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Budgetary Externalities inthe Countries ofthe Economic and Monetary Union of West Africa

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Summary: *This article examines fiscal externalities within the West African Economic and Monetary Union from 1980 to 2015 using the autoregressive distributed delay (ARDL) approach. Empirical results indicate that public investment spending leads to positive and negative externalities between the countries of this union. The study also showed that the real interest rate has a positive effect on output in the short term. The document calls for greater coordination between countries.*

Keywords:*Budgetary externality, public expenditure, ARDL model, UEMOA*

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I. Introduction

The creation of currency unions, on the one hand, and problems related to information[1] asymmetry between countries and between governments and the central bank, on the other, have renewed interest in concerns about externalities[2] arising from international transmission channels in a monetary union (Burda and Wyploz, 2009; Merler and Pisani-Ferry, 2012). Externalities in monetary union are also due to the unintended effects of expansionary fiscal policies pursued by one member country affecting the economies of other countries and the common monetary policy (Artus, 2009).

Indeed, in monetary union the common monetary policy is in the hands of a common and independent central bank and budgetary policies are decided separately and generally in a non-cooperative manner, so economic policies may prove ineffective if economic cycles are not synchronised. Since the economic policy objectives of the central bank and governments are different, conflicts between the fiscal authorities and the central bank may arise, for example. These conflicts of interest can lead to policy inefficiency even in the absence of asymmetric shocks (Alesina and Tabellini, 1987; Artus, 1999)[3].

Two main approaches are identified with regard to externalities in monetary union. The first approach focuses on public spending and tax competition (Cassette and Paty, 2008). The second approach concerns the effect of public debt on the common monetary policy (Noyer, 2012).

For the first approach, externalities appear between countries through public spending. A change in public spending in one country when information is asymmetric and economic policy is non-cooperative has unexpected positive and negative consequences for other countries (Benassy-Quere et al 2007).

With regard to tax competition, externalities arise when changing tax rules in one country unintentionally affects decision-making in other countries. This interaction is only possible if the tax bases involved are mobile (Raspiller, 2005; Reulier and Rocaboy, 2004a).

[1] It corresponds to the idea that the same information is not shared by everyone (thus, the authorities of one country may have information that others do not) and that even if this were the case, the same information would not be perceived in the same way. As information is mainly collected by national statistical institutes, budgetary authorities can have private information on the shock affecting their own economies, thus creating new problems of inefficiency in the conduct of economic policies at the Union level. As a result, behavior and policy choices can change, eventually leading to new types of macroeconomic balances. Private information can effectively be used by governments to influence the economic policies of other countries in this union and the monetary policy of the Common Central Bank (Mengue, 2011).

[2] The externality, whatever its origin, represents the effect suffered (by an economic agent who is the receiver of the externality), and not compensated in the context of an exchange or market, an action, either of production or consumption, of an economic agent (the issuer of the externality) (Marshall, 1898). This effect can be negative or positive, on the usefulness of the receiving agent (Pigou, 1920).

[3]Thus, even if governments have a behavioural bias (a natural tendency towards excessive public deficits for electoral reasons or to compensate for the loss of the inflationary tax), the fact that the central bank overweighs the objective of price stability does not correct the imbalance (Artus, 2000; Artus, Espinoza and Muller, 2000).

The second approach, which concerns the effect of public debt on the common monetary policy, refers to the bank balance sheet and the crisis of confidence.

With regard to bank balance sheet externalities, an unsustainable level of debt in a country could lead to a potential risk of partial or total non-payment. This threat of non-payment can lead to a banking crisis. This failure has macroeconomic repercussions that were previously unobservable in other countries of the union through economic and financial interdependence and also when the risk of contagion through self-realization mechanisms is high (Janne, 2012, Loisel, 2006).

As regards externalities due to the crisis of confidence, a high debt ratio could lead the common central bank in certain circumstances not to implement the previously announced monetary policy. This situation could lead economic agents to no longer believe in the central bank's determination and ability to achieve the objectives it has announced. This would be detrimental to all countries in the monetary union (Noyer et al, 2012; Creel and Sterdyniak, 1999).

