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Optimal Monetary Zone and Economic Growth: Case of the CEMAC Countries (CHAD, CAMEROON, CENTRAL AFRICAN REPUBLIC, GABON, EQUATORIAL GUINEA, CONGO BRAZZAVILLE)

SENOUSSI Seid Abakar[1], MOUSSA KABIR SALEH[2], DJIMNADJINGAR Ratangar[3], Yahya YAHYAOUI[4]

[1]Doctor in Economic Sciences, Teacher-Researcher, Faculty of Business Sciences and Techniques University of Moundou-Chad

[2](Assistant Professor, CAMES) Management Sciences, University of Moundou (CHAD)

[3]Lecturer, CAMES Management Sciences, University of Moundou (CHAD)

[4]Professor, Mohammed 1st University Oujda (Morocco)

ABSTRACT: This article examines the relationship between a monetary zone and the economic growth of its member countries in Central Africa. The countries are Cameroon, Gabon, and Congo-Brazzaville, as well as the Central African Republic, Chad, and Congo-Brazzaville. Little research has been devoted to the link between optimal monetary zones and economic growth. Our methodology is hypothetico-deductive. Initially, it draws on the theory of Robert Mundell (1961) [1], which defines optimality in terms of labor mobility. His theory evolved considerably thereafter. Our study covers the period from 1960 to 2022.

Our variables are household consumption, public consumption, investment, savings, exports, imports, external debt, the population aged 15 to 65, the real interest rate, the money supply, GDP, the price index, and the real exchange rate, all of which are from the World Bank, except for employment (UNCTAD). We established five equations relating the endogenous variables (money supply, real interest rate, and real exchange rate) to the other exogenous variables.

We used cointegration models. The effect of a double cointegration relationship of rank two, as determined by the Johansen method, will allow us to determine whether the studied variables influence each other reciprocally in the long term. Granger causality analysis shows how one variable can be explained by another. We processed the statistical data of the different variables of the models using the EViews econometrics software.

Our econometric results show that this relationship remains contradictory due to the lack of regular time series for the CEMAC region, caused by political crises, etc. We cannot reject our central hypothesis that there is a correlation between monetary policy and economic growth. Despite the statistical data, economic growth in the CEMAC monetary zone is not uniform. Some member countries, such as Equatorial Guinea, the Republic of the Congo, and Gabon, have experienced periods of strong and sustained growth, while others, such as the Central African Republic, Chad, and Cameroon, have experienced periods of imbalance.

KEYWORDS: Monetary zone, optimal monetary zone, regional cooperation, monetary policy, economic growth, CEMAC, empirical measures

I- INTRODUCTION

Thanks to its geographical proximity, the monetary zone[1] improves economic, commercial, and financial relations between member countries. The abolition of conversion costs, the adoption of a fixed exchange rate, and the free circulation of capital, goods, and services, as well as efficient resource allocation, are the prerequisites for establishing a true internal market. Stable exchange rates encourage businesses to expand into other countries in the zone, thus promoting intra-community trade. Using the CFA[2] franc in member countries increases liquidity, creates new demand for financial instruments, and reduces financing costs

[1]A monetary union is an area where there is a fixed exchange rate and a single currency among the member countries.

[2]Francine Quentin (2002) The franc of the French colonies in Africa was created on December 26, 1945, and was tied to the French franc at a fixed rate (1 French franc = 50 CFA francs). Today, it is called the franc of the Community of African Financial Institutions (1 euro = 655.957 FCFA), fixed parity.

(due to the absence of conversion) for businesses. Furthermore, the elimination of customs barriers reduces transaction costs for businesses within the CEMAC[3]. This reduction allows for broader market access.

This intensification of trade allows industries to specialize in price and quality niches, benefit from economies of scale and product range, and modify their comparative advantages. Within companies, the conversion of national prices to CFA francs primarily affects the sectors of raw materials intended for export and consumer goods, as well as customers and their purchasing behavior. Price harmonization depends on the sector and the member country.

II- REVIEW OF LITERATURE

The theory of the optimal currency area was not developed today. Lerner (1947), Friedman (1953), Meade (1951), and T.Scitovsky (1958) were the first to study it by analyzing the effectiveness of interregional adjustment in different countries. They demonstrated that monetary and fiscal policies play an essential role in the free circulation of production factors and goods in the absence of variation in exchange rates between regions.

The theory of optimal currency areas emerged during a long controversy between fixed and floating exchange rate regimes. In this debate, attention was not focused on the actual characteristics of the economies.

This is why, in the 1960s, Robert Mundell emphasized the importance of real economic characteristics in determining the choice of exchange rate regime. He defined a basic criterion for an optimal monetary union: labor mobility. Since then, his theory has evolved and no longer limits itself to the mobility of production factors.

Deciding between a fixed exchange rate system and a monetary union is one thing, but deciding which countries can join is another. The classic framework for evaluating the feasibility of a monetary union was presented by Mundell in 1961.

III- OPTIMAL MONETARY ZONE: FEASIBILITY OF A MONETARY UNION

The theory of optimal currency areas lists some criteria that countries in a geographic area wishing to join a monetary union must meet so that the benefits of this integration are greater than the costs of losing sovereignty in monetary policy and the disappearance of the exchange rate as an adjustment variable. Accepting these sacrifices leads a country to opt for a monetary union for the following reasons:

In the 1960s, Mundell emphasized three fundamental criteria for establishing a monetary union:

The first is that the member countries must have comparable economic structures. This property aims to affirm that candidate countries are vulnerable to asymmetric shocks[4]. In our study, we found that the countries in the FCFA zone in Central Africa have homogeneous and very similar economic structures.

The second criterion indicates that there must be sufficient flexibility in wages between the countries involved to absorb asymmetric shocks. However, this second criterion was difficult to affirm in our study due to a lack of significant data on salaries between members of the FCFA zone in Central Africa.

The third criterion states that labor mobility between different countries must be widely ensured. This last criterion is almost met, as the intra-zone mobility of the CEMAC is explained by the historical, cultural, and linguistic links between the peoples of Central Africa. In addition to these criteria, there is the mobility of capital. In our study, we observed perfect capital mobility between the countries of the Central African CFA zone, but foreign direct investment between them is significant.

Mundell built on the Keynesian hypothesis of fixed prices by demonstrating that when two countries produce different goods, a shift in demand towards one of them causes a structural imbalance in the balance of payments, resulting in unemployment in one country and an increase in the demand for labor in the other.

