



ISSN: 2230-9926

Available online at <http://www.journalijdr.com>

IJDR

International Journal of Development Research
Vol. 10, Issue, 01, pp. 33215-33223, January, 2020



RESEARCH ARTICLE

OPEN ACCESS

DUALITY IN CYCLICAL TRENDS IN THE WEST AFRICAN CFA FRANC ZONE BETWEEN 1970 AND 2007

***Dr. Anna SESS ADIABOUAH**

Department of Economics, University Felix Houphouët-Boigny, Abidjan, Côte d'Ivoire

ARTICLE INFO

Article History:

Received 02nd October, 2019
Received in revised form
17th November, 2019
Accepted 26th December, 2019
Published online 29th January, 2020

Key Words:

West African Economic and Monetary Union, CFA FRANC, Common cycle, short and long cyclical components.

*Corresponding author:

Dr. Anna SESS ADIABOUAH

ABSTRACT

The purpose of this study is to verify if the West African Economic and Monetary Union can be identified as a becoming optimum monetary area in terms of existing synchronization of national economic cycles, as it known that their single currency rather belongs to an economic arrangement created during colonization. This paper provides the identification of a common cycle of the west African CFA Franczone, expressed as either an aggregate national cycle or a common cycle coming out of a multivariate analysis of the cycle. The analysis reveals that Côte d'Ivoire, which has the highest economic weight in the region, contributes mostly to the common cycle of the west African CFA Franczone. Therefore, we notice a co-movement phenomenon of short and long national cycles. An average conformity between the national cycles and the common cycle is to be pointed out.

Copyright © 2020, Dr. Anna SESS ADIABOUAH. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Dr. Anna SESS ADIABOUAH. 2020. "Duality in cyclical trends in the West African CFA franc zone between 1970 and 2007", *International Journal of Development Research*, 10, (01), 33215-33223.

INTRODUCTION

The implementation of the monetary union contributes in a significant way to the economic and social development of the member countries. That is why African countries of the CFA Franc zone, which belonged to an economic arrangement created during colonization, chose to be bifurcated into two monetary unions. As a result, the Western African countries in the CFA Franc zone created on January 10th 1994 the West African Economic and Monetary Union (WAEMU), to better ensure its benefits and to answer to the imperatives born after the economic crisis faced by the members countries at the end of the 1980s and in the beginning of the decade of the 1990. Mundell (1961) pointed out that a currency area is deemed optimal based on the degree of cyclical convergence of the countries within the union. If a synchronization of cycles and a convergence of cycles especially after the creation of the WAEMU is observed, the WAEMU could be considered as a becoming efficient currency area. In this regard, our study uses the annual GDP series of the WAEMU member countries. A modified version of the widely used Hodrick-Prescott (King and Rebelo (1999), Stock and Watson (1999), Ramadorai (2012), Madeira (2014)) is applied on series from 1967 to

2010. And, we focus on result from 1970 to 2007 in order to reduce the border distortion as criticized by authors such as De Jong and Sakarya (2016). Despite the imperfections of this common market, we observe a co-movement of the short term and long term cycles. The remainder of the paper is organized as follows. The second section is concerned with data and a brief review of the methodological framework. The third section provides an univariate analysis of the cycle in the west African CFA Franczone. The fourth section presents a multivariate analysis of the cycle in the west African CFA Franczone, which is a means to look for the common cycle of the west African CFA Franczone. The national cycle, the aggregate cycle and the common cycle are the conjunction of short and long cyclical components. This cyclical duality is taken account in the fifth section. The last section gives conclusions.

DATA AND METHODS

This study focuses on series of annual GDP of the member countries of the WAEMU: Benin, Burkina-Faso, Côte d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo. Our analysis concerns a time period between colonization's end and recent

economic crisis in Côte d'Ivoire: 1970 to 2007. Instead of using the ARIMA projection, we used series from 1967 to 2010 and focus on result from 1970 to 2007 in order to reduce the border distortion as criticized by authors such as De Jong and Sakarya (2016). Data are in current international dollars and are extracted from the World Development Indicators (WDI) database (World Bank database). Considering the type of study to be done and the length of data, it is preferable to limit ourselves to the general cycles of Juglar (long term cycle) and Kitchin (short term cycle). As suggested by Bentoglio et al (2002), we can consider a global cycle, which would be the sum of the short-term cycle and the long-term cycle. The global cycle as a result has a periodicity ranging from 1 to 10 years. Among the common procedures used to estimate the cycles, Iacobucci and Noullez (2005) showed that the Hodrick-Prescott (HP) filter extracts a cyclical component of equivalent duration without modifying the smoothing period. Furthermore, studies as in Barell and Sefton (1995), uncovered that the chronology of the turning points were marginally modified by the method used, and this is one of the key aspects of the cycle we analyze in our study of the west African CFA Franczone. Thus, this paper stands on outputs given by univariate and multivariate unobserved components structural time series model based on a modified version of the Hodrick-Prescott filter (1997). The univariate filter allows to extract the national cycles of the member countries. We aggregate the national cycles in order to get back to the cycle of the west African CFA Franczone as the aggregate cycle. The multivariate filter is used to look for the cycle of the west African CFA Franczone as the common cycle. The national cycle, the aggregate cycle and the common cycle are the conjunction of short and long cyclical components.