In the countries of the West African Economic and Monetary Union (UEMOA), strategic coordination to strengthen integration between countries came into effect in 1999. Compliance with the four main criteria should allow for some convergence among countries. However, the performance of WAEMU member countries in recent years has shown that these economies are not converging, despite some improvements. In WAEMU, the effectiveness of economic policies during periods of crisis or shock remains limited by the structures and characteristics of the Union's economies. These countries are characterized by an unbroadened productive base, cyclical fragility and reduced competitiveness.

Thus, the existence of international externalities is a major concern in relations between the countries members of a monetary union and between the countries members of a union and the central bank. This leads us to question the sign of externalities resulting from the channels of international transmission within a West African Economic and Monetary Union (WAEMU).

The rest of the article is structured as follows: Section 2 presents the theoretical model. Next, the econometric methodology will be discussed, specifying the function, and the variables used and the estimation procedure. The fourth section will be devoted to the presentation and analysis of the results. Finally, the fifth section concludes.

II. Model Presentation

We use the Dolado, Griffith and Podilla (1994) model that we adapt to our framework. We assume an economic and monetary union composed of two countries A and B. The model we are developing favors the logic of demand over supply, because it is the demand for goods that determines production. There are no trade barriers and each country's inflation rate (π) is positively dependent on domestic demand. Monetary policy is delegated to a common, independent and supranational central bank that controls the interest rate (r)

In this model, governments can only act indirectly on the equilibrium inflation rate, which depends, in part, on their relative preferences.

The production (y) of each member country increases with domestic public expenditure[4] (g) and decreases with the interest rate (r). On the other hand, an increase in public deficits in the rest of the region has contradictory effects on economic activity; no sign can be imposed a priori on the multiplier associated with foreign policy. An increase in public expenditure is a positive externality insofar as it favors demand for the partners' products and therefore for their exports (income effect), on the one hand. On the other hand, the issuance of securities to finance deficits is unfavorable for the region because it puts upward pressure on the market interest rate and thus causes an appreciation of the common currency that is detrimental to foreign trade. This double crowding out effect by the interest rate and the exchange rate slows down activity in the area.

The different hypotheses that have just been presented are found in the following equations:

$$y_A = a_A r + b_0 g_A + b_1 g_B \quad (1)$$

$$y_B = a_B r + \varphi_0 g_B + \varphi_1 g_A \quad (2)$$

with:

y_A, the level of activity in country A ;

y_B, the level of activity in country B ;

r, the common interest rates of the union,

g_A, the public expenditure of country A ;

g_A,the public expenditure of country B.

[4]They can be considered as deficits, since tax revenues are not considered.

For the sake of simplicity, we group the different externalities in the coefficient$b_1$andφ_1. The assumptionsb_1,φ_1>0 (positive externalities) and b_1,φ_1<0 (negative externalities)[5] are used successively.
with$a$>0, and $b_0, \varphi_0 > |b_1, \varphi_1| \geq 0$ (a change in fiscal policy always has a greater domestic impact). The deficits g_A and g_B are the control instruments for countries A and B.

III. Methodology

3.1 Data source and description

The data used in this work are annual secondary data from the statistical services of the African Development Bank for public investment expenditure, annual reports of the Central Bank of West African States for the interest rate and the World Bank's statistical database for inflation over the period 1980-2015.

The economic growth rate measured by the growth rate of the real gross domestic product(GDP), which represents the level of national production. This is the dependent variable through which externalities through public investment expenditure will be measured.

The real interest rate(r), is the interest rate that determines the return on capital at the time a loan is created (for the borrower) or a loan (for the creditor) after deduction of the inflation rate and risk premiums.

Public investment expenditure(PIE), corresponds to expenditure made by the State, by local authorities (municipalities, departments and regions) in the construction of buildings and infrastructure (public hospitals, schools, libraries, roads, etc...).