IV- CRITICISM OF MUNDELL'S THEORY

Fortunately, the story isn't over. Starting in the 1970s, Mundell began to emphasize the advantages of a monetary union, particularly its ability to allow member countries to share the costs of external shocks.

He also became more skeptical of the benefits of floating exchange rates, which most often do not reflect macroeconomic fundamentals. This change of heart has been referred to as "Mundell II" by De Grauwe and Kouretas (2004). Mundell a modifié sa position en se fondant sur deux arguments :

First, he asserts that a monetary union enables the establishment of a more effective insurance system to cope with asymmetric shocks than a system of national currencies with uncertain exchange rates. The union facilitates capital flows between

[3]Economic and Monetary Community of Central Africa

[4]It creates an excess demand for X products and an excess supply of Y products.

members, which mitigates the effects of adjusting to external shocks. With distinct currencies and variable exchange rates, these flows are less likely to occur.

Secondly, Mundell's (and other authors') thinking has evolved, as it is increasingly evident that exchange rate movements are often unrelated to underlying fundamentals, such as inflation differentials or increased production. Currency exchange rates are often influenced by psychological factors and herd behavior, which accentuates instability.

In such circumstances, variations in the exchange rate are likely to cause asymmetric shocks. Thus, Mundell concluded that abandoning this instrument would not be a significant sacrifice and that the benefits could outweigh the disadvantages.

It seems that Mundell changed his position after observing the high mobility of capital during this period. In a world where capital is free to circulate, the exchange rate is no longer a stabilizing force. On the contrary, according to Mundell, the exchange rate becomes the target of destabilizing speculative movements and constitutes a source of significant asymmetric shocks.

V- FINANCIAL INTEGRATION

In 1962, Ingram argued that financial integration could address the need for financing in a monetary union. According to him, financial integration could mitigate the need for a monetary instrument, as disruptions could be offset by an influx of capital in the form of loans from surplus areas or by selling foreign net assets. In a context of high financial integration, small interest rate variations could thus cause capital movements between countries to find equilibrium.

Other criteria for optimality of the monetary zone were developed in the 1960s literature. These include macroeconomic criteria, such as the degree of openness of economies proposed by Mac Kinnon (1963) and the diversification of national productions proposed by Kenen (1969).

In this study, Mac Kinnon (1963) explains that it is preferable for the economy to be open, meaning that the proportion of tradable goods in the national income is significant compared to non-tradable goods. Such an economy would benefit from joining a monetary union to avoid price instability in the event of flexible exchange rates.

VI- CRITERIA FOR THE OPTIMALITY OF THE MONETARY ZONE

Other criteria for optimality of the monetary zone were developed in the 1960s literature. In this regard, there are, on the one hand, macroeconomic criteria, such as the degree of openness of the economies of Mac Kinnon (1963) or the diversification of national productions of Kenen (1969).

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In 1969, Kenen added that a country should join a monetary union if its foreign trade is sufficiently geographically and sectorially diversified.

In 1969, Kenen revealed that a small open economy is generally more specialized than a large closed economy, which is more diversified. The former experiences symmetric shocks[5], while the latter primarily experiences asymmetric shocks. When two specialized economies are exposed to asymmetric shocks.,

In this article, Tamim Bayoumi and Barry Eichengreen (1944) discuss the idea that "if the respective economies' internal adjustment mechanisms are flexible and rapid enough, it could be optimal to create only one monetary union. Indeed, flexible economies considerably reduce the costs of the union. To analyze asymmetry or symmetry of shocks, McKinnon revealed in 1963 the existence of two economies engaging in intra-sectorial trade.

In these economies, shocks are more symmetrical because a shock affects all differentiated products in a given industry in the same way. For example, an increase in the global price of raw materials should affect all similar industries. Conversely, when two economies engaged in inter-sectorial trade are confronted with asymmetric shocks of opposite signs.

When two countries have opposing industrial structures, there is specialization and interindustrial trade. Therefore, they are not good candidates for a monetary union.

On this subject, Krugman and Obstfeld (1995) cite: 'The costs of union are decreasing with integration, while the benefits are increasing.' »

In addition to these macroeconomic criteria, Ishiyama (1975) and Tower and Willett (1976) offered microeconomic justifications based on the evaluation of the costs and benefits of joining a monetary zone.

[5]A shock affects a country X at the expense of a country Y when it causes a shift in capital and labor, resulting in inflation and unemployment.

These reasons focus on the advantages and disadvantages of the monetary zone, as identified by Ishiyama (1975) and Tower and Willett (1976). The latter mention that the advantages of belonging to a monetary zone are primarily microeconomic and shared by all member countries.

Monetary exchanges will be considerably developed, as they eliminate the exchange risk associated with transaction and information costs. Simultaneously, member countries will enjoy monetary and price stability, as well as credibility for their economic policies in the eyes of the rest of the world. However, this will require strong coordination of monetary policies (budgetary and fiscal).

As for the costs, they are of a macroeconomic nature and felt individually. For example, the abandonment of monetary sovereignty prevents each country from stabilizing its economy in the face of specific shocks, the diversity of its economies, and their lack of monetary and real integration.

In 1986, Kindleberger recommended another criterion: membership in a monetary union is also a matter of preference. Union is a public good that meets a similar need of the different populations. When trade between member countries is significant and preferences are similar regarding goods, services, and public goods, candidate states for union fulfill the conditions to form an optimal monetary zone.

Homogeneity of preferences covers the geographic space. Candidates for the monetary union must share the same essential objectives. It is essential, for example, that they aim for convergence in terms of internal stability and accept the same compromise between unemployment and inflation.

Three homogeneous preference situations can be considered:

1) The small country freely adjusting to the large one, as in the Mark zone.

2) A monetary union in which the dominant partner imposes its alignment and terms on the other, as in the case of German reunification.

- negotiated convergence, as in the case of the European Monetary Union for the other major countries besides Germany.

Bertola (1989) highlighted the uncertainty of income and the fixed costs associated with an economic agent's relocation. These two factors alone can sabotage all attempts by the governments of the Union to liberalize the labor market.

Based on the Mundell-Fleming model, he shows that for an agent to relocate, the difference between the expected income abroad and the expected local income must exceed the fixed cost of relocation, which is linked to the probability of returning to the starting point.

