compares models that takes into account border effects and those that do not show. The convergence speed was reduced by half by moving from a model with spillover effects to one without spillover effects during the post-devaluation period, while during the SAP period the speed fell drastically (to five times less). Incorporating border effects into the analysis reduces the convergence speed and, indirectly, the speed of integration, considering that the convergence speed is a key factor for integration.

Furthermore, the results of the spillover effects during the SAP period in the Franc Zone shows that the convergence speed fell from 1.63% (before incorporating border effects) to 0.33%, when these effects were integrated into the model. This means that border effects led to almost a 1.3% fall in the convergence speed, which corresponds to avoiding a stationary state by about 52 years. The same phenomena were observed over the post-devaluation period. The Franc Zone countries' convergence speed fell from 1.43% when the spillover effects were not taken into account in the model to 0.7% when they were. It is thus evident that border effects have an inhibitor effect on convergence.

There are several possible explanations for these findings. The geographically heterogeneous nature of the CFA franc zone countries can explain the low convergence speed or the persistent disparities in income despite the process of economic integration. And indeed, in the theoretical and empirical literature on the convergence of economies, increasing attention is being paid to geographical characteristics in the data. For example, some empirical studies (Beine and Jean-Pierre, 2000) stress the coincidence between the resemblance of geographical data and the types of convergence that hold between different groups of regions or countries. The geographical patterns are apparently reflected in economic disparities and, in general, this stems from the existence of forces of spatial interaction that come into play to determine the dynamics of growth and convergence.

The hypothesis of the homogeneity of space collapses (Catin and Djondang, 1992) as you go deeper into traditional theories of international trade and freeing oneself from the simplistic hypotheses of the homogeneity of production factors, sectors, products and trade partner countries. Regions are linked at the production level in a specialization–integration process and have a very different weight in inter-regional and international trade. The new paradigm of international economics and the new theories of growth, while insisting on comparative advantages and the virtuous circle of growing yields and of positive externalities, call for the introduction of a territorial component as a key element of the beginning of a renewed theory of trade.

The inhibitor role of border effects is undoubtedly an indication of the distortions and inadequacies inherent in a constantly evolving economic integration, without real communication means and without controls at the borders. Admittedly, significant efforts have been made at the institutional level, like setting up instruments designed to help pool resources for better management of border resources. One example is the Common External Tariff in force in the UEMOA zone. Unfortunately, however, such regulatory texts are yet to be implemented in an effective way. It is sad to note that

instead of regulating the flow of goods and services, borders tend to actually divert or block them. In this way, the free movement of labour, which is one of the foundations of the theory of international trade expounded by Krugman (1991), is jeopardized by a heavy and asphyxiating legislative and administrative arsenal that eventually becomes detrimental to the very countries that put it in place. The models put forward by Martin and Ottaviano (1999), Englmann and Walz (1995) and Baldwin and Forslid (2000) conclude that the location of activities and growth can be two inextricably linked phenomena. This provides an important theoretical foundation for the observation that growth can stem from geographical concentration.

9. Conclusion

The aim of this study was to analyse the status of convergence in the Franc Zone by identifying its specificities during three subperiods that corresponded to the establishment and functioning of monetary and economic integration institutions. This convergence was considered in its two principal forms: nominal convergence and real convergence. It transpired from the findings that nominal convergence led to real convergence, even though over certain periods this was just conditional convergence. This means that the convergence criteria and institutions put in place in the zone were effective. The stability pact has often accelerated the alignment of certain member countries, especially with regard to nominal criteria. In the case of the Franc Zone, such results can be explained by the monetary discipline imposed on member countries by the BCEAO and the BEAC. The presence of convergence clubs was also highlighted in the CFA Zone. Indeed, it was observed that similarity effects, whether in relation to the specialization of economies dependent on cash crops (cotton and coffee), to the natural advantages (for coastal countries) or to mining resources (for oil countries), led to convergence processes in countries that had enjoyed certain advantages during some of the periods studied.

Three major facts have emerged from the study: First, the integration process is more advanced in UEMOA than in CEMAC, irrespective of the subperiod studied. This means that the institutional effect within UEMOA is much greater. The discrepancy in level of integration reflects the difficulty in coordinating macroeconomic policies and meeting convergence criteria in a union where economies are constantly exposed to external asymmetrical shocks. In this connection, Masson and Doré (2002) have demonstrated the influence of the exchange value and the cycle of economic activity on the countries' performance vis-a-vis the convergence criteria. They showed that over the 1994–1997 period, favourable exchange values and economic activity cycles had enabled the countries to achieve good performance. Conversely, over the 1998-2001 period the reversal of the situation led to a degradation of this economic performance. These results show that the difficulty in coordinating budgetary policy in a monetary zone is still a topical issue. Authors like Cohen (1989) have suggested that the coordination of budgetary policies is not necessary if the monetary policy is credible, as this leads to an optimal budgetary response. This is a legitimate concern for the unions, where the two banks (BCEAO and BEAC) strive to achieve a credible monetary policy. An analysis of the structure of the economies of the Franc Zone shows that achieving coordination of budgetary policies is thus a delicate enterprise. It would therefore be preferable to strengthen the monetary discipline, which seems to give better results, as the analysis of inflation rate-related performance, coupled with the experience of more than 40 years of

common monetary policy, has shown. If jointly pursued with a growth promotion policy, monetary discipline could actually consolidate the budgetary situation.

Second, the overall process of real convergence requires homogeneity among the countries involved. In this respect, absolute convergence was observed to be more manifest in UEMOA than in either the Franc Zone or CEMAC. In addition, the findings about conditional convergence, to which this study was often directed, have brought to the fore the importance of the economic policies in force in each subzone compared with the entire zone. This phenomenon can be explained by the fact that the levels and dynamics of convergence vary between countries, as a result of the likely structural differences between the economies of the Franc Zone. Thus, in the presence of asymmetrical shocks, the economies would react differently, as a result of a divergence in economic policy preferences. With the budgetary policy being the only instrument of economic policy available for those countries, it is necessarily prone to divergences. Decaluwé, Dissou and Patry (2001) revealed that the application of external common tariffs causes painful adjustments to the public finances of many countries in the UEMOA zone.

Third, the study shows that there exists a hard core of variables that strongly condition performance. Public development aid, stock of human capital, rate of investment and inflation are the key variables that integration policies must emphasize if satisfactory results are to be achieved in the area of convergence, that is, if the process of convergence and integration is to be accelerated in the Franc Zone.

Finally, the spatial econometric analysis has shown that the spatial effects studied here, with a focus primarily on the border effects, can inhibit convergence. It has been observed that the convergence speed was largely reduced when these border effects were taken into account. This study sees the frontier effect as a proxy for many non-mentioned factors such as customs restrictions, the informal economy, corruption at the border, etc., all of which constitute obstacles to the implementation of integration policies. It is therefore imperative that border barriers be relaxed in order to facilitate a successful perfect integration.