Inflation(CPI),is measured by the annual change in the consumer price index. Indeed, the inflation rate in WAEMU countries is ambivalent with the growth rate. The significant share of agricultural production in the composition of total supply in sub-Saharan countries and the deflationary impact on food goods generally exerted by a good agricultural season justifies the hypothesis that there is an inverse relationship between total supply and inflation. Nevertheless, the increase in the inflation rate can also reflect the result of a "demand effect" in the economy. In this sense, high inflation can be a sign of a growing economy, following the Keynesian perspective, illustrated by the Phillips curve. In total, the expected sign of this variable is undetermined, since the value of its parameter depends on relative developments in money supply, money demand and the supply shock (Kako, 2007).

3.2. Model specification

The model in its general specification is written as follows

$$Y_{it} = X_{it}\beta + \varepsilon_{it} \quad (3)$$

With $i = 1,2 \ldots\ldots\ldots\ldots, n$et $t = 1,2 \ldots\ldots\ldots\ldots, T$, X the matrix of explanatory variables and β the vector of coefficients to be estimated.

The equation specified for country i is written:

$$GDP_{it} = \alpha_0 + \alpha_1 r + \alpha_2 PIE\_BEN_t + \alpha_3 PIE\_BFA_t + \alpha_4 PIE\_CIV_t + \alpha_5 PIE\_MLI_t + \alpha_6 PIE\_NIG_t + \alpha_7 PIE\_SEN_8 + \alpha_9 PIE\_TGO_9 + \alpha_{10} CPI_{it} + \varepsilon_i \quad (4)$$

with :

GDP : the rate of GDP growth,
PIE_BEN, Benin's public investment expenditure as a percentage of GDP;
PIE_BFA, Burkina Faso's public investment expenditure as a percentage of GDP;
PIE_CIV, Côte d'Ivoire's public investment expenditure as a percentage of GDP;
PIE_MLI, Mali's public investment expenditure as a percentage of GDP;
PIE_NIG, Niger's public investment expenditure as a percentage of GDP;
PIE_SEN, Senegal's public investment expenditure as a percentage of GDP;
PIE_TGO, Togo's public investment expenditure as a percentage of GDP;
CPI: measures inflation approximated by the change in the consumer price index.

We will estimate this unique model for Côte d'Ivoire. The choice of this country is that it is the leader and represents more than 35% of the GDP of the West African Economic and Monetary Union.

3.3. Estimation procedure

In this study we use the ADRL (Auto Regressive Distributive Lags) method to estimate our models. The ARDL procedure, which has been used to examine the relationship between external debt and its determinants, is used to address problems related to time series analysis such as the problem of studying series that are not integrated in the same way. This procedure has several advantages. First of all, the ARDL test methodology is applicable regardless of whether the explanatory variables are stationary or first-order integrity.

[5]Bryson (1994) and De Bonis (1996) use the same type of formalization to study fiscal policy in fixed exchange rates, but ignore monetary policy and further assume that the sign of externalities is negative (the double effect of crowding out by the interest rate and the exchange rate is systematically the strongest).

Thus, it goes beyond the problem of the order of integration associated with Johannsen's test (1995). Secondly, it has good properties of small samples compared to other techniques. Third, the ARDL method corrects the problem of serial correlation and endogeneity, by an appropriate increase in the order of the explanatory variables. To illustrate ARDL's approach, consider the simple model:

$$y(t) = \alpha + \beta x(t) + \mu(t) \quad (5)$$

The long-term ARDL procedure involves two steps. In the first step, we test the existence of a long-term relationship. The presence of the long-term relationship between the variables is tested by calculating the F-statistics to test the significance of the shift levels of the variables as an error correction of the underlying ARDL model. The error-correction model of the ARDL model is as follows:

$$Dy(t) = \alpha_0 + \sum_{i=1}^{p} \delta_i Dy_{t-i} + \sum_{i=1}^{p} \gamma_i Dx_{t-i} + \beta_1 y_{t-1} + \beta_2 x_{t-1} + \varepsilon_t \quad (6)$$

where δ and γ represent the short-term dynamics of the model while β_1 and β_2 represent the long-term relationship and ε is the error term for white noise. The current values deD_x from the equation is excluded following the Pesaran and Shin (1998) model. The null hypothesis of the F test is the non-existence of the cointegration relationship:

$$\begin{cases} H_0: \beta_1 = \beta_2 = 0 \\ H_1: \beta_1 = \beta_2 \neq 0 \end{cases}$$

The relevant statistics are the F statistics for the joint meaning of $\beta_1$and β_2, and the asymptotic distribution of F is non-standard, and calculates independently of the order of integration of the explanatory variables. Peseran et al (1996) calculated the appropriate critical values; therefore, there are two sets of critical values. A set assuming that all variables are I (0) and one assuming that all variables are I (1).