Frankel and Rose (1997) studied a group of about twenty industrialized countries over a period of thirty years and concluded that countries with significant trade see an improvement in the correlation between their economic cycles. Consequently, a monetary union, by promoting trade between its member countries, helps to harmonize the effects of asymmetric shocks.

VII- CRITERIA FOR CONVERGENCE OF PREFERENCES

Rose (2000) argues that belonging to a monetary union has an effect greater than 200% on trade.

However, De Grauwe and Skudelny (2000), Frankel and Wei (1992), and Eichengreen and Irwin (1995) argue that the impact of reduced exchange rate volatility on trade volume is minimal.

The advances of the monetary union are based on convergence criteria. In 1993, Georges S. Tavlas proposed various levels of monetary zones and identified four forms.

A fixed exchange rate union consists of an irrevocable fixed exchange rate regime with no margin of fluctuation. In this system, the monetary policy of each member is not coordinated. However, this system involves capital circulation control.

The pseudo-exchange rate union is a fixed exchange rate regime in which capital circulation control and policy coordination are loosely enforced.

Monetary integration is a regime in which the exchange rate is irrevocably fixed and the margin of fluctuation is zero. It also includes irreversible convertibility of currency, liberalization of capital movements, and a common monetary policy.

The monetary union is the realization of monetary integration, completed by a single currency and a common central bank.

VIII- THE EVALUATION OF AN OPTIMAL MONETARY ZONE

To evaluate the optimality of a monetary union, economists most often refer to structural and adjustment criteria. Using these criteria, they quantify the costs and benefits of each member country's participation in a monetary union.

These criteria determine the conditions favorable to the formation of a monetary zone.

Optimal Monetary Zone and Economic Growth: Case of the CEMAC Countries (CHAD, CAMEROON, CENTRAL AFRICAN REPUBLIC, GABON, EQUATORIAL GUINEA, CONGO BRAZZAVILLE)

In this excerpt, McKinnon (1963) lists the characteristics of an optimal monetary zone: the use of fiscal and monetary policies, as well as the maintenance of a flexible exchange rate with the outside world, in order to solve the following three problems:
(1) maintaining full employment;
(2) Maintaining an international balance of payments;
(3) maintaining a stable level of domestic prices.
We identified three optimality criteria for internal adjustment mechanisms: first, labor mobility, as defined by Mundell in 1961.
The second, capital mobility, was defined by McKinnon in 1963. This capital mobility refers to two types of adjustment: short-term and long-term. In the short term, it is optimal for a monetary zone to finance temporary imbalances and compensate for income shortfalls. However, in the long term, there must be actual capital formation, i.e., direct investment..
In 1972, L. Dudley defined a third adjustment criterion: the acceptability of transfer payments. These transfers of public capital between two member countries of an economic zone aim to preserve the purchasing power of the least favored countries.
In 1992, P. De Grauwe analyzed the Phillips curve and showed that convergence of inflation rates in a fixed exchange rate regime implies two types of costs: higher or lower than desired inflation, and higher or lower than desired unemployment. These costs include permanent structural imbalances and a future reduction in living standards.
The different structures of labor markets lead to significant costs when joining the monetary union. Some countries have a structure in which workers are more likely to be unionized than in others. This difference leads to a dispersion of wages and prices, resulting in a different unemployment rate.
. In 1995, Heylen and Van Poeck claimed that an increase in unemployment caused by a negative shock is significant when nominal wage adjustments, due to wage rigidity and hysteresis, are slow.
- Loss of credibility: Inflation plays a vital role in the value of the currency. Therefore, a member country experiencing price instability may benefit from adopting a low-inflation currency.
- When interest rates are high, they can reduce investments, delay consumption, and decrease the liquidity of a currency.
In addition to these costs, a monetary union generates benefits.
- The formation of a monetary union generates certainty: the absence of exchange rates between member countries eliminates uncertainty and reduces the volatility of prices of goods traded. This gain in certainty promotes investment and mitigates the exchange rate risk premium.
Eliminating transaction costs reduces price discrimination, resulting in indirect gains such as greater price diversity between national markets, improved quality of information, and stimulated economic growth.
Eliminating the costs of exchanging one currency for another would be a significant gain for the monetary union. These costs will be eliminated when the member countries adopt a common currency. Indeed, the establishment of a fixed and irreversible exchange rate regime allows for the harmonization of similar gains in the countries of the monetary union.
- A national currency persists in the presence of an irrevocable exchange rate. This situation encourages economic agents to favor the national currency over foreign currencies, resulting in an imperfect substitution of currencies.
The openness of an economy can increase well-being.
- Eliminating transaction costs (currency exchange) is important for businesses and consumers who buy (or sell) products abroad. Eliminating these risks increases well-being more in an open economy than in a closed one.
- A population averse to risk may experience increased social well-being due to changes in exchange rates, as they can lead to income uncertainty for businesses. Eliminating the foreign exchange risk reduces uncertainty and improves well-being.
Reducing exchange rate risk decreases the uncertainty of prices for goods and services. Economic agents make decisions based on price information regarding production, investment, and consumption.
Investors demand a higher compensation rate for the risk incurred, creating a selective approach to effective investment projects.
In the Economic and Monetary Union, each country has indeed lost its monetary sovereignty.
In a given institutional and economic context, the central bank can establish effective cooperation with national central banks. However, we have questioned the disparities between member countries, asymmetric shocks, the absence of coordination of fiscal policies, and the heterogeneity of the channels through which monetary policy affects the economy. These are issues that the central bank faces when seeking to promote economic growth. Economic growth for countries involves creating jobs through public or private enterprises.
In the short term, we acknowledge that economic growth depends primarily on domestic and foreign demand for consumer and investment goods and services. In the long term, however, it depends primarily on the supply and efficiency of production factors (land, physical capital, labor, human capital, technological progress, and institutions).

Our study shows that people can move freely within the CEMAC, but labour mobility is not respected due to fears of political interference between member states. Some countries are rich and others are poor.

In his study titled "The New Economic Geography," P. Krugman (1991) examined the location and concentration of economic activities in space. This model fundamentally relies on three variables:

1) the proportion of activities related to the land;
2) transportation costs;
3) increasing returns.

The concentration of economic activities in a limited number of locations is caused by the relative decline of agriculture in the economy due to fixed land resources, reduced transportation costs, and increased economies of scale related to returns.