The univariate analysis of the cycle: We suggest a modified version of the HP filter (HPmod). First, the objective of reducing the effects of the growth rates fluctuation reflected by the trend component is reached when minimizing the gap between the value of the trend at time t and the second order average around that value.

This cut-off frequency occurs where the gain function is equal to 0.5. For quarterly data, $\Delta t = 1/4$ and $\varpi = 1/10$, thus the HP filter has a smoothing parameter $\lambda_{HP} = [2\sin(\pi\varpi\Delta t)]^{-4} = 1600$ (Iacobucci and Noullez (2005)). The filter HPmod that shares a common frequency limit with the HP filter (we consider the equality of gain functions when located at that common frequency) has a smoothing parameter $\lambda = 64.645$. For annual data, $\Delta t = 1$ and the equivalent HPmod filter has a smoothing parameter $\lambda = [2\sin(\pi\varpi\Delta t)]^{-4} = 0.27693$. Finally, to improve the estimate at the end periods, the filter is applied to the series (free of the irregular component) extended from 1967 to 2010. To better evaluate the relevance of a study about a shared cycle among members of the west African CFA Franczone, it is essential to verify that the analysis of the national cycles reveals noticeable similarities. The HPmod filter is thus applied to the logarithm of the selected countries GDP to obtain the extraction of the global cycle. Côte d'Ivoire and Senegal represent the largest share in the GDP of the west African CFA Franczone (each country had respectively 39.78% and 18.854% from 1970 to 2007). Guinea Bissau was excluded from this study for two reasons: its very low contribution to the west African CFA Franczone (0.626% in 2007, 0.792% from 1970 to 2007) and a weak correlation between its cycle and the one of each member state. Thus, when commonly referring to the west African CFA Franczone (called WAEMU since 1994) one should consider this monetary union without Guinea Bissau. If one considers as countries of reference the countries with the strongest GDP in the currency area (CIV and SEN), then we can identify two groups: those with a strong correlation with the country of reference and those with a weak correlation with the country of reference (Table 1). Regardless of the country of reference, we can distinguish a group of countries strongly correlated to CIV: CIV, BEN, BFA, NER, TGO and a group of countries strongly correlated to SEN: MLI, SEN. The national cycles of the different countries are shown in Figure 1.

Table 1. Correlation matrix of the national cycles

	BEN	BFA	CIV	GNB	MLI	NER	SEN	TGO
BEN	1.000000	0.639395	0.744807	-0.082437	0.584016	0.872134	0.692728	0.639395
BFA	0.639395	1.000000	0.862111	0.229718	0.770448	0.747931	0.734008	1.000000
CIV	0.744807	0.862111	1.000000	0.097285	0.661442	0.852899	0.680638	0.862111
GNB	-0.082437	0.229718	0.097285	1.000000	0.055025	0.023555	0.050735	0.229718
MLI	0.584016	0.770448	0.661442	0.055025	1.000000	0.680181	0.835554	0.770448
NER	0.872134	0.747931	0.852899	0.023555	0.680181	1.000000	0.793708	0.747931
SEN	0.692728	0.734008	0.680638	0.050735	0.835554	0.793708	1.000000	0.734008
TGO	0.639395	1.000000	0.862111	0.229718	0.770448	0.747931	0.734008	1.000000

The filter uses a longer moving average, which takes best into account the structure of the series and gives a stronger estimate of the turning points. Then, we identify a new smoothing parameter. We consider the frequency limit ϖ associated to a period of 10 years as the frequency of separation between the trend and the residual component.

The cycles' durations seem overall similar. All cycles reveal a trough around 1984, 1994 and 2001, followed by a strong and rapid growth. These fluctuations match with the creation of the WAEMU within the CFA zone and the implementation of different budgetary and monetary policies. In general, the growth rate of the cycle decreases in the first part of the 1980s, and later in the 1990s.