1. If the value of the F-stat exceeds the upper bound, then rejectH_0 and it is concluded that there is a long-term relationship between the variables considered.
2. If the value of the F-stat is lower than the lower bound, then pasH_0 is rejected and it is concluded that there is no long-term relationship between the variables considered.
3. If the value of the F-stat is between the two limits, then we cannot conclude. The result depends on whether the variables are I (0) or I (1). Once the test results reject the null hypothesis of the "non-existence of the long-term relationship", then it is possible to proceed to the next step of the ARDL estimation procedure, which is the estimation of long-term coefficients.

In the second step, the orders of delays in the ARDL model are determined using the Akaike Information Criterion (AIC) and then the chosen model is estimated using the least ordinary edges method to obtain a long-term estimate. This long-term estimate of the selected ARDL specification gives an estimate of the coefficients of the cointegration relationship. It is important to note, however, that this step is only viable if the results of the F tests reject the non-existence of a long-term relationship between the variables, so variable X can be considered as the variable that explains the long-term relationship. The condition of the solution of the long-term model of y can be obtained from the solution of the previous equation, when $D(y) = D(x) = 0$:

$$y_t = \mu_0 + \theta x(t) + \vartheta(t) \quad (7)$$

Where:ϑ(t) are uncorrelated series with means equal to zero and constant variances-covariances. The long-term estimation coefficients using the ARDL approach are defined by the following reports:

$\mu_0 = \frac{-\alpha_0}{\beta_1}et\theta = \frac{-\beta_2}{\beta_1}$

IV. Results and Interpretations

The main results of the estimates will be presented and interpreted.

4.1. Presentation of the results

The study uses two conventional unit root tests - the Augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979; 1981) and the Phillips-Perron (PP) test (Phillips and Perron, 1988) - to help select an appropriate methodology. Table 1 presents the results of the tests. They show that Senegal's GDP growth rate, real interest rate and public investment expenditure are stationary in level. While inflation, public investment expenditure in Benin, Burkina Faso, Côte d'Ivre, Mali, Niger and Togo is not stationary at the level, but becomes so after the first difference.

Table 1 : Unit root test

Variables	Level		First différence	
	ADF	PP	ADF	PP
log GDP growth rate	-5.257***	-5.266***	-8.676***	-14.496***
	(-4.243)	(-4.243)	(-4.252)	(-4.252)
log real interest rate	-4.291***	-4.306***	-5.767***	-11.141***
	(-4.243)	(-4.243)	(-4.262)	(-4.252)
log inflation	-3.341	-4.611***	-3.569***	-10.040***
	(-3.587)	(-4.243)	(-2.650)	(-4.252)
log public investment expenditure_BEN	-3.947	-3.355***	-8.022***	-8.029***
	(-4.252)	(-3.544)	(-4.252)	(-4.252)
log public investment expenditure_BFA	-3.384	-3.384	-7.217***	-9.502***
	(-3.544)	(-3.544)	(-4.252)	(-4.252)
log public investment expenditure_CIV	-0.928	-0.661	-6.535***	-7.157***
	(-3.544)	(-3.544)	(-4.252)	(-4.252)
log public investment expenditure_MLI	-2.874	-4.408***	-4.156**	-12.811***
	(-3.552)	(-4.243)	(-3.557)	(-4.252)
log public investment expenditure_NIG	-3.317	-3.359	-4.575***	-9.335***
	(-3.552)	(-3.544)	(-4.273)	(-4.252)
log public investment expenditure_SEN	-5.339***	-5.343***	-5.643***	-18.898***
	(-4.243)	(-4.243)	(-4.273)	(-4.252)
log public investment expenditure_TGO	-0.951	-0.795	-4.209**	-7.061***
	(-4.243)	(-3.544)	(-3.595)	(-4.252)

Source : Auteur

Notes: les valeurs entre parenthèses sont les T-student. ***, ** Significativité au seuil de 1% et 5%.