IX- INSTITUTIONS, GOVERNANCE, AND ECONOMIC GROWTH

La coopération monétaire entre les pays composant une communauté économique régionale donnée vise à mettre en place une zone monétaire commune avec une stabilité monétaire renforcée pour faciliter l'intégration économique et favoriser un développement économique durable.

In the monetary zone, political institutions define monetary and fiscal policies that influence the functioning of economic agents and markets.

X- THE LINK BETWEEN THE INTENSITY OF TRADE AND ECONOMIC CYCLES

In 1993, P. Krugman argued that increased economic integration between regions leads to greater industrial specialization, asymmetric shocks, and diverging economic cycles.

In 1997, Frankel and Rose tested and validated the hypothesis that the intensity of trade between countries would positively influence their economic cycles. However, with the creation of a monetary union, which would stimulate trade between member countries and synchronize their economic cycles more closely, the importance of smoothing out economic cycle fluctuations through independent monetary policy would decrease. Therefore, countries that take early measures to increase their economic integration with future partners of a monetary union will have a better chance of meeting the entry criteria and succeeding in their participation.

The Impact of the Exchange Rate Regime on the Degree of Specialization of an Economy

Of course, there may be differences of opinion regarding the effects of intensifying trade between regions. These exchanges can indeed affect their degree of specialization and the relationship between their economic cycles. In any case, another question deserves to be studied: the impact of a particular exchange rate regime on the degree of specialization of the regions concerned.

In a two-country, two-good model, Ricci (1997) studied the impact of flexible and fixed exchange rate regimes on the location choices of firms and the degree of specialization of countries within a monetary union. The results show that countries would be more specialized in a flexible exchange rate regime. Adopting a fixed exchange rate regime would lead to sectoral dispersion of production, reducing asymmetry of shocks and making the creation of a monetary union more attractive.

XI- MONETARY ZONES AND REGIONAL DISPARITIES OF MEMBER COUNTRIES

When a monetary zone is characterized by regional disparities. The need for a wide range of monetary, budgetary, fiscal, or industrial policies to mitigate or manage these disparities becomes evident, particularly in the context of fixed exchange rates and when production factors are not sufficiently mobile to counter these imbalances between the member countries of the monetary zone.

These regional disparities affect the competitiveness of the monetary zone, as member states must accept sometimes contradictory regional demands that do not reflect an identical economic reality in all member countries.

Indeed, regional imbalances reflect different structural and behavioral realities between member states. First, when disparities between countries are caused by significantly different industrial structures, it indicates that we will experience many asymmetric or country-specific shocks. This confirms that the monetary zone is suboptimal.

Industrial structures differ because the industries of the member countries do not produce the same goods, use the same production factors, or target the same consumers, and are affected differently by the global dynamic. The GDP and trade volume of each member country relative to international trade can serve as rough indicators for the monetary zone.

Secondly, when the monetary zone is characterized by specific, asymmetric shocks to each country and the disparities introduced by these shocks persist, the index signals that the production factors are not sufficiently mobile to restore the monetary zone's balance, or that the structural imbalances are too significant.

Then, we will discover persistent disparities in terms of compensation and other characteristics of the labor market and other markets where factors of production are exchanged.

In this case, we must qualify the imperfection of the mobility of production factors, particularly labor. When it is structural, this imperfection is due to the qualifications required to work in a particular industry, prices that do not include all the information due to the remoteness of the markets, workers who deliberately refuse to follow market signals, or the fact that the cost of migration is higher than the cost of labor inactivity. These elements demonstrate suboptimality in the monetary zone.

The effectiveness of a monetary zone's institutions and governance is key. This effectiveness depends on the political positions taken by the government, the firmness with which it responds, the behavior of the population during the adjustment process, the nature of financial institutions, etc.

Government policies and initiatives modify economic characteristics, facilitating or hindering the adjustment process by limiting or accentuating the cost of asymmetric shocks. The lack of coordination and harmonization of fiscal and budgetary policies among member states contributes to the ineffectiveness of the monetary zone and exacerbates disparities between member states.

Governments pursue objectives aimed at balancing development opportunities within the zone, such as reducing income or employment disparities between countries, providing incentives for businesses to locate there, or revitalizing or redistributing resources, which are generally targeted at struggling countries.

XII- GOVERNANCE: ACCESS TO FINANCING AND ECONOMIC GROWTH

The goal of government policies on economic growth is to ensure access to capital in order to finance investment and generate economic growth. This policy aims to reduce the effects of unequal access to public and private capital within member countries. This initiative creates equal opportunities for development among these countries.

In the case of public capital, access to it is limited by the heterogeneity of fiscal capacity between countries. However, if tax rates are different among the member countries of the zone, this situation pushes economic actors to migrate to countries where taxes are the lowest.

XIII- THE CONSEQUENCES OF JOINING A MONETARY ZONE

The formation of a monetary zone makes all policies related to regional balance of payments incompatible, as it is impossible to isolate a member country of the monetary zone from shocks affecting the balance of payments of the zone. Consequently, governments cannot absorb these shocks by adjusting relative prices between member states

Then, trade and financial flows between the economies of the monetary zone are formed at parities that do not automatically guarantee the relative efficiency or productivity gap of the member countries.

Thus, in the event of an asymmetric shock within the monetary zone, if the markets fail to effectively reallocate productive resources towards full employment, it will be impossible to restore the zone's internal balance. In the short term, the economies of the member countries will be marked by instability, and in the long term, permanent structural imbalances will appear within the monetary zone.

In this context, to optimize a monetary zone and guarantee its stability, member countries must commit to defending their participation in the monetary union on structural and functional levels. The affected countries must unite to reduce internal asymmetric shocks. These measures primarily include the mobility of production factors and flexible real wages.

Adhering to a monetary zone has short- and medium-term repercussions on the specialization strategies of the zone's businesses. In the short term, it reduces administrative costs and delays, which lowers costs. Furthermore, harmonizing technical standards facilitates trade by making goods less expensive and more accessible.

In the medium term, reducing the costs of regional businesses should increase intra-community trade, with more goods crossing borders and transactions. This intensification of trade between different sectors will allow industries to specialize in price and quality niches, benefit from economies of scale and product range economies, and modify their comparative advantages.

The effectiveness of the monetary zone depends on the political positions taken by the government, the behavior of the population, and the nature of the institutions.

XIV- THE CEMAC'S ARCHITECTURE

The treaty, signed by the heads of state at their 33rd summit, was published on February 5, 1998. The CEMAC officially began on June 24 and 25, 1999, in Malabo, Equatorial Guinea, with the entry

Its statutes are in effect, as are the nominations of its first officials: the secretary-general and the secretary-general-in-training.