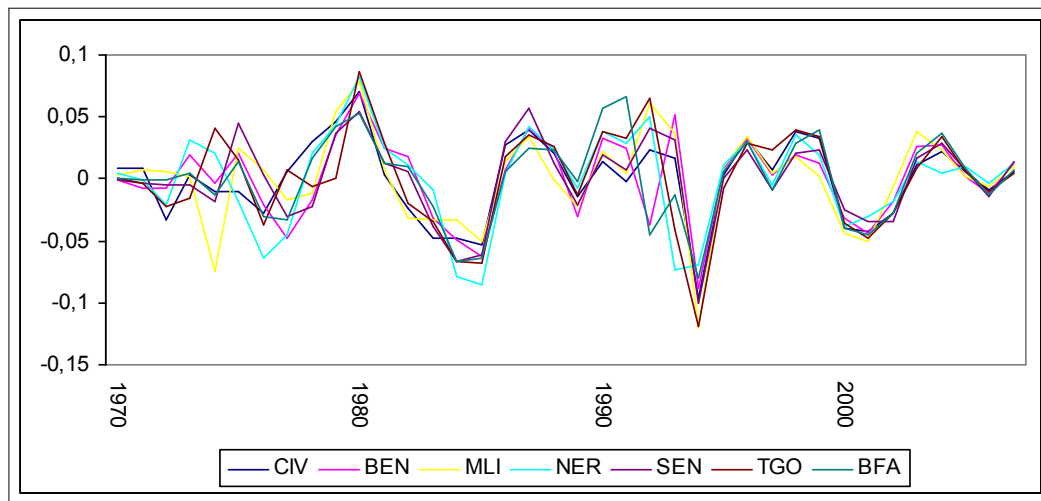


Figure 1. National cycles

Table 2. National cycles contribution to the aggregate cycle

	BEN	BF	CIV	ML	NER	SEN	TGO	UEMOA
Country's weight (%)	7,782	10,257	39,800	9,548	8,350	18,854	5,092	100
Correlation with the aggregate cycle	0,872	0,854	0,876	0,819	0,928	0,879	0,854	1
Volatility relatively to the aggregate cycle	1,197	1,096	1,066	1,230	1,076	1,263	1,096	1
Conformity with the aggregate cycle	1,044	0,936	0,934	1,007	0,999	1,110	0,936	1
Contribution to the aggregate cycle (%)	8,241	9,741	37,718	9,756	8,464	21,244	4,836	100

Table 3. Coefficient α_i associated to the common cycle

	BEN	BFA	CIV	MLI	NER	SEN	TGO
Coefficient	1,078164	1,707606	1	0,999289	1,084374	1,056685	0,948366

Table 4. National cycles contribution to the common cycle

	BEN	BFA	CIV	ML	NER	SEN	TGO	UEMOA
Country's weight (%)	7,782	10,257	39,800	9,548	8,350	18,854	5,092	100
Correlation with the common cycle	0,817	0,869	0,852	0,784	0,879	0,819	0,869	1
Volatility relatively to the common cycle	0,747	0,684	0,665	0,768	0,672	0,788	0,684	1
Conformity with the Common cycle	0,610	0,594	0,567	0,602	0,591	0,646	0,594	1
Contribution to the common cycle (%)	8,009	10,282	38,057	9,695	8,319	20,534	5,104	100

Table 5. Coefficient α_i associated to the short common cycle

	BEN	BFA	CIV	MLI	NER	SEN	TGO
Coefficient	0,859493	0,696629	1	1,067662	0,848421	0,992653	1,041312

These two time periods correspond to periods of economic crisis. To face the consequences of these economic crises, the WAEMU was created on January 10th, 1994 by the West African Presidents and Head of Governments having in common the CFA Franc. Its creation subsequently led to the adoption of different economic policies to increase growth rate for all the countries (on January 28th, 1999: a common industrial policy, on December 8th, 1999: a Convergence, Stability, Growth and Solidarity Pact). When looking at Figure 1, we would be tempted to talk about a synchronization of cycles.

From the national cycles, it is possible to determine an average cycle by assigning a weight to each country. The weight b_i represents the share of GDP of country i in the GDP of the group over the period considered. The aggregate cycle of the west African CFA Franczone is equal to the average national cycles weighted by the GDP weights: \bar{C} (figure 2). We can thus calculate the contribution of the national cycle to the volatility of the aggregate cycle:

$$\beta_i = b_i * \varphi_i .$$

The coefficient φ_i represents the index of conformity between the cycle of country i and the aggregate cycle of the west African CFA Franczone :

$$\varphi_i = \text{corr}(C_i, \bar{C}) * \sigma(C_i) / \sigma(\bar{C})$$

The ratio between the standard deviations $\sigma(C_i)$ and $\sigma(\bar{C})$ measures the volatility of the national cycle relatively to the aggregate cycle. The coefficient β_i takes into account the weight of country i within the group, which makes it independent of the order in which the countries are listed in the model space-state. For a better interpretation, this contribution to the cycle of the monetary union is evaluated in percentage:

$$\beta_i (\%) = 100 * \beta_i / \sum_{j=1}^7 \beta_j .$$

Table 2 summarizes the results. When the national cycle is perfectly conform to the aggregate cycle of the west African CFA Franczone, the index of conformity is equal to « 1 ». However, to avoid erroneous interpretations, it should be noted that the converse is not true. Indeed, the index of conformity can be high if the national cycle is poorly correlated to the monetary union cycle and if there is a strong relative volatility. As a result, it is important to fully analyze the table before any interpretation. The index of conformity is the product of a strong correlation with the monetary union cycle by a relative volatility sensibly comparable. A synchronization exists between the national cycles and the aggregate cycle exists. As we could expect, the contributions of CIV and SEN cycles are the highest. (Respectively: 37.718 and 21.244), but the volatilities of SEN, MLI and BEN are more pronounced (much higher than the unit). These three countries amplify the fluctuations of the monetary union cycle. This fact attests that the monetary zone is not optimal. It becomes then necessary to apply some measures in order to attenuate the cyclical volatility of these countries, in order to guarantee a stable aggregate cycle of the west African CFA Franczone. The

values of the contribution to the aggregated cycle highlight two groups: - CIV and SEN, and – the other countries. The gap between these two groups is very important. As a result, these two countries make decision regarding the evolution of the cyclical fluctuation in this monetary union.

The multivariate analysis of the cycle: the common cycle:
The multivariate version of the HPmod filter is inspired in part from the multivariate HP filter (HPMV) used by Lemoine and Pelgrin (2003). These authors offered a HPMV filter that incorporates one economic information in the optimization program more generally (Laxton and Tetlow (1992)), while decomposing a time series into a trend and a cycle by simultaneously minimizing the cycle variance and the trend's degree of smoothness. The minimization program includes residual from the economic equations, linking the production gap to other economic variables. Their objective is thus to decompose only one series considering the economic information. Our objective however is different; we suggest a multivariate version of the HPmod filter of the same type, but we simultaneously decompose a set of macroeconomic series in order to extract the common cycle. The program of minimization of the multi HPmod filter is an extension of the optimization of the HPmod filter in which a minimization of the irregular component contained in the macroeconomic series is integrated. When taking into account the irregular component in the optimization program it becomes possible to establish a link between the common cycle and the macroeconomic cycle. The smoothing parameter establishes a relationship between the growth rate of the trend and the common cycle. The shift to the space-state model permits to estimate jointly the other variables not observed and the parameters (Estimations are made using the Kalman's filter).

The multivariate HPmod filter is applied to 7 series of GDP of the WAEMU member countries. The series of CIV, BEN, BFA, MLI, NER, SEN and TGO are named respectively Y_1, Y_2, \dots, Y_7 . over the period of 1970 to 2007; the series $Y_{i,t}$ ($1, \dots, 7$) are broken down each in a trend $X_{i,t}$, a cyclical component $\alpha_i C_t$ and an irregular component $u_{i,t}$. These series share a common cycle C_t to which a specific weight is associated.

$$Y_{1,t} = X_{1,t} + \alpha_1 C_t \text{ where } \alpha_1 = 1$$

$$Y_{i,t} = X_{i,t} + \alpha_i C_t + u_{i,t}, \text{ for } i = 2, \dots, 7$$

$$\text{knowing that } C_{i,t} = \alpha_i C_t + u_{i,t}$$

In order to determine the common component to the entire monetary zone, a weighted average is constructed using individual weight for each country (table 3). The final common cycle obtained describes the state of the economy of the west African CFA Franczone over time. To avoid all errors of analysis related to the order in which countries are listed in the space-state model, we analyze the conformity of the national cycle with the common cycle, as described in the previous section (Table 4). Figure 3 shows that the common cycle and the one obtained from the aggregation of the national cycles are quite close. This observation is confirmed by the coefficient of correlation equals 0.932. However, the common cycle is attenuated when assimilated to the aggregate cycle whose amplitude is smaller.