Since the unit root test results reported in Table 2 are a mixture of processes I(0) and I(1), the test related to the ARDL cointegration approach is chosen for analysis because of the benefits mentioned above. For the choice of the number of delays, we used the Akaike Information Criterion (AIC) (Figure 1 in the appendix). The graphs present the twenty best models according to the Akaike information criterion, the ARDL model (2, 2, 0, 2, 2, 2, 2, 2, 2, 1) corresponds to the smallest value of AIC.

The results of the residue autocorrelation tests (attached table) strongly suggest that there is no evidence of autocorrelation in the model residues, which is essential for the continuation of our estimates. Because if there is autocorrelation of errors, parameter estimates will not be consistent, due to the delayed values of the dependent variable that appears as explanatory variables in the models.

Following the decision of the results of the unit root test, we proceed with the ARDL cointegration test. Table 2 below presents the results of the cointegration test, in which the calculated F statistics of 31.358 are above the upper limit values provided by Narayan (2005) at the 1% level. This validates the rejection of the null hypothesis against the alternative hypothesis that there is evidence of the cointegrating relationship between the variables in both models. Once a cointegrating relationship is established, the next step is to estimate the long-term relationship and the error correction model (ECM).

Table 2: Bounds test

F-Statistics	K	Significativity							
31.358	9	10%		5%		2,50%		1%	
		Borne I0	Borne I1	Borne I0	Borne I1	Borne I0	Borne I1	Borne I0	Borne I1
		1.8	2.8	2.04	2.08	2.04	2.08	2.5	3.68

Table 3 above provides the results of the long-term estimation of our model. It shows that the estimated coefficients with the exception of the real interest rate and inflation are statistically significant.

For example, public investment spending in Burkina Faso, Côte d'Ivoire, Mali, Niger and Togo has a positive impact on Côte d'Ivoire's long-term GDP growth rate. On the other hand, public investment spending in Benin and Senegal has a negative impact on Côte d'Ivoire's production.

Table 3 : Long run coefficients

Variable dependency: GDP growth rate of Côte d'Ivoire			
Regressors	ARDL (2, 2, 0, 2, 2, 2, 2, 2, 2, 1)		
	Coefficient	t-Statistic	
log real interest rate	0.111	(1.148)	
log inflation	0.028	(1.576)	
log public investment expenditure_BEN	-0.080***	(-8.503)	
log public investment expenditure_BFA	0.035**	(2.895)	
log public investment expenditure_CIV	0.017**	(3.344)	
log public investment expenditure_MLI	0.024*	(2.122)	

log public investment expenditure_NIG	0.011**	(2.439)	
log public investment expenditure_SEN	-0.116**	(-2.865)	
log public investment expendituret_TGO	0.0149***	(5.163)	
Constant	4.216***	(9.019)	

Source :Autor, Note: *** , **and * indicate significance at 1%, 5% and 10% level.

Table 4 presents the short-term estimates using the error correction model (ECM). D is the first difference of the variables considered. The term CointEq(-1) corresponds to the delayed residue resulting from the long-term equilibrium equation. Its estimated coefficient is negative and largely significant, thus confirming the existence of an error-correction mechanism. This coefficient, which expresses the degree to which the variable y (GDP growth rate) will be recalled to the long-term target, is estimated at -1.453 for our ARDL model, reflecting a relatively rapid adjustment to the long-term target.

The short-term results show that the growth rate depends positively on its past value. The real interest rate, the public investment expenditure of Burkina Faso, Côte d'Ivoire and Mali in year t and the real interest rate, the public investment expenditure of Benin, Côte d'Ivoire and Mali in year t-1 have a positive effect on Côte d'Ivoire's economic GDP growth in year t. On the other hand, public investment expenditure in Benin, Niger and Senegal in year t and public investment expenditure in Burkina Faso, Niger and Senegal have a negative impact on Côte d'Ivoire's GDP growth rate.