The CEMAC treaty was signed by these six states on March 16, 1994, in N'Djamena, Chad, and entered into force in June 1999.

Article 1 of the treaty[6] emphasizes the desire to create two entities: an Economic Union and a Monetary Union.
The countries that are members of the CEMAC are:



Source de l'image : http://www.cemac.int/

The table below summarizes the various initiatives and steps that led to the creation of the CEMAC. However, the realization of this idea required several steps, the main ones of which are: the Equatorial Customs Union (UDE), the Central African Customs and Economic Union (UDEAC), the Union of Central African States, and finally, the CEMAC.
History of Central African Groupings: Chronological and institutional analysis of the creation process of the Central African franc zone, then the CEMAC, and the institutions that established them.
figure[7]

[6] Worldtardelaw. Net ' Economic Monetary Community of Cenral Africa (CEMAC) p:1
[7] Claude N'KODIA « l'Intégration Economique : les enjeux pour l'Afrique Centrale » édit Harmattan 1999 p 32

	EQUATORIAL CUSTOMS UNION (UDE)	UNION OF THE REPUBLICS OF CENTRAL AFRICA (URAC)	CUSTOMS AND ECONOMIC UNION OF CENTRAL AFRICA (UDEAC)	UNION OF CENTRAL AFRICAN STATES (UEAC)	ECONOMIC COMMUNITY OF CENTRAL AFRICAN STATES (CEEAC)	ECONOMIC AND MONETARY COMMUNITY OF CENTRAL AFRICA (CEMAC-EX-UDEAC)
MEMBER COUNTRIES	CAMERON, CONGO, CENTRAFRIQUE, GABON, TCHAD.	TERRITOIRE DE L'AEF (GABON EXCLU)	CAMEROUN, CONGO, CENTRAFRIQUE, GABON, TCHAD, GUINEE EQUATORIALE.	EX-ZAIRE, TCHAD, CENTRAFRIQUE.	CAMEROUN, CONGO, CENTRAFRIQUE, GABON, TCHAD, GUINEE EQUATORIALE, RWANDA, SAO TOME ET PRINCIPE, BRUNDI, CONGO, DEMOCRATIQUE, ANGOLA. (depuis février 1998)	CAMEROUN, CONGO, CENTRAFRIQUE, GABON, TCHAD, GUINEE, EQUATORIALE.
date of creation	CONVENTION of 7 DECEMEBRE 1959	charter of PORT-LAMY TCHAD MAI 1960	8 DECEMBRE 1964 (date d'entrée en vigueur du traité, le 1er janvier 1966, dissolution prononcée en février 1998)	1 1er AVRIL 1968-DECEMBRE 1975	18 DECEMBRE 1983	16 MARS 1994
RESULT	**REALIZATION**	**ABANDON**	**REALIZATION**	**ABANDON**	**REALIZATION**	**REALIZATION**

The following table summarizes the advantages and disadvantages of an optimal monetary zone: the case of the Central African Economic and Monetary Community (CEMAC).

Advantages	**Disadvantages**
- An economic and monetary union in Central Africa would allow for a more effective response to crises, as the CEMAC would have more reserves to ensure financial solidarity. An economic union in Central Africa would eliminate monetary, economic, and commercial barriers. - Preserve the monetary union in Central Africa and the monetary policy of the CEMAC, because fluctuations in the exchange rate caused fluctuations in the remuneration of production factors in the different countries of the CEMAC zone. - Fixed exchange rates are preferable to fixed exchange rates because they generate stability, reduce uncertainty, and promote solidarity among partners.	The instability of the euro is detrimental to the significance of the franc zone. Any devaluation creates new problems by increasing the cost of imports outside of the CEMAC. For debtor countries in the CEMAC, the aforementioned measures cause internal deflation, which is detrimental to development (reduction of credit, increase in the discount rate and required reserves in case of deficit). - Free transferability is a permissive condition for repatriating profits and tax evasion, which can lead to a diversion of savings. At the international level, maintaining a fixed exchange rate worsens the terms of trade (collapse of the price of

- The guarantee of full convertibility of the currencies of the CEMAC countries leads to monetary stability. It protects countries from capital flight. - A means of protection against currency fluctuations for cross-border trade. - Avoid the devaluation of currencies on foreign markets, as the CFA franc is not traded on the international foreign exchange market.; - Strengthen the influence of members within international organizations. - Give monetary support to regional integration. - Favorize the development of foreign trade by enabling the settlement of all balances. On the commercial side, maintaining a fixed exchange rate for the CFA franc has allowed France and Europe to access trade flows. A fixed exchange rate protects against the risk of international instability in exchange rates. The absence of exchange rate risk reduces uncertainty and certain economic inefficiencies related to forecasting errors. Thus, countries in the franc zone were able to focus on manipulating interest rates. . It is not only an instrument of domestic policy (fighting inflation and stimulating growth), but also an instrument of foreign policy (fighting capital flight). The main problem in this type of situation is the conflict of objectives that arises when it is also necessary to combat unemployment and eliminate external deficits. The strictness of monetary policy helps limit the risk of excessive internal inflation. - The credibility of the CFA franc allows for the borrowing of resources from abroad. The guaranteed transferability and stability promote the establishment of international banks that dominate production structures through financing structures, etc.	their main export products and depreciation of the euro or the US dollar) and the real appreciation of the CFA franc can lead to a decline in competitiveness in the tradable goods sector. - When the exchange rate is defined as an economic policy instrument, countries are forced to use other tools that, in principle, already serve other purposes. The guaranteed transferability and fixity promote the establishment of international banks, which leads to the transmission of inflationary trends accompanied by interest rate fluctuations. - Fighting imported inflation is difficult due to the freedom of trade.- Guaranteed transferability and fixity can cause the devaluation of a country's reserves in the event of a currency devaluation. - A country's economic imbalance in the CEMAC destabilizes the other member countries. - etc.

Source: author

XV- OUR DATA SOURCES

The observations used were collected from the World Bank from 1960 to 2022, except for Equatorial Guinea (1985). In our model, we considered the following variables to analyze the impact of monetary policy on economic growth in the CEMAC zone: These annual data are described and represented in the table below.