Notes

1. See Coe and Hoffmaister (1998) study using a sample of 23 countries that was divided into two groups: the first group was composed of the African countries of the franc zone, and the second of Botswana, Burundi, Ethiopia, Gambia, Ghana, Lesotho, Liberia, Madagascar, Mauritania, Mozambique, Rwanda, Sierra Leone, Swaziland, Tanzania, and Uganda.

Ben Hammouda and Kasse, 2000 *L'avenir de la Zone Franc. Perspectives Africaines*.

2. Owing to the availability of data related to the ratio of external debt to GDP, this subperiod runs from 1970 to 1979 and has simply been left out in relation to the ratio of the current external balance to the GDP.

References

- Anselin L. 1988. *Spatial Econometrics: Methods and Models*. Dordrecht: Kluwer Academic Publishers.
- Anselin, L. and R. Florax. 1995. "Small Sample Properties of Tests for Spatial Dependence in Regression Models". In Anselin, L., Florax R. eds., *New Directions in Spatial Econometrics*, Springer-Verlag, Berlin.
- Anselin L. 1996. "The moran scatterplot as an ESDA tool to access local instability in spatial association". In N. Fisher and H.J. Scholten, eds., *Spatial Analytic Perspective on GIS*. London: Taylor and Francis.
- Baldwin, R. and R. Forslid. 2000. The core-periphery model and endogenous growth: Stabilising and de-stabilising integration". *Economica*, 67(3): 307–24.
- Barro, R.J. and X. Sala-i-Martin, 1991. "Convergence across States and Regions". *Brookings Papers on Economic Activity*, 22: 107–82.
- Barro, R.J. and X. Sala-i-Martin. 1992. "Convergence". *Journal of Political Economy*, 100: 223–51.
- Barro, R.J. and X. Sala-i-Martin. 1995. *Economic Growth Theory*. Boston: McGraw-Hill.
- Baumol W.J. 1986. "Productivity growth, convergence, and welfare: What the long run data show". *American Economic Review*, 76: 1072–85.
- Beine, M. and P. Jean-Pierre. 2000. "L'apport des test de racine unitaire en panel l'identification des clubs de convergence". In M. Beine and F. Docquier, eds., *Croissance et Convergence Economique des Régions*, 235–60. Brussels, Université De Boeck.
- Ben Hammouda, H., and M. Kasse. 2000. "L'avenir de la Zone Franc". *Perspectives Africaines*. Codesria-Karthala, 341–70.
- Ben Hammouda, H., S. Karingi, A. Njuguna and M. Sadni-Jallab. 2006. "Diversification: Towards a new paradigm for Africa's development". *Africa Trade Policy Centre Work in Progress*, No. 35. United Nations Economic Commission for Africa, Addis Ababa, Ethiopia.
- Bensaid, D. and C. Guyton. 1997., "Le retour de la question sociale". Lausanne: Page 2.
- Catin, M. and P. Djondang, 1992. *Commerce international et économies régionales*, Economica.
- Cliff, A.D. and J.K. Ord. 1981. *Spatial Processes: Models and Applications*. London, Pion.
- Cliff and Ord. 1981: 10
- Cohen, D. 1989. "Monetary and fiscal policy in an open economy with or without policy coordination". *European Economic Review*, 33: 303–9.
- Coe, D.T. and A.W. Hoffmaister. 1998. "North-South Trade: Is Africa Unusual?" Working papers for IMF, Washington, D.C.
- Decaluwé, B., Y. Dissou and A. Patry. 2001. "Union douanière au sein de l'UEMOA: une analyse quantitative". *Revue économique*, 54(2): 811–30.
- Dillings-Hansen, M. and V. Smith. 1997. "Regional income growth and convergence. Evidence of Danish municipality". In C. Sorensen, ed., *Empirical Evidence of Regional Growth: The Center-Periphery Discussion*, Rapport from the Expert Committee of the Danish Ministry of the Interior, October, Mimeo.

- Durlauf, S.N. and P.A. Johnson. 1995. "Multiple regime and cross-country behaviour". *Journal of Applied Econometrics*, 10: 365–84.
- Durlauf, S.N. and A.B. Bernard. 1996. "Interpreting tests of the Convergence Hypothesis". *Journal of Econometrics*, 71: 161–73.
- Englmann, F.C. and U. Walz. 1995. "Industrial centers and regional growth in the presence of local inputs". *Journal of Regional Sciences*. 35: 3–27.
- Fingleton, B. 1999. "Estimates of time to economic convergence: An analysis of regions of the European Union". *International Regional Science Review*, 22: 5–34.
- Gang, I.N. and H.A. Khan. 1991. "Foreign aid, taxes and public investment". *Journal of Development Economics*, 34: 355–69.
- Griffith, D.A. 1992. "What is spatial autocorrelation: Reflections on the past 25 years of spatial statistics". *L'Espace Géographique*, 21: 265–80.
- Guillaumont, P., S. Guillaumont and P. Plane. 1988. "Participating in African, monetary unions: An alternative evaluation". *World Development*, 16(5): 569–76.
- Heidhues, F. And H. Michelsen. 1995. "Structural adjustment in a monetary union: Some considerations about the West-African franc zone". In Lang, F.P. and R., Ohr., ed., *International Economic Integration Pysica-Verlag*. Heidelberg, Germany.
- Horowitz, Stanley A., and A. Sherman. 1980. "A Direct Measure of the Relationship Between Human Capital and Productivity". *Journal of Human Resources* 15(1):67–76.
- Islam, N. 1995. "Growth empirics, panel data approach". *Quarterly Journal of Economics*, 110: 1127–70.
- Jean-Pierre, P. 1999. "La convergence régionale européenne: Une approche empirique par les clubs et les panels". *Revue d'Economie Régionale et Urbaine*, 1: 21–44.
- Khan, H. and E. Hoshino. 1992. "Impact of foreign aid on the fiscal behaviour of LDC governments". *World Development*, 20(10): 1481–88.
- Krugman, P. 1991. "Increasing Returns and Economic Geography". *Journal of Political Economy*, 99: 48–99.
- Lauridsen, J. 2002. Spatial Autoregressively-Distributed Lag Model: Equivalent Forms, Estimation, and an Illustrative Commuting Model. Discussion Paper. Department of Statistics and Demography, University of Southern Denmark.
- Lauridsen, J.N.R. and P. Kosfeld. 2002. Test Strategy for Spurious Regressions, Spatial Non-Stationarity and Spatial Cointegration. Economic Discussion Paper No. 8/2002. Faculty of Social Sciences, University of Southern Denmark, Odense.
- Le Gallo, J. 2000a. "Econométrie spatiale: Autocorrélation spatiale dans les modèles de régression Linéaire". *Economie et Prévision*, 155: 139–58.