Table 4: Short run coefficients

Dependant variable: GDP growth rate of Côte d'Ivoire			
Regressors	ARDL (2, 2, 0, 2, 2, 2, 2, 2, 1)		
	Coefficient	t-Statistic	
D(log GDP growth rate_CIV (-1))	0.121***	(4.091)	
D(log real interest rate)	0.546***	(20.454)	
D(log real interest rate (-1))	0.318***	(12.198)	
D(log public investment expenditure_BEN)	-0.032***	(-7.459)	
D(log public investment expenditure_BEN (-1))	0.094***	(17.952)	
D(log public investment expenditure_BFA)	0.021***	(3.646)	
D(log public investment expenditure_BFA (-1))	-0.102***	(-16.940)	
D(log public investment expenditure_CIV)	0.111***	(20.424)	
D(log public investment expenditure_CIV (-1))	0.075***	(14.021)	
D(log public investment expenditure_MLI)	0.042***	(9.951)	
D(log public investment expenditure_MLI (-1))	0.026***	(6.661)	
D(log public investment expenditure_NIG)	-0.009***	(-4.023)	
D(log public investment expenditure_NIG (-1))	-0.009***	(-3.904)	
D(log public investment expenditure_SEN)	-0.135***	(-14.417)	
D(log public investment expenditure_SEN (-1))	-0.119***	(-11.867)	
D(log public investment expenditure_TGO)	-0.007	(-1.843)	
CointEq(-1)	-1.453***	(-28.943)	
R-squared : 0.989	Sum squared:0.000	AIC :-7.306	
Adjusted R-squared : 0.979	D W-stat : 2.069	SIC : -6.543	

Source :Autor, Note: *** , **and * indicate significance at 1%, 5% and 10% level.

Diagnostic tests were performed to evaluate the robustness of our model: the Lagrange multiplier test for residue autocorrelation, the Ramsey functional form test (RESET), the JarqueBera test for residue normality and a homoscedasticity test. The results of some tests that show that the residues have all the desired properties are given in the appendix.

4.2 Interpretation

We can say that public investment spending by WAEMU member countries produces externalities on production whose magnitude and meaning can come from the economic, social and geographical relations that exist between them.

Indeed, these countries are small open countries that are highly indebted and in which internal savings are low due to the low rate of bancarization. Thus, any increase in public investment expenditure could amount to a deficit. Under these circumstances, fiscal policy is an important strategic complement because any stimulus in a country (e.g. any stimulus in Senegal in the case of Côte d'Ivoire) forces countries that receive negative effects to increase, in turn, public spending, in order to counter these negative effects on their production. The consequence of this situation is, for a monetary union, an increase in public deficits and a low growth of the money supply. Only a progressive central banker could allow each budget decision maker to improve his room for manoeuvre, by giving himself the opportunity to reduce his expenses. Thus, he encourages his neighbour to do the same, since the impoverishing effect is reduced. The decline in the deficit in one country (e.g. Senegal in the case of Côte d'Ivoire) therefore favours economic activity in the other countries (Faure, 2001).

Several reasons can therefore be given to explain the positive or negative influence of budget deficits on economic activity in the short and long term.

Thus, when the deficit leads to positive externalities in both the short and long term, it means that public spending is beneficial to economic activity. Under these conditions, these expenses can be considered as consumption expenses. As Keynes points out, an increase in the level of consumption is necessary to stimulate economic activity. Indeed, when demand from the economy is high, this leads to an increase in the production capacity of companies, which benefits the economy as a whole. Therefore, when, for example, the deficit in one country leads to positive short- or long-term externalities on another country's production, this could mean that an increase in consumer spending in that country (an increase in civil servants' wages, all other things being equal) increases imports of products from the other country, which benefits the foreign economy. Indeed, when income increases in a country, it results in an increase in these imports, and therefore in an increase in exports for foreign countries. Thus, a positive effect of increased demand is immediately perceptible in the deficit country and among its partners. This situation leads to an inflow of foreign currency, which benefits the national economy as the trade balance improves.