Exogenous variables			
Symbols	**Definitions**	**Monetary Units**	**Source**
X_1	Final consumption of public administrations	Franc CFA	World Bank
X_2	Final consumption of households	Franc CFA	World Bank
X_3	savings	Franc CFA	World Bank
X_4	Investment	Franc CFA	World Bank
X_5	Exportation	Franc CFA	World Bank
X_6	Importation	Franc CFA	World Bank
X_7	Total external debt	Franc CFA	World Bank
(P_2)	Population (15 to 64 years)		World Bank

In addition to these exogenous variables, we also considered endogenous variables.

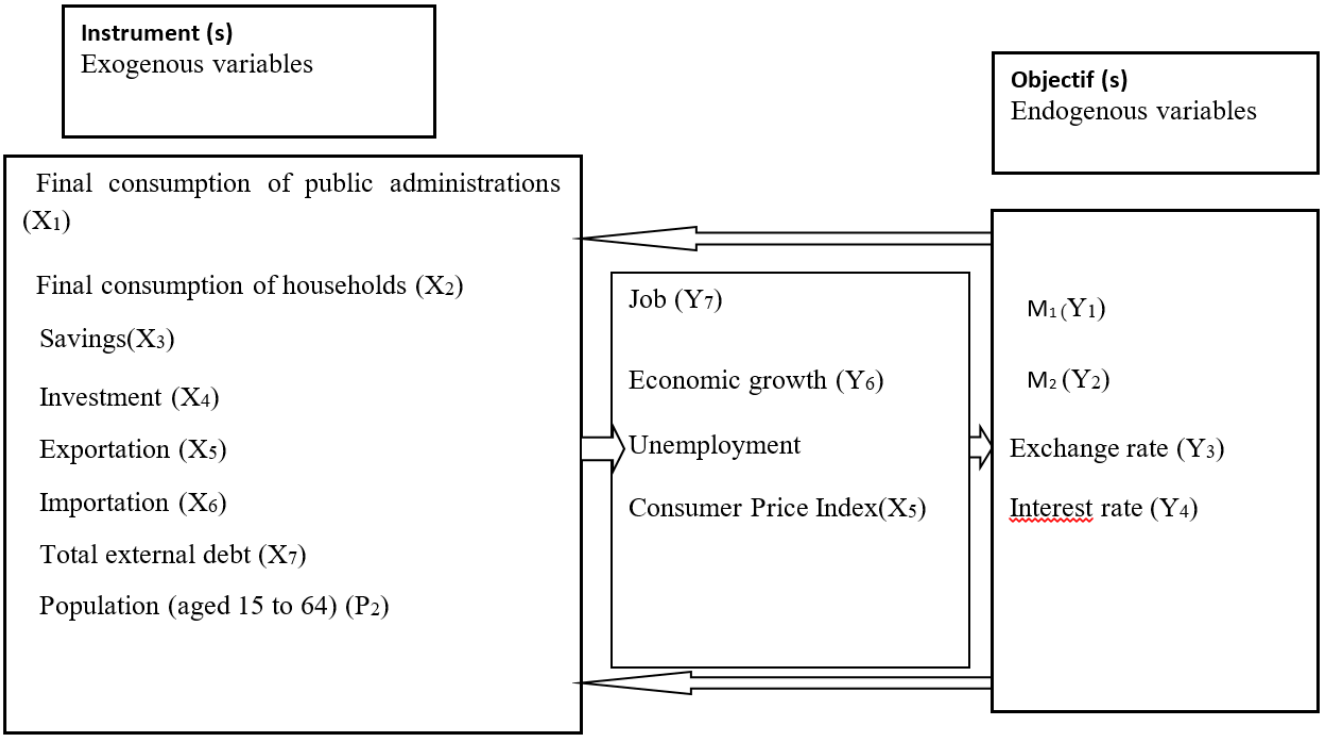
Endogenous variables			
Symbols	**Definition**	**Monetary Units**	**Source**
Y_1	M_1 Currency in the broad sense	Franc CFA	World Bank
Y_2	M_2 Money supply	Franc CFA	World Bank
Y_3	Real exchange rate	Franc CFA	World Bank
Y_4	Real interest rate	Franc CFA	World Bank
Y_5	Consumer price index	Franc CFA	World Bank
Y_6	GDP	Franc CFA	World Bank
(Y_7)	Job		CNUCED

After determining the integration order of the variables, one can use the Johansen cointegration test. To do so, we must estimate the VAR of the following equation:

XVI- ECONOMETRIC ANALYSIS OF THE EFFECT OF MONETARY POLICY ON ECONOMIC GROWTH

Our model aims to determine whether monetary policy leads to economic growth. To do so, we will select some endogenous and exogenous variables, and then we will perform a test to determine the degree of relationship between these variables. This test will allow us to perform a unit root test. Then, we will see if these variables are integrated with each other. To do so, we will use cointegration models. The effect of a confirmed two-stage cointegration relationship (rank two) according to the Johansen method will allow us to determine the long-term reciprocal influence of the studied variables on each other.

The figure below (source: author) shows the effects of monetary policy objectives on exogenous variables, and then on employment, economic growth, and the consumer price index.



All of the models used in our study are linear regression models, whose coefficients are estimated using the ordinary least squares method. We transformed them into six equations.

$$:Y_1 = c(1) + c(2)X_1 + c(3)X_2 + c(4)X_3 + c(5)X_4 + c(6)X_5 + c(7)X_6 + c(8)Y_6 + c(9)Y_7 \quad (1)$$

$$Y_2 = c(1) + c(2)X_1 + c(3)X_2 + c(4)X_3 + c(5)X_4 + c(6)X_5 + c(7)X_6 + c(8)Y_6 + c(9)Y_7 \quad (2)$$

$$Y_3 = c(1) + c(2)X_5 + c(3)X_6 + c(4)X_7 + c(5)Y_6 + c(6)Y_7 \quad (3)$$

$$Y_4 = c(1) + c(2)X_3 + c(3)X_4 + c(4)Y_6 + c(5)X_7 \quad (4)$$

$$Y_5 = c(1) + c(2)X_1 + c(3)X_2 + c(4)X_3 + c(5)X_4 + c(6)X_5 + c(7)X_6 + c(8)Y_6 + c(9)Y_7 \quad (5)$$

$$X_7 = c(1) + c(2)X_4 + c(3)X_5 + c(4)Y_5 + c(5)Y_6 + c(6)Y_7 \quad (6)$$

XVII- JOHANSEN'S CO-INTEGRATION METHOD

Once the order of integration of the variables has been determined, the Johansen cointegration[8] test can be used. To do so, we must estimate the VAR of the following equation:

$$\Delta X_t = \mu + \sum_{i=1}^{p} \Gamma_i \Delta X_{t-k} + \Pi X_{t-k} + v_t \quad (2)$$

X_t is a matrix of dimension $n * \rho$, and μ is a vector of constants.