Figure 2. Aggregate cycle

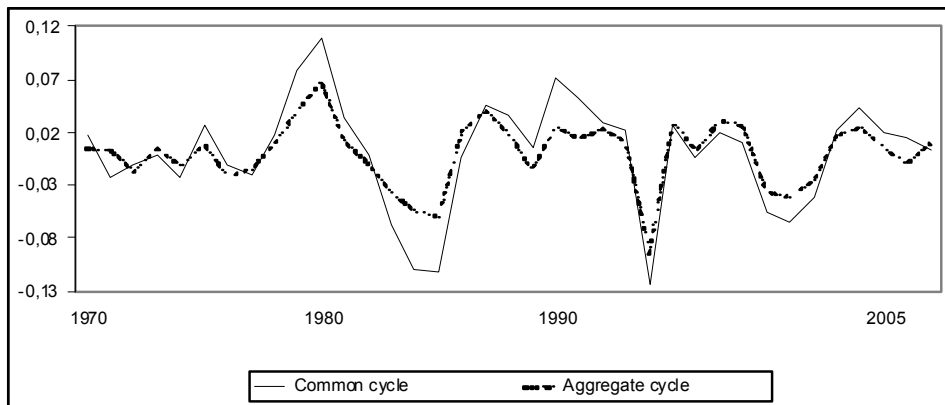


Figure 3. Common cycle and aggregate cycle

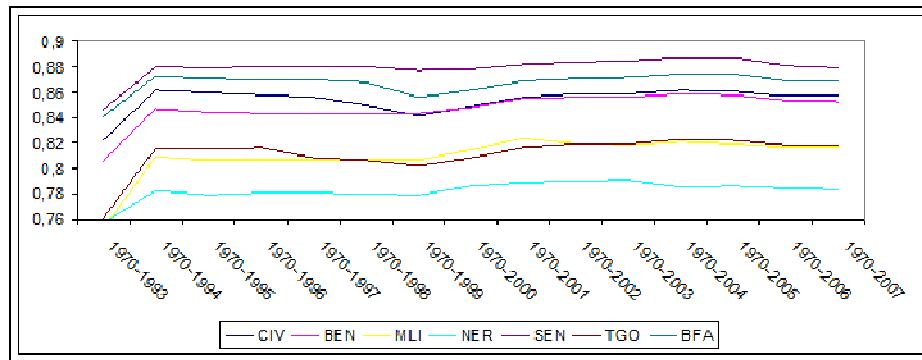


Figure 4. Evolution of the coefficients of correlation

Table 6. Contribution of the short national cycle to the short common cycle

	BEN	BFA	CIV	ML	NER	SEN	TGO
Country's weight (%)	7,782	10,257	39,800	9,548	8,350	18,854	5,092
Correlation with the Common cycle	0,845	0,800	0,880	0,811	0,748	0,897	0,804
Student statistic	10,487	8,839	12,292	9,198	7,468	13,491	8,958
Volatility relatively to the common cycle	0,416	0,396	0,380	0,515	0,443	0,448	0,479
Conformity with the common cycle	0,352	0,317	0,334	0,418	0,331	0,402	0,385
Contribution to the Common cycle (%)	7,694	9,135	37,375	11,205	7,765	21,319	5,506

It would be interesting to see if we can obtain the same results as in the previous section; however, there is no guaranty, since the multivariate approach gives more information. In fact the multivariate model considers separately the contribution of the common cycle from the cycle specific to each country. The cycle specific to each country i is the one obtained when the univariate HP mod filter is applied to the series $Y_{i,t}$ without $\alpha_i C_i$. As opposed to the conclusions drawn from the aggregation of the national cycles, the volatilities are inferior to the unit. The different countries attenuated the fluctuations of the group in various ways (volatility between 0.672 and 0.788). Even if the countries exhibit a strong correlation with the common cycle, the attenuation of the volatility creates a decrease in the conformity of same order. Such difference in results is related to the fact that the monetary union aggregated cycle comes from the aggregation of national cycles which contain the cycles specific to the countries. The common cycle seems to play a minor role in the constitution of the national cycles of these west African countries by contrast with the results we anticipated from the aggregate cycle: the degree of conformity goes from the unit to 0.7 on average. This result shows that 30% of the variance of the GDP growth rate in the CFA zone is explained by the idiosyncratic component (component specific to each country). It shows that common macroeconomic and budgetary policies must be reinforced, along with the interregional exchanges. Similarly to the findings on the aggregated cycles, the national cycles are strongly correlated to the cycle of the GDP. These results show a global similarity with the cyclical fluctuations within the west African CFA Franczone.

13 data), to enable us to conduct a pertinent study. Therefore, we focus on a graphic analysis of the common cycle (figure 3). In fact, the level of commercial exchange among countries of the WAEMU is quite low, about 17% of total commercial exchange of the WAEMU in 2004 against 8.5% in 1994. The primary partners in exports are the developed countries. Furthermore, the main goods exported by almost all these countries are agricultural products such as cocoa, cotton and coffee, which are marked by a high volatility in the terms of exchange. These shocks have variable effects based on the nature of the goods exported, which can then affect the synchronization of the economic fluctuations of these different countries. The trough of 1975, 1980, and 1990 occur at the time of a recession in the industrialized country partners, beginning with the crisis of 1980-1982 (oil shock) and 1990. In the 80's the price of commodities exported by the members countries fell down dramatically with the depreciation of the dollar, currency in which the products were valued in the stock market. The second major decrease in the growth appears between 1990 and 1994 where the terms of trade declined by 45% for these countries taken together, leading to a huge decrease in the revenues from exports. In this unfavorable economic environment, the Bretton Woods institutions advised in 1993 a monetary adjustment. The devaluation of the CFA Franc is decided in 1994 and the inflation limited the recovery in the early 1994. In 1998, the growth is interrupted until 2000. Early in the years 2000, the countries of the WAEMU, recorded an economic growth better controlled despite the contrasted fluctuations, related among other things to the economic crisis of CIV, whose intra-regional economic weight is very high.