The presence of negative externalities of the deficit in the short term would mean that the public spending that leads to this deficit does not stimulate economic activity in the immediate future. Such expenditure shall either be made in areas or sectors that do not stimulate economic activity or that have beneficial effects on long-term economic activity. This is the case, for example, for transport infrastructure expenditure and many others. This is also the case for spending on education, health and research and development.

In the long term, negative externalities would be due to real demand shocks. When fiscal policy is in the hands of governments and information is imperfect, fiscal policy does not immediately respond to an asymmetric demand shock, reflecting the inefficiency of fiscal policy and the misuse of fiscal weapons by countries in good times. This situation could lead to an increase in the deficit and an accumulation of public debt. The increase in the deficit leads to a decrease in private demand and a decrease in supply due to agents' expectations regarding their future taxes. Changes in demand also lead to higher prices, especially in the deficit country, and a monetary policy response. All this leads to an increase in interest rates and therefore discourages investment (Perotti et Schiantarelli, 2002 ;Guidice et al 2003).

V. Conclusion

The objective of this study was to analyse the externalities of fiscal policy that may exist between the economies of the member countries of the Economic and Monetary Union of West Africa (UEMOA). Indeed, the conduct of fiscal policy in one country may have positive effects on economic activity in another country, but also negative effects.

In order to analyse budgetary externalities within WAEMU, we used the model of analysis of externalities through the production of Dolado, Griffith and Podilla (1994). The use of the ARDL (Auto Regressive Distributive Lags) staggered delay autoregressive model has shown from our analyses that positive and negative externalities exist between the deficit and production within the West African Economic and Monetary Union. These externalities would be due to the economic, social and geographical relations that exist between the countries of this union.

In order to reduce the effects of negative externalities, we recommend strengthening policy coordination. However, taking into account other variables in the model such as physical capital accumulation, human capital accumulation, balance of payments, etc. could lead to different results. But as Dolado, Griffith and Podilla (1994) point out, the objective was to determine the meaning of externalities and not the magnitude or intensity of externalities

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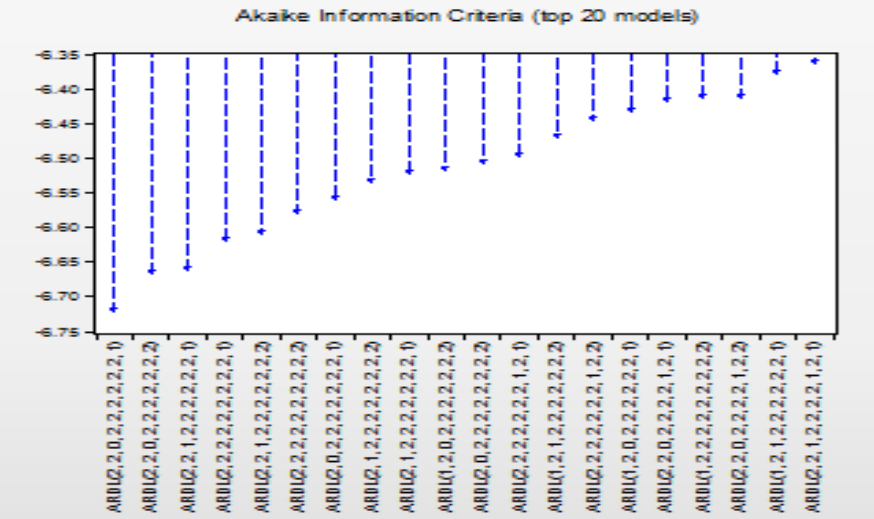
APPENDICES