The Π and Γ_i represent the coefficients of the matrices. The ΔX_{t-k} corresponds to a correction in the case of autocorrelated residuals. The K designates the length of the delay. The v_t is the independent and identically distributed error term with a mean of zero and constant variance.

The rank of the Π matrix determines the number of co-integration relationships.

If the rank Π is equal to 0, the variables are all integrated of order 1, and there is no cointegration relationship.

If the rank of the matrix Π is n, then it is of full rank. All the variables are of order 0.

If the rank of the matrix is $n-r$, we use the maximum likelihood estimator to obtain two likelihood ratios with which we will determine the unique co-integration vector X_t. To do so, two tests are used.

[8] Johansen.S (1988) "Statistical Analysis of Cointegration Vectors' Journal of Economic Dynamics and Control p :12, 231, 24

The first test is a statistic called the trace, which allows us to test the hypothesis that the rank of Π is less than or equal to n (the number of cointegration vectors), as presented below. $\lambda tracer(r) = -T\sum_{i=r+1}^{n}\ln(1-\lambda_i)$ (3)

λ_i are the eigenvalues, T is the number of observations, and n is the number of variables.

The second test is defined as the maximum of the eigenvalue, and the hypothesis states that there are exactly r vectors of cointegration in X_t. It follows:

$\lambda \max(r+1) = -T\ln(1-\lambda_r)$ (4)

The critical values of the two tests are presented in the Johansen and Juselius[9] (1990) article.

The third step is to perform the Granger causality test to determine the direction of causality between the studied variables. Our goal is to use the Granger causality test to quantify the relationship between the studied variables in both directions.

XVIII- CAUSALITY ANALYSIS

Granger's causality analysis allows us to understand how one variable can be explained by another. According to Granger[10] (1980), a variable causes another if and only if the present and past values of the second variable allow for a better prediction of the first variable's values. According to Hairault.J.O[11] (1995), Granger's causality analysis highlights the interactions between variables. A variable is said to be caused by another in the Granger sense if the delayed values of the latter help predict the former.

To do so, we must test the hypothesis that variable causes variable Y, and vice versa. We use the $F-Statistic$ test to do this. A high F level means that the non-causality hypothesis has been rejected, confirming the presence of a causal effect. The F test is associated with a probability that allows us to measure the tolerance threshold for error in interpreting the test.

This probability must be less than 5%. If we find a cointegration relationship, we can conclude that there is at least one causal relationship between our variables. We can then perform causality tests to define the relationship between the variables.

XVIII-1-LONG-TERM MODEL ESTIMATION

This first equation expresses the degree of relationship between M_1 and the exogenous variables of the model.

$$Y_1 = -0,0261X_1 + 1,532X_2 + 0,090X_3 - 0,096X_4 - 0,086X_5 + 0,085X_6 + 0,006Y_6 + 22,746Y_7 - 0,444$$
$$= (-0,177)\quad (0,765)\quad (0,334)\quad (-0,339)\quad (-0,328)\quad (0,302)\quad (0,131)\quad (0,261)\quad (-0,187)$$

This equation tells us that the R^2_{12} $(R^2 = 0,051)$ coefficient of determination is positive. This means that there is a strong correlation between the dependent variables and the selected explanatory variable.

M_1 degree of relationship is positive with final consumption of households, savings, imports, employment, and economic growth, and negative with the other variables.

For their part, the Durbin and Watson[13] (DW) $DW = 2,221$ [14]are raised to allow for the hypothesis of the absence of autocorrelation of the residuals, which is an essential point in the context of data analysis.

The second equation gives us the degree of relationship between M_2 and the exogenous variables of the model.

$$Y_2 = -6,877X_1 - 11,206X_2 - 1,260X_3 + 1,725X_4 + 1,676X_5 - 1,420X_6 + 0,098Y_6 - 745,895Y_7 + 26,069$$
$$= (-0,381)\quad (-0,455)\quad (-0,380)\quad (0,495)\quad (0,515)\quad (-0,408)\quad (0,159)\quad (-0,698)\quad (0,895)$$

[9] Johansen.S, and Juselius. K (1988) "Hypothesis Testing for Cointegration Vectors with an Application to the demand for money in Denmark and Finland p.

[10] Granger, C.W.J (1969) "Investigating Causal Relations by Econometric Models and Cross Spectral Methods " Econometrica p 37-424-459

[11] Hairault J.O (1995) "Presentation and evaluation of the real business cycles approach " Springer p: 21-54

[12] It measures the percentage of variations that are actually explained by the considered exogenous variables. Its value is always between 0 and 1: the closer it is to 1, the better the correlation.

[13] The Durbin-Watson test detects the presence or absence of first-order autocorrelation of the residuals.

[14] The Durbin-Watson statistic takes on values that vary within the interval $[0,4]$

This identity reveals that the $(R^2 = 0,162)$ coefficient of determination is positive. This indicates a strong relationship between the dependent variables and the selected explanatory variable.

The degree of M_2's relationship with investment is high. It is also high with exports and economic growth. The degree of relationship of M_2 is negative with the other variables.

The $(DW = 1,640)$ is positive, which leads us to accept the hypothesis of the absence of autocorrelation of the residuals and thus confirm the previous hypothesis.

The third identity represents the degree of relationship between the exchange rate Y_3 and the exogenous variables (import, export, employment, total external debt, and economic growth) of the model.

$$Y_3 = -0,466X_5 + 1,624X_6 + 135,912X_7 + 1,707Y_6 + 5135,183Y_7 + 95,968$$
$$= (-0,399) \quad (1,554) \quad (3,567) \quad (0,882) \quad (1,393) \quad (1,233)$$

This equality indicates that the determination coefficient $(R^2 = 0,682)$ is positive. This means that there is a strong correlation between the dependent variables and the selected explanatory variable.

Y_3's degree of relationship is high with importation, total external debt, employment, and economic growth, but negative with exportation.

The $(DW = 0,954)$ is high. This allows us to consider the possibility that the residuals are not autocorrelated.