Table 7. Contribution of the long national cycle to the long common

	BEN	BFA	CIV	MLI	NER	SEN	TGO	UEMOA
Country's weight (%)	7,782	10,257	39,800	9,548	8,350	18,854	5,092	100
Correlation with the Common cycle	0,722	0,804	0,741	0,710	0,707	0,744	0,715	1
Volatility relatively to the common cycle	0,809	0,876	0,839	0,871	0,985	0,792	0,982	1
Conformity with common cycle	0,584	0,705	0,622	0,619	0,696	0,589	0,702	1
Contribution to the common cycle (%)	7,223	11,482	39,340	9,384	9,239	17,649	5,683	100

The values of the different contributions to the common cycle are close to the ones inferred from the aggregation of the national cycles and leads us to two groups: - CIV and SEN, and - the other countries. The gap between these two groups is significant. As a result, both countries are decision makers in the evolution of the cyclical fluctuation in this group. The series previously studied go from 1970 to 2007. The countries were already members of the CFA monetary zone, but the creation of the WAEMU only happened in 1994. It could be interesting to conduct a study similar to the third section starting in 1994. We will then be able to verify whether the volatility of the national cycle relatively to the common cycle and the index of conformity are both close to the value "1". But the size of the series is too short (from 1994 to 2007, only

Figure 4 represents the evolution of the correlation coefficient between the common cycle and the national cycles from 1970-1993 to 1970-2007, for each country. Since 1994, we notice a perceptible amelioration of the synchronization between the national cycles and the common cycle. A slight decrease is observed between 1996 and 1999. Also, the analysis of the coefficients of correlation confirms the strong influence of the cycle of CIV, despite its economic crisis.

Distinction of the Short Cycles and the Long Cycles: The cycle studied in the previous parts is a cycle of up to 10 years. The observation of the common cycle reveals a duality (figure 3). It is possible to break it down into two cyclical components, one close to 3 years (for example a cycle between 1986 and 1989) and the other which period averages almost 10