Figure 1: Optimal number of delays

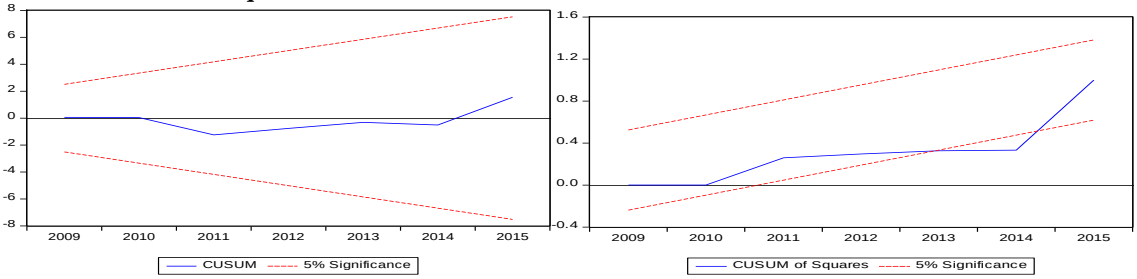


Autocorrélation test

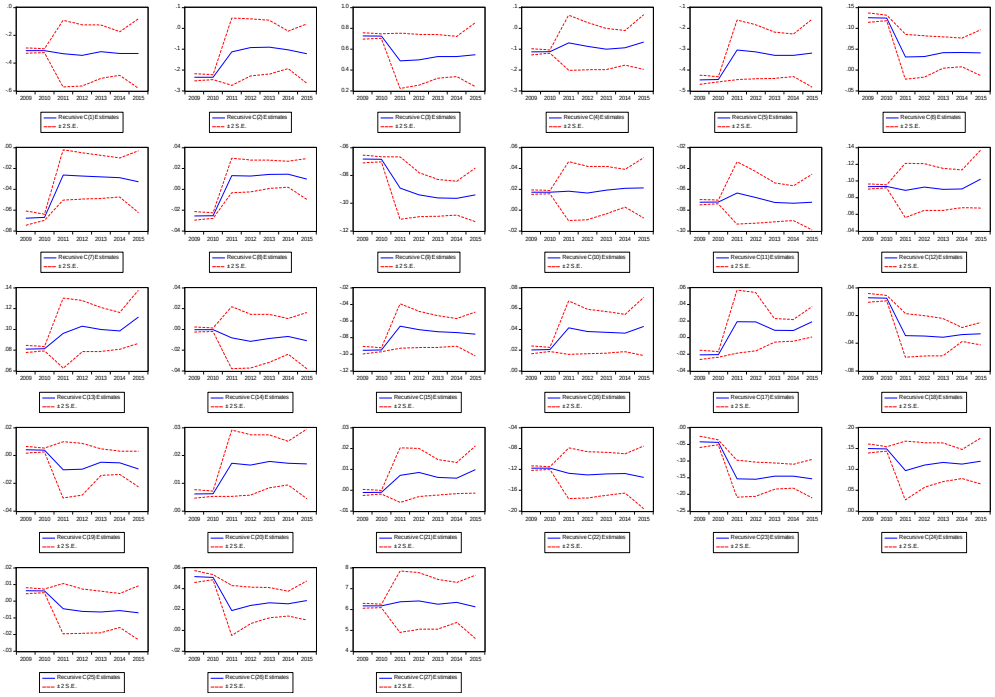
Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	0.247	0.247	2.2600	0.133
		2	-0.017	-0.083	2.2712	0.321
		3	-0.026	-0.001	2.2976	0.513
		4	0.155	0.172	3.2741	0.513
		5	-0.025	-0.123	3.3001	0.654
		6	-0.057	-0.007	3.4419	0.752
		7	-0.099	-0.079	3.8824	0.793
		8	-0.066	-0.065	4.0870	0.849
		9	-0.027	0.025	4.1223	0.903
		10	-0.054	-0.066	4.2732	0.934
		11	-0.088	-0.045	4.6860	0.945
		12	-0.049	-0.008	4.8210	0.964
		13	-0.095	-0.119	5.3418	0.967
		14	-0.050	0.005	5.4967	0.978
		15	0.087	0.111	5.9796	0.980
		16	0.223	0.171	9.3479	0.898

*Probabilities may not be valid for this equation specification.

Cusum and Cusum squares test



Recursive test



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