- Lelart, M. 2003. "L'Union monétaire en Afrique de l'Ouest". *Journal L'Economie Politiques*, 19: 106–12.
- Loufir, Reichlin L. 1993. "Convergence nominale et réelle parmi les pays de la CEE et de l'AELE". *Revue de l'OFCE*, No. 43, Janvier 1993, 69–87.
- Mairesse, J. and M. Sassenou. 1989. "Les facteurs qualificatifs de la productivité: un essai d'évaluation". *Economie et Prévision*, 91: 35–42.
- Mankiw, N.G., D. Romer and D.N. Weil. 1992. "A contribution to the empirics of economic growth". *Quarterly Journal of Economics*, 107: 407–37.
- Martin, P. and G. Ottaviano. 1999. "Growing location: Industry location in a model of endogenous growth". *European Economic Review*, 43(2): 281–302.
- Masson, P.R and O. Doré. 2002. "Experience with budgetary convergence in the WAEMU". IMF Working Paper WP/02/108. International Monetary Fund, Washington, D.C.
- Moran, P.A.P. 1948. "Interpretation of statistical maps". *Journal of Royal Statistical Society Series, B*, 10: 243–51.
- Naudet, J-D. 1994. "...tudes des perspectives long terme en Afrique de l'Ouest. Réflexions sur l'aide au développement en Afrique de l'Ouest (1960–1990)". Working Papers DIAL.
- Prebisch, R. 1950. "The economic development of Latin America and its principal problems, reprinted in *Economic Bulletin for Latin America*, 7(1, 1962): 1–22.
- Pritchett, L. 1995. "Divergence, big time". Policy Research Working Paper No. 1522. The World Bank, Washington, D.C.
- Quah, D. 1993. "Galton's Fallacy and test of convergence hypothesis". *Scandinavian Journal of Economics*. 95: 427–43.
- Quah, D. 1996. "Regional convergence across Europe." *European Economic Review*, 40: 1951–58.
- Rey, S.J. and B.D. Montouri. 1999. "Regional Income Convergence: a Spatial Econometric Perspective". *Regional Studies*, 33, 145–56.
- Sachs, J. and A. Warner. 1995. "Economic Reform and the Process of Global Integration." *Brookings Papers on Economic Activity*, 1:1–95.
- Savvides, A. 1995. "Economic Growth in Africa". *World Development*, 23(3):449–58.
- Sevestre, P. 1990. "Qualification de la main d'oeuvre et productivité du travail". *Economie et Statistiques*, 237–238: 109–20.
- Solow, R.M. 1956. "A contribution to the theory of economic growth". *Quarterly Journal of Economics*, 70: 65–94.
- Swan, T.W. 1956. "Economic growth and capital accumulation". *Economic Record*, 32: 334–61.
- Tété-Adjalo T.G. 1989. *Question du plan Marshall et l'Afrique*. Paris, L'Harmattan.
- Upton G.J.G. and B. Fingleton, 1985. *Spatial Data Analysis by Example*. New York, Wiley.
- World Bank, 1998. *Assessing Aid: What Works, What Doesn't and Why*. New York, Oxford University Press.

Appendix A: Basic indicators for Franc Zone countries

Table A1: Basic indicators for 1993

Country	Population	Total area (Km ²)	GDP		Illiteracy rate (%)
			Total in CFA	Per capita in 1000 CFA	
Benin	5,185,890	115,762	1,840,320,943	355	70.5
Burkina	9,527,900	274,000	2,059,977,354	216	81.6
Central African Rep.	3,150,180	622,984	997,669,472	317	62.9
Ivory Coast	13,036,540	322,462	9,161,815,006	703	58.4
Cameroon	12,621,800	475,422	7,908,540,695	627	37.9
Congo Brazzaville	2,444,760	341,821	2,132,524,258	872	28.4
Gabon	1,020,870	267,667	4,480,681,838	4389	
Mali	9,164,100	1,240,192	2,301,000,808	251	79.3
Niger	8,495,380	1,267,000	1,762,454,440	207	87.3
Senegal	7,859,850	197,000	4,131,341,140	526	69.0
Chad	6,248,250	1,284,000	1,295,541,433	207	68.3
Togo	3,710,170	56,785	1,055,918,692	285	52.0
Guinea Bissau	1,028,250	36,125	235,714,306	229	69.7
Equatorial Guinea	378,500	28,051	136,527,367	361	24.3
Franc Zone	83,872,440	6,529,271	39,500,027,753	471	

Source: World Bank Database, 1993

Table A2: Basic indicators: 1994

Country	Population	Total area (Km ²)	GDP		Illiteracy rate (%)
			Total in CFA	Per capita in 1000 CFA	
Benin	5,345,530	115,762	1,920,788,158	359	69.5
Burkina	9,755,030	274,000	2,088,927,094	214	80.9
Central African Rep.	3,242,010	622,984	1,046,555,276	323	61.6
Ivory Coast	13,456,700	322,462	9,342,677,486	694	57.4
Cameroon	12,950,000	475,422	7,710,827,178	595	36.5
Congo Brazzaville	2,522,280	341,821	2,015,235,424	799	27.1
Gabon	1,049,480	267,667	4,635,014,127	4,416	
Mali	9,393,740	1,240,192	2,321,990,038	247	78.6
Niger	8,798,150	1,267,000	1,833,033,070	208	86.9
Senegal	8,076,780	197,000	4,253,157,804	527	68.1
Chad	6,463,870	1,284,000	1,426,825,604	221	66.9
Togo	3,807,030	56,785	1,214,120,806	319	50.7
Guinea Bissau	1,053,060	36,125	243,257,164	231	68.6
Equatorial Guinea	388,590	28,051	143,511,592	369	23.0
Total	86,302,250	6,529,271	40,195,920,819		

Source: World Bank Database, 1994

Table A3: Basic indicators: 2000

Country	Population	Total area (Km ²)	GDP		Illiteracy rate (%)
			Total in CFA	Per capita in 1000 CFA	
Benin	6,272,000	115,762	2,597,648,923	414	62.6
Burkina	11,274,900	274,000	2,736,348,548	243	76.1
Central African Rep.	3,717,000	622,984	1,258,457,728	339	53.3
Ivory Coast	16,013,000	322,462	11,833,398,585	739	51.4
Cameroon	14,876,000	475,422	10,043,553,302	675	28.7
Congo Brazzaville'	3,018,000	341,821	2,387,610,785	791	19.3
Gabon	1,230,000	267,667	5,384,938,329	4,378	
Mali	10,840,000	1,240,192	3,189,157,632	294	74.4
Niger	10,832,000	1,267,000	2,163,494,863	200	84.0
Senegal	9,530,000	197,000	5,806,050,468	609	62.6
Chad	7,694,000	1,284,000	1,676,049,284	218	57.4
Togo	4,527,000	56,785	1,460,548,061	323	42.9
Guinea Bissau	11,990,000	36,125	251,498,951	210	61.6
Equatorial Guinea	457,000	28,051	730,540,215	1,599	16.8
Franc Zone	112,270,900	6,529,271	51,519,295,675	459	