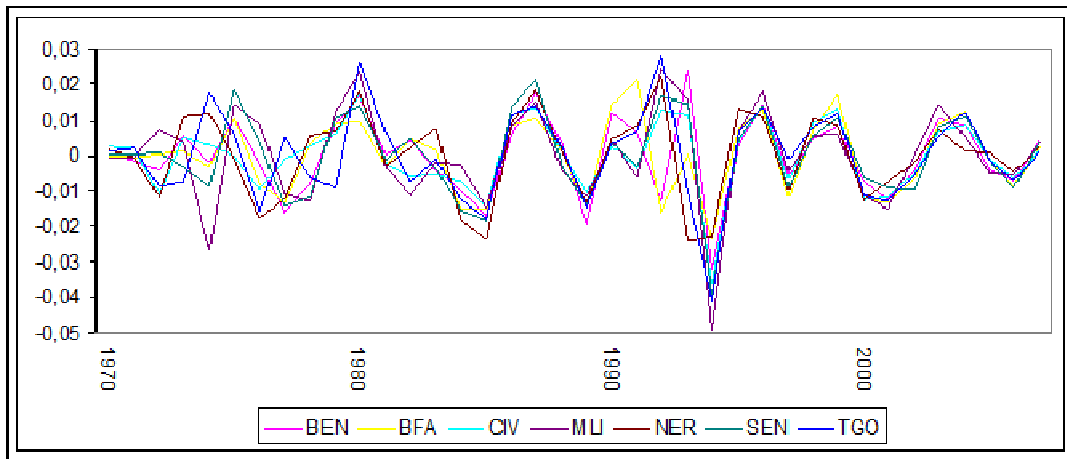


Figure 5. Short national cycles

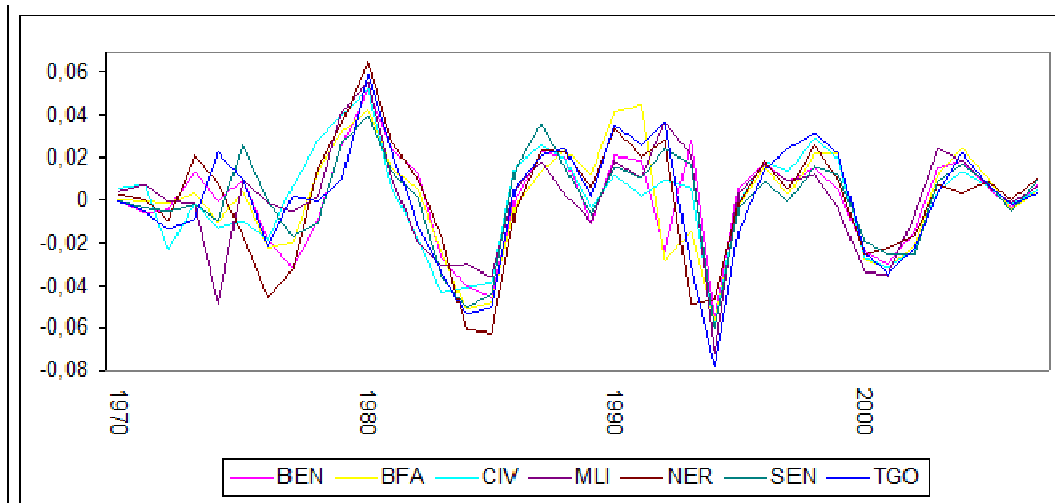


Figure 6. Long national cycles

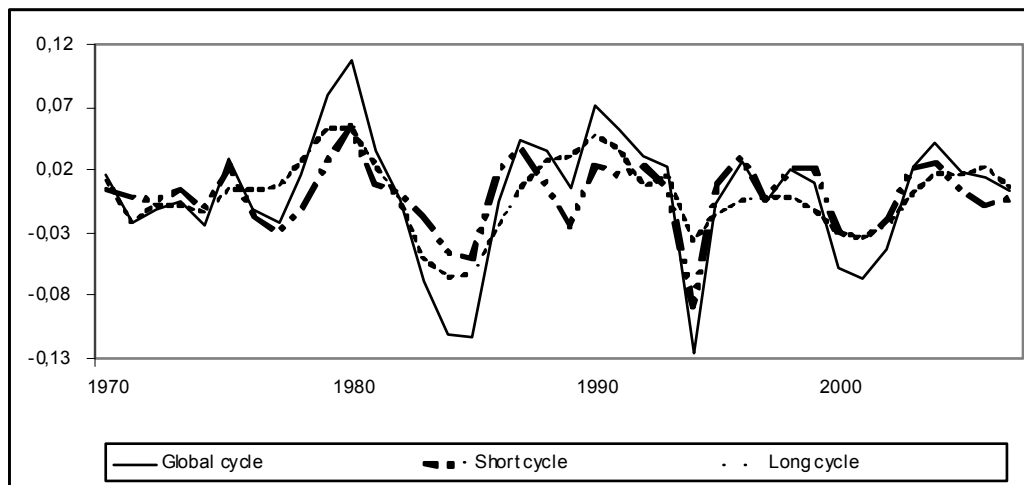


Figure 7. Decomposition of the global cycle

years (for example between 1986 and 1994)). It is respectively the short (-term) cycle or cycle of Kitchin and of the long (-term) cycle or cycle of Juglar. We can consider the short term cycle with a maximal length of 5 years and a long term cycle between 5 and 10 years as in Bentoglio and al. (2002). This section will explain the common global cycle by stressing the short term cycle and long-term cycle. In previous parts, we extracted a global cycle using a filter with a frequency of separation between the trend and the residual component

ϖ equals to $1/10$. However, with the analysis of the short cycle, we consider the frequency limit $\varpi = 1/5$ that is associated to a period of 5 years. In the case of the HP filter, we know $\lambda = [2\sin(\pi\varpi\Delta t)]^{-4}$ with $\Delta t = 1$, for annual data. The result is a parameter $\lambda = 0.5236$. Thus, the filter HPmod ($\lambda \square$) that shares a common frequency limit with the HP filter ($\lambda = 0.5236$) can be identified. We consider the equality of gain functions when located at that common frequency.

The result is a HP modfilter with a smoothing parameter $\lambda_1 = ((0.27693 * 0.5236) / (6.8541)) = 0.0212$. This latter filter is applied to each series. Figure 5 represents the national short cycles. The period of the short cycles is very homogenous and fluctuates between 3 and 5 years. The elaboration of the multivariate HPmod filter is the same as in the third section. Table 6 reveals a significant link between the short national cycles and the short cycle of the west African CFA Franczone for all countries including BFA: we can observe a strong correlation between variables and a significant Student statistic (broadly greater than 1.96). The synchronization between the common cycle and the national short cycles is average. The relative volatilities are very low, except the one of MLI that exceeds 0.5. The national cycles have the tendency to attenuate the short cyclical fluctuations of the west African CFA Franczone. Accordingly, none of the national cycles is in true conformity with the common short cycle. As in the previous cases, the contributions to the common cycle bring out two groups: -CIV and SEN, - the other countries which are classified according to the importance of their contribution to the cycle. The contribution of all the countries has slightly declined, while those of MLI and NER have sensibly increased. The west African CFA Franczone short cycle seems to play a minor role in the constitution of the national cycles. Since the short cycle is associated with the variation of the moving stocks, this finding is evidence that the common macroeconomic and budgetary policies must be reinforced, along with intensified exchanges in the monetary union. The different results show a global similarity of the cyclical fluctuations within the west African CFA Franczone.

However, we should point out that the main crisis observed in the short cycle coincided with the global cycle as specified in the third section. Most crises were linked to the fluctuations in the terms of the exchange of exported commodities. The volatility of the terms of exchange influences the internal demand through a revenue effect thus affecting the growth and movements of stocks. In addition, these countries primarily import equipments. If the fluctuations of commodity prices (their main source of revenue) were not in phase with the volatility of the prices of investment goods, it could lead to a negative shock on production and thus influence consumption. Commercial shocks could then lead to a decrease in production of 45% (Kose and Riezman (2001)). The long cycle is associated with the fluctuations of investments. It is obtained by subtracting the short cycle from the global cycle. Figure 6 represents the national long cycles. The analysis of Table 7 reveals a good and significant correlation with the cycle of the west African CFA Franczone and a relative volatility almost comparable. The index of conformity exceeds 0.5 and even reaches 0.705 for BFA. We can conclude a synchronization of the national long cycles with the long cycle of the west African CFA Franczone.