The fourth equation shows the degree of relationship between the real interest rate Y_4 and the exogenous variables (savings, investment, and economic growth) of the model.

$$Y_4 = -0,142X_3 + 0,024X_4 - 0,160Y_6 + 3,694X_7 + 8,729$$
$$= (-0,859) \quad (0,119) \quad (-0,601) \quad (0,657) \quad (1,437)$$

This equation indicates that the $(R^2 = 0,079)$ coefficient remains high. This means that there is a strong correlation between the dependent variables and the selected explanatory variable.

The degree of relationship between Y_4 is positive with investment and economic growth. However, it is negative with the other variables.

Concerning the $(DW = 1,879)$, it is positive and accepts the hypothesis of the absence of autocorrelation of the residuals.

The fifth equation shows the degree of relationship between the price increase Y_5 and the exogenous variables of the model.

$$Y_5 = -13,614X_1 - 3,117X_2 + 1,491X_3 - 1,205X_4 - 1,379X_5 + 1,359X_6 + 0,344Y_6 - 382,111Y_7 + 10,621$$
$$= (-1,276) \quad (-0,237) \quad (0,841) \quad (-0,646) \quad (-0,793) \quad (0,730) \quad (0,983) \quad (-0,506) \quad (0,475)$$

This equality indicates that the $(R^2 = 0,079)$ coefficient of determination is positive. This indicates that there is a strong relationship between the dependent variable and the selected explanatory variable.

The relationship between Y_5 is positive with savings, imports, and economic growth; conversely, it is negatively correlated with the other variables.

Regarding the $(DW = 1,574)$ test, the result is positive, which allows us to accept the hypothesis of the absence of autocorrelation of the residuals.

The sixth equality represents the degree of relationship between the total external debt X_7 and the investment, exportation, importation, price, economic growth, and employment variables of the model.

$$X_7 = 0,051X_4 + 0,008X_5 - 0,028X_6 + 0,003Y_5 - 0,006Y_6 - 18,262Y_7 + 1,249$$
$$= (3,146) \quad (1,500) \quad (-2,727) \quad (0,428) \quad (-0,719) \quad (-0,770) \quad (2,589)$$

The sixth equation shows that the $(R^2 = 0,436)$ -squared coefficient remains high. This indicates a strong correlation between the dependent variables and the selected explanatory variable.

The relationship between X_7 and investment, exportation, and price is high, and negative with the other variables.

This equation has a positive $(DW = 1,641)$, which allows us to accept the hypothesis of the absence of autocorrelation of the residuals.

Our econometric results show that, in the six (6), the Darbin-Watson (DW) and R^2 are positive, and the degrees of relationship between the variables M_1, Y_5, Y_4, and Y_3, on the one hand, and the other variables, on the other hand, are positive, while the degrees of relationship between the variables M_2 and X_7, on the one hand, and the other variables, on the other hand, are negative.

XIX- DISCUSSIONS

For the past thirty years, the countries of the CEMAC have sought to maintain sustainable growth and reduce mass unemployment. Despite the statistical data, we tried to verify this fundamental relationship ourselves, given the ambiguity of the results obtained. Indeed, the method used revealed the type of relationship indirectly for certain CEMAC countries. In most cases, we found that our results were plausible.

However, this correlation does not manifest regularly from one year to the next, and it is difficult to explain the relationship between the monetary zone and economic growth.

We compared it to other monetary zones, such as the West African Economic and Monetary Union (WAEMU), which have integrated convergence criteria into their monetary union. Another example is the European Union, which has emphasized the importance of adhering to these criteria (the budget deficit should not exceed 3% of GDP).

Although the countries of the CEMAC did not take into account these convergence criteria (public deficit, taxation, etc.), other factors encourage strengthening the CEMAC's integration through other forms of integration, particularly social integration, to expand its domestic market, mobilize financial resources, develop its industry, and protect its biodiversity, which are necessary to carry out its integration projects. These factors are vectors of the evolution of the CEMAC.

For example, social integration has produced extraordinary results with ALBA (Bolivarian Alternative for the Americas). This is a form of cooperation in which a country with human resource deficits and natural resources trades with another country with human resources in a particular field (the example of Venezuela, which is rich in oil, and Cuba, which has a strong medical system).

The CEMAC must also integrate or correct the economic growth method by taking the following recommendations into account:

XX- CONCLUSION

In this study, we presented the importance of theories of monetary zones and economic growth. Our central idea was to determine whether the creation of an optimal monetary zone could promote economic growth in a heterogeneous region like the CEMAC. The constant pursuit of growth and economic and monetary integration is crucial for the development of the CEMAC because it contributes to strengthening trade, savings, investments, etc., and economic growth.

. Furthermore, implementing a common monetary policy with a stable currency and harmonized fixed exchange rates within the CEMAC would strengthen integration efforts and economic growth in the region. However, our empirical results show that this relationship remains contradictory due to the lack of regular time series for certain countries (Chad, Central African Republic, etc.). However, the correlation between the monetary zone and economic growth is confirmed for Cameroon, Gabon, and Equatorial Guinea. Indeed, our studies are compatible with our theoretical model. It should be noted that this relationship (its existence or nonexistence, as well as its theoretical significance) is central not only to debates on the theories of monetary zones, past and present, but also, and especially, to discussions on economic policies of any government concerned with the benefits of economic growth.

Africa's own experience with monetary integration has not been a resounding success, but it has had positive aspects. For example, Clément argues that since its creation nearly 50 years ago, the CFA franc zone has served its members well, who have enjoyed a long period of moderate inflation and sustained economic growth until the mid-1980s.

Their economic growth was sustained. The fact that the CFA zone subsequently experienced difficulties proves that, even if the arrangements encountered some problems, important lessons can be learned about the path to monetary integration, even among poor countries that export primary products and have non-differentiated economic structures.

In their study, Bénassy-Quéré and Coeurpet (2005) “On the Adequacy of Monetary Arrangements in Sub-Saharan Africa “ examined the similarity of six criteria for an optimal currency area and concluded that the CFA franc zone was not an Optimal Monetary Zone for sub-Saharan Africa. They came to the following conclusion:The franc CFA zone would then be reduced to the CEMAC. It appears that the current zone franc CFA cannot be considered an optimal monetary zone, as the countries of the CEMAC and UEMOA do not belong to the same groups, and an "inner core" of the UEMOA can be defined on economic bases.

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