Source: World Bank database, 2000

Appendix B: Variables and test results

Table B1: Sources and availability of variables

Abbreviation	Description	Period	Source	Type
Gnitete	Per capita income	1970–2000	World Bank Database	Endogenous
Inflation	GDP deflator (index)	1970–2000	World Bank Database	Mixed
Aidtete	Per capita aid	1970–2000	World Bank Database	Exogenous
SEC/PIB [GDP]	Current external balance	1970–2000	World Bank Database	Mixed
Debt Ext/PIB [GDP]	Ratio of external debt to the GDP	1970–2000	World Bank Database	Mixed
Qltelabor	Pupil-teacher ratio in primary school	1970–2000	World Bank Database	Exogenous
FBCF/PIB [GDP]	Gross investment rate	1970–2000	World Bank Database	Exogenous
G/PIB [GDP]	Share of expenditure in the GDP	1970–2000	World Bank Database	Exogenous
Relative working population	Ratio of the working population to the total population	1970–2000	World Bank Database	Exogenous
Export/PIB [GDP]	Export rate	1970–2000	World Bank Database	Exogenous
Trade	Exchange value	1970–2000	World Bank Database	Exogenous
Labour	Stock of labour	1970–2000	World Bank Database	Exogenous
Coastal countries	Benin, Côte d'Ivoire, Cameroon, Congo, Gabon, Senegal, Togo	1970–2000	World Bank Database	Endogenous
Oil exporting countries	Côte d'Ivoire, Cameroon, Congo, Gabon	1970-2000	World Bank Database	Endogenous
Cotton-producing countries	Benin, Burkina-Faso, Central African Rep., Mali, Niger, Chad, Togo	1970-2000	World Bank Database	Endogenous
Coffee-producing countries	Central African Rep., Côte d'Ivoire, Cameroon, Congo, Togo	1970-2000	World Bank Database	Endogenous

*The variables "relative working population" and "labour" are exclusive in the model.

Table B2: Root unit test on panel data

		Root unit test			
Variable	Methods	At level			
		Intercept	Prob	Intercept and trend	Prob
LGNITETE	Levin, Lin & Chu t*	-4.72034	0.0000	0.48375	0.6857
	Breitung t-stat	1.74533	0.9595	0.76271	0.7772

	Im, Pesaran and Shin W-stat	-2.10798	0.0175	2.90512	0.9982
	ADF - Fisher Chi-square	33.4403	0.0951	7.68772	0.9993
	PP - Fisher Chi-square	26.9269	0.3079	1.95118	1.0000
	Hadri Z-stat	9.67864	0.0000	9.12062	0.0000
LINFLAT	Levin, Lin & Chu t*	-20.0509	0.0000	-19.1084	0.0000
	Breitung t-stat	-8.28787	0.0000	-0.42079	0.3370
	Im, Pesaran and Shin W-stat	-20.3670	0.0000	-19.0386	0.0000
	ADF - Fisher Chi-square	316.634	0.0000	291.349	0.0000
	PP - Fisher Chi-square	331.933	0.0000	338.222	0.0000
	Hadri Z-stat	-0.67886	0.7514	2.25153	0.0122
LK	Levin, Lin & Chu t*	-26.5218	0.0000	-3.01205	0.0013
	Breitung t-stat	-2.20746	0.0136	1.22915	0.8905
	Im, Pesaran and Shin W-stat	-8.36877	0.0000	-2.66061	0.0039
	ADF - Fisher Chi-square	67.3418	0.0000	50.4188	0.0013
	PP - Fisher Chi-square	47.4274	0.0030	38.5870	0.0302
	Hadri Z-stat	5.01991	0.0000	4.90636	0.0000
LG	Levin, Lin & Chu t*	-9.42857	0.0000	1.50805	0.9342
	Breitung t-stat	-9.19888	0.0000	-6.62821	0.0000
	Im, Pesaran and Shin W-stat	-10.5768	0.0000	-6.88548	0.0000
	ADF - Fisher Chi-square	144.932	0.0000	111.255	0.0000
	PP - Fisher Chi-square	274.286	0.0000	576.330	0.0000
	Hadri Z-stat	0.86426	0.1937	1.64184	0.0503
LLABOR	Levin, Lin & Chu t*	3.64768	0.9999	-3.33049	0.0004
	Breitung t-stat	0.99461	0.8400	1.52157	0.9359
	Im, Pesaran and Shin W-stat	9.95426	1.0000	-1.46279	0.0718
	ADF - Fisher Chi-square	1.05535	1.0000	38.7653	0.0289
	PP - Fisher Chi-square	0.14145	1.0000	97.6436	0.0000
	Hadri Z-stat	14.1525	0.0000	9.68080	0.0000
LQLTELABOR	Levin, Lin & Chu t*	1.69233	0.9547	2.17601	0.9852
	Breitung t-stat	-1.77712	0.0378	0.06939	0.5277
	Im, Pesaran and Shin W-stat	1.25828	0.8959	0.68047	0.7519
	ADF - Fisher Chi-square	13.2068	0.9626	24.8959	0.4114
	PP - Fisher Chi-square	13.6277	0.9546	16.0515	0.8862
	Hadri Z-stat	3.91023	0.0000	2.78025	0.0027
LTRADE	Levin, Lin & Chu t*	-2.80251	0.0025	-2.63235	0.0042
	Breitung t-stat	-0.77706	0.2186	-0.65240	0.2571
	Im, Pesaran and Shin W-stat	-2.14951	0.0158	-1.97960	0.0239
	ADF - Fisher Chi-square	40.3561	0.0196	41.8124	0.0135
	PP - Fisher Chi-square	39.4711	0.0244	39.4235	0.0246
	Hadri Z-stat	7.10672	0.0000	7.87723	0.0000