These results are better than the one obtained with the analysis of the short. As a result, an increase in investments essentially conditions the growth of the WAEMU. The contribution of the national cycles to the common cycle increases sensibly for BFA, NER, CIV and MLI. We can now identify three groups: - CIV; - SEN, BFA; and - BEN, MLI, NER, TGO classified respectively based on the importance of their contribution to the cycle, with CIV having a very strong influence. Figure 7 clearly shows the duality that exists in the common cycle. The expansion phases that started in 1977, 1985, 1994 and 2001 are the results of the combined actions of the reduction of the

long-term cycle and the reduction of the short-term cycle. Both cyclical components are reciprocally amplified. A restrictive monetary policy on interest rate during the investment recovery would have a negative impact on growth. Policies to create an incentive to invest adopted by the WAEMU seemed to have paid off. Most crises coincided with the fluctuations of commodity prices. Incentives policies to invest are generally used to impulse the recovery. The member countries of the Union promoted rightly the industrialization in order to develop their economies. However, their industrialization remains very low and does not contribute enough to the Gross Domestic Product (the contribution of the manufacturing industry in the WAEMU varies between 7% and 26% of the GDP). On the other end, the index of conformity of the different types of cycles reveals that it is necessary to reinforce the cooperation among member countries of the WAEMU and enlarge the internal markets.

Conclusion

In this paper, the filter is generalized and extended in order to propose a satisfying and homogeneous methodological framework for starting a relevant study on a shared cycle among members of the west African CFA Franczone. Even though it is premature to envision an optimum currency area, one could ask whether there is harmonization of cycles or whether new dynamic impulses by the WAEMU guarantees the synchronization in the currency area. This paper focused on the degree of co-movement of cycles and the synchronization with the monetary union cycle (aggregate cycle and common cycle). In order to better analyse cycles, a global cycle comprised of both long term and short-term cycle is studied. The analysis reveals that Côte d'Ivoire, which has the highest economic weight in the region, contributes mostly to the cycle of the WAEMU. Consequently, the political instability that negatively impacted the economic activity of Côte d'Ivoire since 2000 has influenced the common cycle of the monetary area. This common market certainly presents some imperfections. The share of the industry is still low (it varies between 12% and 27% of the GDP.). Unemployment remains high and numerous constraints to the industrial development of the monetary union can be underlined, such as the small size of local markets, low competitiveness of production units, difficult access to financing, low investments in technology and corruption. But a closer look at the cycle reveals a sensible co-movement of short and long national cycles. An average conformity between the national cycles and the common cycle is to be pointed out.

REFERENCES

- Barell R, Sefton J. 1995. Output gaps : Some evidence from UK, France and Germany. *National Institute Economic Review*. 151 : 65-73.
- Bentoglio G, Lemoine M, Fayolle J (2002). La croissance européenne perturbée par un cycle de courte période. *Economie et Statistique*. 359- 360.
- De Jong R M, Neslihan S. 2016. The Econometrics of the Hodrick-Prescott Filter. *Review of Economics and Statistics*. 98: 310-317.
- Hodrick RJ, Prescott EC 1997. Post-war U.S. business cycles: an empirical investigation. *Journal of Money, Credit and Banking*. 29. 1 : 1-16.

- Iacobucci A, Noullez A. 2005. A frequency selective filter for short-length time series. *Computational Economics*. Springer. 25.1 :75-102.
- King RG, Rebelo ST. 1999. Resuscitating real business cycles, in J. B. Taylor & M. Woodford, eds. *Handbook of Macroeconomics*. Elsevier. 1 :927-1007.
- Kose AM, Iezman R. 2001. Trade shocks and macroeconomic fluctuations in Africa. *Journal of Development Economics*. 65 : 55-80.
- Lemoine M, Pelgrin F. 2003. Introduction aux modèles espace-ét at, au filtre de Kalman et applications. *Revue de l'OFCE*. 86.3 : 203-229.
- Madeira J. 2014. Overtime Labor, Employment Frictions and the New Keynesian Phillips Curve. *The Review of Economics and Statistics*. 96 : 767-778.
- Mundell RA. 1961. A theory of optimum currency areas. *The American Economic Review*. 51. 4: 657-665.
- Ramadorai T. 2012. The Secondary Market for Hedge Funds and the Closed Hedge Fund Premium, *Journal of Finance*. 67 :479-512.
- Stock JH, Watson M. 1999. Business cycle fluctuations in U.S. macroeconomic time series. in John B. Taylor and Michael Woodford eds. *Handbook of Macroeconomics*. 1A :2-64.