L=Natural logarithm

Table B3: Root unit test on panel data

		Root unit test			
Variable	Methods	At level			
		Intercept	Prob	Intercept and trend	Prob
LEXP	Levin, Lin & Chu t*	-2.33159	0.0099	-2.64300	0.0041
	Breitung t-stat	-1.42271	0.0774	-0.92394	0.1778
	Im, Pesaran and Shin W-stat	-2.57410	0.0050	-2.99740	0.0014
	ADF - Fisher Chi-square	50.4657	0.0012	47.4623	0.0029
	PP - Fisher Chi-square	56.6801	0.0002	62.9432	0.0000
	Hadri Z-stat	8.38186	0.0000	7.12201	0.0000

LGNIENCLOSE	Levin, Lin & Chu t*	-2.39591	0.0083	0.54510	0.7072
	Breitung t-stat	1.00762	0.8432	0.03297	0.5132
	Im, Pesaran and Shin W-stat	-1.14743	0.1256	1.75670	0.9605
	ADF - Fisher Chi-square	12.3991	0.2592	2.87237	0.9843
	PP - Fisher Chi-square	12.1464	0.2754	1.13601	0.9997
GNIUEMOA	Hadri Z-stat	9.78683	0.0000	8.46120	0.0000
	Levin, Lin & Chu t*	-3.36387	0.0004	-0.60558	0.2724
	Breitung t-stat	0.78331	0.7833	-0.90651	0.1823
	Im, Pesaran and Shin W-stat	-1.67582	0.0469	0.82104	0.7942
	ADF - Fisher Chi-square	20.0654	0.1281	6.93531	0.9372
GNICEMAC	PP - Fisher Chi-square	17.0377	0.2542	1.60847	1.0000
	Hadri Z-stat	9.83343	0.0000	8.71541	0.0000
	Levin, Lin & Chu t*	-3.23257	0.0006	1.51431	0.9350
	Breitung t-stat	1.67758	0.9533	1.73977	0.9591
	Im, Pesaran and Shin W-stat	-1.28209	0.0999	3.55486	0.9998
LGNIOIL	ADF - Fisher Chi-square	13.3749	0.2035	0.75241	1.0000
	PP - Fisher Chi-square	9.88912	0.4503	0.34271	1.0000
	Hadri Z-stat	9.59008	0.0000	9.34075	0.0000
	Levin, Lin & Chu t*	-2.85565	0.0021	0.94745	0.8283
	Breitung t-stat	1.31928	0.9065	1.53534	0.9376
	Im, Pesaran and Shin W-stat	-1.19747	0.1156	2.94238	0.9984
	ADF - Fisher Chi-square	9.07043	0.1697	0.47066	0.9982
	PP - Fisher Chi-square	6.01645	0.4213	0.08487	1.0000
	Hadri Z-stat	9.41891	0.0000	9.50677	0.0000

Table B4: Long-term relationship within the UEMOA zone

	UEMOA zone		UEMOA zone	
	Overall period for the CFA zone		Pre-SAP period	
Student's	Coefficient	Student's t	Coefficient	
Gnitete0	-.02110	-13.28	Gnitete0	-.0632669
PRE	-.039234	-8.16	PRE	-.1682531
TRADE	.002697	1.34	EDU	-.015479
DPU	-.002895	-1.28	SEC	-.0352438
INF	-.008415	-1.26	AID	.0331856
AID	.0157623	15.84	CONS	1.13701
EXD	-.002561	-2.75	CONS	1.13701
CONS	.27062	6.69	Wald(Chi-2)	96.44

*Continued next page***Table B4: Continued**

	UEMOA zone		UEMOA zone	
	Overall period for the CFA zone		Pre-SAP period	
Student's	Coefficient	Student's t	Coefficient	
Wald(Chi-2)	583.5		Prob Wald(Chi-2)	0.000
Prob Wald(Chi-2)	0.000		Log Likelihood	116.9401
Log Likelihood	772.629			
	SAP period		Post-devaluation period	

Gnitete0	-.0218093	-2.20	Gnitete0	-.041567	-6.37
SEC	-.07643	-3.65	PRE	-.084134	-9.07
PRE	-.038151	-2.03	AIDE	.005266	1.42
DPU	.002541	0.33	DPU	-.02602	-2.62
TRADE	.0019277	0.37	EXD	-.041240	-6.51
EXD	-.019907	-4.87	TRADE	.018873	2.51
CONS	.67905	3.80	EDU	.031917	3.72
Wald(Chi-2)	61.03		INF	.038082	2.49
Prob Wald(Chi-2)	0.000		CONS	.408714	4.94
Log likelihood	282.3974		Wald(Chi-2)	107.4	
			Prob Wald(Chi-2)	0.000	
			Log likelihood	172.0803	

Table B5: Long-term relationship within the CEMAC zone

UEMOA zone			UEMOA zone		
Overall period for the CFA zone			Pre-SAP period		
Student's	Coefficient	Student's t		Coefficient	
Gnitete0	-.0065394	-2.32	Gnitete0	-.098018	-2.89
AIDE	.019698	14.94	AID	.0849499	2.69
EXP	.040486	6.98	TRADE	.160146	3.05
INF	-.014957	-1.81	EXD	-.110841	-2.37
TRADE	-.055245		EDU	-.0260351	-0.96
EDU	-.0217166		CAP	.123986	4.22
DPU	-.0017484		SEC	.237923	1.57
CAP	.0084429		CONS	-1.30880	-2.00
CONS	.230066	4.39	Wald(Chi-2)	226.42	
Wald(Chi-2)	354.97		Prob Wald(Chi-2)	0.000	
Prob Wald(Chi-2)	0.000		Log likelihood	52.03279	
Log likelihood	476.9239				
SAP period			Post-devaluation period		
Gnitete0	-.017869	-4.62	Gnitete0	-.0159296	-2.72
EDU	-.0345756	-2.09	PRE	.0009139	0.32
EXP	.0576499	5.60	SEC	.0495604	1.92
AID	.0042974	1.10	EXP	.019724	2.18
INF	-.0364655	-2.58	CAP	.011721	1.56
TRADE	-.059824	-4.93	EDU	-.022898	-0.89
DPU	-.0036892	-0.54	CONS	-.144909	-0.86
CONS	.4852339	4.81	Wald(Chi-2)	11.00	
Wald(Chi-2)	78.74		Prob Wald(Chi-2)	0.000	
Prob Wald(Chi-2)	0.000		Log likelihood	97.23902	
Log likelihood	209.8963				

Table B6: Short-term relationship within the CFA zone

(1/31)*Log(Gnitete) relationship	Short-term relationship			
	Model 1 Model 6	Model 2 Model 7	Model 3	Model 4
Model 5				
Log(Gnitete0)	.0002241	-.0005185	.0002555	.000926

.0009581	.000961	.0009817		
Constant	-.0003718	.0013865	.000151	.0006874
.0005598	.0004838	.0005266		
Log(aidtete)	.0024473	.0022352	.0022241	.0022384
.0021628	.0022981	.0023826		
Log(Labor)		-.1461434	-.1542135	-.1726074
-.174682	-.1727544	-.1790908		
Log(FBCF/PIB)			.0020346	.0023962
.0022276	.0022581	.0024769		
Log(Debt Ext/GDP)				-.0053476
-.0052549	-.0051523	-.0047669		
Log(Qltelabor)				
.0052045	.0057528	.0054306		
Log(Inflation)				
	-.0040774	-.0049519		
Log(G)				
		-.0029946		
Resid(-1)	-.0842885	-.0913734	-.1310308	-.1135063
-.1132238	-.1124674	-.1131971		
Wald Chi(2)	33.71	53.53	86.85	110.79
113.60	119.15	126.47		
Prob(Chi2)	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000		

Table B7: The 1970–1979 period

(1/10)*Log(Gnitete) relationship	Short-term				
	Model 1 Model 7	Model 2 Model 8	Model 3 Model 9	Model 4	Model 5
Log(Gnitete0)	.0015219	.0015302	.0014391	.00141	.0025388
.0033916	.003157	.0032171	.0035456		
Constant	.0026592	.0027691	.0026449	.002345	-.0006874
-.0062647	-.0048531	-.0047002	-.005619		
Log(aidtete)	.0057777	.0058183	.0041596	.0039783	.0052133
.005618	.0065759	.0064192	.007725		
Log(Labor)		-.0076728	.0282377	.0458801	-.0281584
.058078	.0426555	.0219424	-.025659		
Log(FBCF/PIB)			.0058809	.0064905	.0066743
-.0004322	-.0009862	-.0001617	.0004997		
Log(Qltelabor)				.0128824	.009607
.0214598	.0204558	.0203678	.0199346		
Log(Dette ext/PIB)					-.0100725
-.0126839	-.0116929	-.0130342	-.0122648		
Log(Inflation)					
-.0185032	-.0286358	-.0287157	-.0273184		
Log(G/PIB)					
	-.0219839	-.0210839	-.0202402		
Log(Export/PIB)					
		.0048964	.0082973		
Log(Trade)					
			-.0064559		
Resid(-1)	-.0168189	-.0215224	-.0260448	-.0346154	-.0271808
-.0501081	-.0590521	-.0545818	-.08453		
Wald Chi(2)	2.78	2.75	2.89	4.14	7.99

14.47	27.90	28.85	31.47		
Prob(Chi2)	0.4273	0.6001	0.7174	0.6580	0.3331
0.0703	0.0010	0.0013	0.0009		

Table B8: The 1980–1993 period**(1/14)*Log(Gnitete)****Short-term relationship**

6	Model 1 Model 7	Model 2 Model 8	Model 3 Model 9	Model 4 Model 10	Model 5	Model
Log(Gnitete0)	-.0005213	-.0004661	-.0004504	-.0005209	-.0005609	
-.000709	-.0006325	-.0008593	-.0008241	-.0006629		
Constant	.0032027	.0029365	.0028725	.0033901	. 0 0 3 5 9 8 9	
.0045661	.0038592	.0056406	.0054816	.0043974		
Log(aidtete)	.0044829	.0017501	.0018254	.0018452	.0014688	
.001733	.0017941	.004293	.0037659	.0022393		
Log(FBCF/PIB)		.0064925	.006542	.0063759	. 0 0 7 5 9 4 7	
.0068325	.0075533	.0074565	.0076823	.0079859		
Log(Labor)			.0002865	.0001282	.0010823	
-.0022734	-.002414	.0044147	.0046714	.0030726		
Log(Inflation)				-.0007508	-. 0 0 2 0 9 8 1	
-.0000931	.0002634	-.0117943	-.0131311	-.0109062		
Log(SEC/PIB)					.0101749	
.0083759	.010435	.0034595	.0024735	.0039417		
Log(Export/PIB)						
-.0095241	-.0120197	-.0012395	-.0016197	-.0004005		
Log(Trade)						
.0037585	-.0030306	-.0007323	-.0011181			
Log(Dette ext/PIB)						
	-.014015	-.0128199	-.0135349			
Log(G/PIB)						
		-.0074769	-.003484			
Log(Qltelabor)						
			.0279688			
Resid(-1)	-.1403981	-.1396052	-.1386201	-.1370933	-. 0 9 7 4 5 4 1	
-.099125	-.0777419	-.0097285	-.0091606	-.0477586		
Wald Chi(2)	19.49	20.81	20.72	20.56	19.19	28.55
27.80	54.99	58.59	100.54			
Prob(Chi2)	0.0002	0.0003	0.0009	0.0022	0.0076	
0.0004	0.0010	0.0000	0.0000	0.0000		

Table B9: The 1994–2000 period**(1/7)*Log(Gnitete)****Short-term****relationship**

6	Model 1 Model 7	Model 2 Model 8	Model 3 Model 9	Model 4 Model 10	Model 5	Model
Log(Gnitete0)	-.0007219	-.0006818	-.0001559	-.0001868	-. 0 0 0 3 3 8 4	
-.0005515	-.000737	-.0004597	-.0005392	-.0005945		
Constant	.0026282	.0019425	-.000434	-.0015925	-.0008352	
.0009776	.001365	-.0006042	-.0003967	.0000544		
Log(Labor)		.0116807	.0066855	.0066914	.0064156	
.0064551	.0110334	.0077717	.0055057	.0036985		
Log(Aidtete)			.0101244	.0077353	.008431	

Other recent publications in the AERC Research Papers Series:

- Determinants of Private Investment Behaviour in Ghana*, by Yaw Asante, Research Paper 100.
- An Analysis of the Implementation and Stability of Nigerian Agricultural Policies, 1970–1993*, by P. Kassey Garba, Research Paper 101.
- Poverty, Growth and Inequality in Nigeria: A Case Study*, by Ben E. Aigbokhan, Research Paper 102.
- Effect of Export Earnings Fluctuations on Capital Formation*, by Godwin Akpokodje, Research Paper 103.
- Nigeria: Towards an Optimal Macroeconomic Management of Public Capital*, by Melvin D. Ayogu, Research Paper 104.
- International Stock Market Linkages in South Africa*, by K.R. Jefferis, C.C. Okeahalam and T.T. Matome, Research Paper 105.
- An Empirical Analysis of Interest Rate Spread in Kenya*, by Rose W. Ngugi, Research Paper 106.
- The Parallel Foreign Exchange Market and Macroeconomic Performance in Ethiopia*, by Derrese Degefa, Research Paper 107.
- Market Structure, Liberalization and Performance in the Malawi Banking Industry*, by Ephraim W. Chirwa, Research Paper 108.
- Liberalization of the Foreign Exchange Market in Kenya and the Short-Term Capital Flows Problem*, by Njuguna S. Ndung'u, Research Paper 109.
- External Aid Inflows and the Real Exchange Rate in Ghana*, by Harry A. Sackey, Research Paper 110.
- Formal and Informal Institutions' Lending Policies and Access to Credit by Small-Scale Enterprises in Kenya: An Empirical Assessment*, by Rosemary Atieno, Research Paper 111.
- Financial Sector Reform, Macroeconomic Instability and the Order of Economic Liberalization: The Evidence from Nigeria*, by Sylvanus I. Ikhinda and Abayomi A. Alawode, Research Paper 112.
- The Second Economy and Tax Yield in Malawi*, by C. Chipeta, Research Paper 113.
- Promoting Export Diversification in Cameroon: Toward Which Products?* by Lydie T. Bamou, Research Paper 114.
- Asset Pricing and Information Efficiency of the Ghana Stock Market*, by Kofi A. Osei, Research Paper 115.
- An Examination of the Sources of Economic Growth in Cameroon*, by Aloysius Ajab Amin, Research Paper 116.
- Trade Liberalization and Technology Acquisition in the Manufacturing Sector: Evidence from Nigeria*, by Ayonrinde Folasade, Research Paper 117.
- Total Factor Productivity in Kenya: The Links with Trade Policy*, by Joseph Onjala, Research Paper 118.
- Kenya Airways: A Case Study of Privatization*, by Samuel Oyieke, Research Paper 119.
- Determinants of Agricultural Exports: The Case of Cameroon*, by Daniel Gbetnkon and Sunday A. Khan, Research Paper 120.
- Macroeconomic Modelling and Economic Policy Making: A Survey of Experiences in Africa*, by Charles Soludo, Research Paper 121.
- Determinants of Regional Poverty in Uganda*, by Francis Okurut, Jonathan Odwee and Asaf Adebua, Research Paper 122.
- Exchange Rate Policy and the Parallel Market for Foreign Currency in Burundi*, by Janvier D. Nkurunziza, Research Paper 123.
- Structural Adjustment, Poverty and Economic Growth: An Analysis for Kenya*, by Jane Kabubo-

- Mariara and Tabitha W. Kiriti, Research Paper 124.
- Liberalization and Implicit Government Finances in Sierra Leone*, by Victor A.B. Davis, Research Paper 125.
- Productivity, Market Structure and Trade Liberalization in Nigeria*, by Adeola F. Adenikinju and Louis N. Chete, Research Paper 126.
- Productivity Growth in Nigerian Manufacturing and Its Correlation to Trade Policy Regimes/Indexes (1962–1985)*, by Louis N. Chete and Adeola F. Adenikinju, Research Paper 127.
- Financial Liberalization and Its Implications for the Domestic Financial System: The Case of Uganda*, by Louis A. Kasekende and Michael Atingi-Ego, Research Paper 128.
- Public Enterprise Reform in Nigeria: Evidence from the Telecommunications Industry*, by Afeikhena Jerome, Research Paper 129.
- Food Security and Child Nutrition Status among Urban Poor Households in Uganda: Implications for Poverty Alleviation*, by Sarah Nakabo-Sswanyana, Research Paper 130.
- Tax Reforms and Revenue Mobilization in Kenya*, by Moses Kinyanjui Muriithi and Eliud Dismas Moyi, Research Paper 131.
- Wage Determination and the Gender Wage Gap in Kenya: Any Evidence of Gender Discrimination?* by Jane Kabubo-Mariara, Research Paper 132.
- Trade Reform and Efficiency in Cameroon's Manufacturing Industries*, by Ousmanou Njikam, Research Paper 133.
- Efficiency of Microenterprises in the Nigerian Economy*, by Igbekele A. Ajibefun and Adebiyi G. Daramola, Research Paper 134.
- The Impact of Foreign Aid on Public Expenditure: The Case of Kenya*, by James Njeru, Research Paper 135.
- The Effects of Trade Liberalization on Productive Efficiency: Some Evidence from the Electoral Industry in Cameroon*, by Ousmanou Njikam, Research Paper 136.
- How Tied Aid Affects the Cost of Aid-Funded Projects in Ghana*, by Barfour Osei, Research Paper 137.
- Exchange Rate Regimes and Inflation in Tanzania*, by Longinus Rutasitara, Research Paper 138.
- Private Returns to Higher Education in Nigeria*, by O.B.Okuwa, Research Paper 139.
- Uganda's Equilibrium Real Exchange Rate and Its Implications for Non-Traditional Export Performance*, by Michael Atingi-Ego and Rachel Kaggwa Sebudde, Research Paper 140.
- Dynamic Inter-Links among the Exchange Rate, Price Level and Terms of Trade in a Managed Floating Exchange Rate System: The Case of Ghana*, by Vijay K. Bhasin, Research Paper 141.
- Financial Deepening, Economic Growth and Development: Evidence from Selected Sub-Saharan African Countries*, by John E. Udo Ndebbio, Research Paper 142.
- The Determinants of Inflation in South Africa: An Econometric Analysis*, by Oludele A. Akinboade, Franz K. Siebrits and Elizabeth W. Niedermeier, Research Paper 143.
- The Cost of Aid Tying to Ghana*, by Barfour Osei, Research Paper 144.
- A Positive and Normative Analysis of Bank Supervision in Nigeria*, by A. Soyibo, S.O. Alashi and M.K. Ahmad, Research Paper 145.
- The Determinants of the Real Exchange Rate in Zambia*, by Kombe O. Mungule, Research Paper 146.
- An Evaluation of the Viability of a Single Monetary Zone in ECOWAS*, by Olawale Ogunkola, Research Paper 147.
- Analysis of the Cost of Infrastructure Failures in a Developing Economy: The Case of Electricity Sector in Nigeria*, by Adeola Adenikinju, Research Paper 148.
- Corporate Governance Mechanisms and Firm Financial Performance in Nigeria*, by Ahmadu Sanda, Aminu S. Mikailu and Tukur Garba, Research Paper 149.
- Female Labour Force Participation in Ghana: The Effects of Education*, by Harry A. Sackey, Research Paper 150.
- The Integration of Nigeria's Rural and Urban Foodstuffs Market*, by Rosemary Okoh and P.C. Egbon, Research Paper 151.
- Determinants of Technical Efficiency Differentials amongst Small- and Medium-Scale Farmers*

- in Uganda: A Case of Tobacco Growers*, by Marios Obwona, Research Paper 152.
- Land Conservation in Kenya: The Role of Property Rights*, by Jane Kabubo-Mariara, Research Paper 153.
- Technical Efficiency Differentials in Rice Production Technologies in Nigeria*, by Olorunfemi Ogundele, and Victor Okoruwa, Research Paper 154.
- The Determinants of Health Care Demand in Uganda: The Case Study of Lira District, Northern Uganda*, by Jonathan Odwee, Francis Okurut and Asaf Adebua, Research Paper 155.
- Incidence and Determinants of Child Labour in Nigeria: Implications for Poverty Alleviation*, by Benjamin C. Okpukpara and Ngozi Odurukwe, Research Paper 156.
- Female Participation in the Labour Market: The Case of the Informal Sector in Kenya*, by Rosemary Atieno, Research Paper 157.
- The Impact of Migrant Remittances on Household Welfare in Ghana*, by Peter Quartey, Research Paper 158.
- Food Production in Zambia: The Impact of Selected Structural Adjustments Policies*, by Muacinga C.H. Simatele, Research Paper 159.
- Poverty, Inequality and Welfare Effects of Trade Liberalization in Côte d'Ivoire: A Computable General Equilibrium Model Analysis*, by Bédia F. Aka, Research Paper 160.
- The Distribution of Expenditure Tax Burden before and after Tax Reform: The Case of Cameroon*, by Tabi Atemnkeng Johannes, Atabongawung Joseph Nju and Afeani Azia Theresia, Research Paper 161.
- Macroeconomic and Distributional Consequences of Energy Supply Shocks in Nigeria*, by Adeola F. Adenikinju and Niyi Falobi, Research Paper 162.
- Analysis of Factors Affecting the Technical Efficiency of Arabica Coffee Producers in Cameroon*, by Amadou Nchare, Research Paper 163.
- Fiscal Policy and Poverty Alleviation: Some Policy Options for Nigeria*, by Benneth O. Obi, Research Paper 164.
- FDI and Economic Growth: Evidence from Nigeria*, by Adeolu B. Ayanwale, Research Paper 165.
- An Econometric Analysis of Capital Flight from Nigeria: A Portfolio Approach*, by Akanni Lawanson, Research Paper 166.
- Extent and Determinants of Child Labour in Uganda*, by Tom Mwebaze, Research Paper 167.
- Oil Wealth and Economic Growth in Oil Exporting African Countries*, by Olomola Philip Akanni, Research Paper 168.
- Implications of Rainfall Shocks for Household Income and Consumption in Uganda*, by John Bosco Asiimwe, Research Paper 169.
- Relative Price Variability and Inflation: Evidence from the Agricultural Sector in Nigeria*, by Obasi O. Ukoha, Research Paper 170.
- A Modelling of Ghana's Inflation: 1960–2003*, by Mathew Kofi Ocran, Research Paper 171.
- The Determinants of School and Attainment in Ghana: A Gender Perspective*, by Harry A. Sackey, Research Paper 172.
- Private Returns to Education in Ghana: Implications for Investments in Schooling and Migration*, by Harry A. Sackey, Research Paper 173.
- Oil Wealth and Economic Growth in Oil Exporting African Countries*, by Olomola Philip Akanni, Research Paper 174.
- Private Investment Behaviour and Trade Policy Practice in Nigeria*, by Dipo T. Busari and Phillip C. Omoke, Research Paper 175.
- Determinants of the Capital Structure of Ghanaian Firms*, by Jochua Abor, Research Paper 176.
- Privatization and Enterprise Performance in Nigeria: Case Study of some Privatized Enterprises*, by Afeikhena Jerome, Research Paper 177.

- Sources of Technical Efficiency among Smallholder Maize Farmers in Southern Malawi*, by Ephraim W. Chirwa, Research Paper 178.
- Technical Efficiency of Farmers Growing Rice in Northern Ghana*, by Seidu Al-hassan, Research Paper 179.
- Empirical Analysis of Tariff Line-Level Trade, Tariff Revenue and Welfare Effects of Reciprocity under an Economic Partnership Agreement with the EU: Evidence from Malawi and Tanzania*, by Evious K. Zgovu and Josaphat P. Kweka, Research Paper 180.
- Effect of Import Liberalization on Tariff Revenue in Ghana*, by William Gabriel Brafu-Insaidoo and Camara Kwasi Obeng, Research Paper 181.
- Distribution Impact of Public Spending in Cameroon: The Case of Health Care*, by Bernadette Dia Kamgnia, Research Paper 182.
- Social Welfare and Demand for Health Care in the Urban Areas of Côte d'Ivoire*, by Arsène Kouadio, Vincent Monsan and Mamadou Gbongue, Research Paper 183.
- Modelling the Inflation Process in Nigeria*, by Olusanya E. Olubusoye and Rasheed Oyaromade, Research Paper 184.
- Determinants of Expected Poverty Among Rural Households in Nigeria*, by O.A. Oni and S.A. Yusuf, Research Paper 185.
- Exchange Rate Volatility and Non-Traditional Exports Performance: Zambia, 1965–1999*, by Anthony Musonda, Research Paper 186.
- Macroeconomic Fluctuations in the West African Monetary Union: A Dynamic Structural Factor Model Approach*, by Romain Houssa, Research Paper 187.
- Price Reactions to Dividend Announcements on the Nigerian Stock Market*, by Olatundun Janet Adelegan, Research Paper 188.
- Does Corporate Leadership Matter? Evidence from Nigeria*, by Olatundun Janet Adelegan, Research Paper 189.
- Determinants of Child Labour and Schooling in the Native Cocoa Households of Côte d'Ivoire*, by Guy Blaise Nkamleu, Research Paper 190.
- Poverty and the Anthropometric Status of Children: A Comparative Analysis of Rural and Urban Households in Togo*, by Kodjo Abalo, Research Paper 191.
- Measuring bank Efficiency in Developing Countries: The Case of the West African Economic and Monetary Union (WAEMU)*, by Sandrine Kablan, Research Paper 192.
- Economic Liberalization, Monetary and Money Demand in Rwanda: 1980–2005*, by Musoni J. Rutayisire, Research Paper 193.
- Determinants of Employment in the Formal and Informal Sectors of the Urban Areas of Kenya*, by wambui R. Wamuthenya, Research Paper 194.
- An Empirical Analysis of the Determinants of Food Imports in Congo*, by Léonard Nkouka Safoulanitou and Mathias Marie Adrien Ndinga, Research Paper 195.
- Determinants of a Firm's Level of Exports: Evidence from Manufacturing firms in Uganda*, by Aggrey Niringiye and Richard Tuyiragize, Research Paper 196.
- Supply Response, Risk and Institutional Change in Nigerian Agriculture*, by Joshua Olusegun Ajetomobi, Research Paper 197.
- Multidimensional Spatial Poverty Comparisons in Cameroon*, by Aloysius Mom Njong, Research Paper 198.
- Earnings and Employment Sector Choice in Kenya*, by Robert Nyaga, Research Paper 199.