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Interactions of Economic Policy Instruments in Waemu: The Role of the Economic Cycle

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Abstract

This paper examines the coherence of economic policy instruments for cyclical stabilization of the WAEMU economies over the period 1980-2013. Employing a structural autoregressive panel model, the study shows that there is no complementarity (substitutability) between monetary and fiscal policy instruments during periods of recession (expansion). Moreover, the fiscal shock has more effect on monetary policy and economic cycle than any monetary shock. Denoting the non-coherence of economic policy instruments, the paper advocates the adoptionof a policy-mix focusing on the cyclical position of the WAEMU economies in order to maintain the overallmonetary stability of the union.

Keywords: Economic policy, Economiccycle, Structural autoregressive vector model, Panel

J.E.L. Classification: E63, E32, C29

1-Introduction

Is there substitutability or complementarity between monetary policy and coordinated fiscal policies within a monetary union? The answers given by the theoretical and empirical literature confirm that this debate has not yet been resolved. Since the work of Debrun and Wyplosz (1999), which showed the existence of a strategic substitutability between monetary policy and fiscal policy, the economic literature has been enriched by other contributions influencing or even calling into question these initial results. First, Muscatelli et al., (2004) showed that the degree of effectiveness of complementarity or substitutability between monetary and fiscal policy depends on the type of shock affecting the economy. Indeed, when shocks are in perfect positive correlation, monetary policy can be a substitute for fiscal policy in order to improve the level of welfare than adoption of a policy mix (Leith, 2004). However, the literature has showntwo-way relationship between fiscal policy and monetary policy. In reality, fiscal policy affects monetary policy by monetizing debt (purchasing public debt by the central bank). Similarly, restoring the effectiveness of monetary policy often requires public spending that affects fiscal policy. This idea has been relayed in a recent contribution highlighting the link between fiscal and monetary instruments (Benassy et al., 2016).

From this postulate, the literature shows, under certain conditions, the existence of an interdependence between monetary and fiscal policy instruments according to different time horizon (short term and long term). In the short term, monetary and fiscal policies are independent. However, such complete independence is possible in the long term only if the fiscal policy instrument is viable or if the central bank is not sensitive to the risk of bankruptcy of the state. This postulate is not always obvious.

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Thus, in the short term, there is no consensus on the need to adopt a policy mix in a context of fluctuation of the economic activity (Benassy et al., 2010). This debate, although controversial, focuses on the cyclical position of the economy in the conduct of economic policy.

It focuses on the causes and mechanisms that determine the magnitude and duration of economic cycles that are often imperfectly known by the authorities (Lucas, 2003). More importantly, the impact of economic policy instruments and the gap with which they affect the economic cycle are surrounded by uncertainties. These factors require taking into account the economic cycle in the coherence of economic policy instruments for cyclical stabilization purposes.

The coherence of economic policy instruments (in terms of strategic or non-strategic interdependencies between economic policy instruments) has been the subject of several research works. This renewed interest in empirical literature is due to the improvement in the social well-being of such a policy. In this context,Sarr and Ndiaye (2011) have shown that, in the presence of a conflict of objectives arising from heterogeneity of preferences from monetary and budgetary authorities, there are two effects: decorrelation of economic cycles and reinforcement of the structural heterogeneity of countries within the union. This conflict undermines the guarantee of non-inflationary growth, which is the objective of the interactive articulation between fiscal and monetary policies (SarrFodé, 2011).

In general, it appears from the literature that the identification of an interdependent relationship between economic policy instruments has two major issues. First, it highlights the strategy adopted by the economic policy authorities to promote non-inflationary growth within a monetary union. Second, any substitutability or complementarity of economic policy instruments depends not only on the level of structural heterogeneity; but also and mostly the cyclical position of economies within the monetary union.

Although, there are baseline studies that assessed the interdependence of economic policy instruments within the West African Economic and Monetary Union (WAEMU), they obscured the role of structural heterogeneity and the cyclic position. Dramani (2007) found that fiscal policy behaves as a substitute for monetary policy in the WAEMU zone while SarrFodé (2011) showed that a rise in interest rates leads to a decline in economic activity and an increase in budget deficits. It is clear that these studies overshadowed the role of the economic cycle in the interdependence or non-interdependence relationshipbetween the monetary and fiscal policy instruments within the WAEMU. The present paper proposes an in-depth analysis. The objective of this study was to demonstrate the existence of substitutability or complementarity between monetary and fiscal policy instrumentsbased on the economic cycle of WAEMU countries. While adopting a structural autoregressive panel model, this paper differs from existing studies in the method of identifying structural shocks. Contrary to previous approaches that adopt conventional methods of identifying structural shocks, this paper uses the recent method proposed by Jacobs and Wallis (2007). This remains little used in the literature and is based on cointegrationrelations. This paper adds empirical contribution to the debate on the link between the single monetary policy and mechanism of the WAEMU stability pact.

The rest of the paper is structured as follows. Section 2 presents an overview of the interdependence between monetary and fiscal policies within the monetary union. Section 3 discusses the methodological aspects, while section 4 presents and analyzes the estimation results. Finally, Section 5presents the conclusions and implications of the study.

2-Interdependence between Economic Policy Instruments: Synthesis of Literature

Several arguments have been put forward in the literature to highlight the need for coordination of economic policy instruments. Thus, since the pioneering work of Oudiz and Sachs (1985), that evaluated the gains in macroeconomic policy coordination, the consensus that emerged was that the gains from coordination were real and would be of the order of 0.5 to 1 point of GDP for all countries (DGTPE, 2007). From this baseline study, there has been an enthusiasm for assessing the losses (gains) generated by an absence (presence) of coordination of macroeconomic policies within monetary unions. Thus, one can cite the studies of Nordhaus (1994) and Salvado (2009). Indeed, using a structural macro-econometric model in the United States, Nordhaus (1994) estimated the cumulative loss of GDP due to a lack of coordination of macroeconomic policies in the range of 4 to 6% of GDP over a period of seven years.

He concluded that the gains in coordination (between monetary and fiscal policies) are "extremely high". In the same line, Salvado (2009) pointed out that macroeconomic policy coordination generates a substantial gain of 17% in terms of consumer welfare. Starting from such euphoria, the issue of the coordination of macroeconomic policies through a policy-mix has been a recurrent theme in international economic debates and continues to be the subject of study in much theoretical and empirical work (Bénassy et al., 2010, Sarr and Ndiaye, 2011, Albulescu and Oros, 2012, Artus, 2014, Combey, 2014).

From a theoretical point of view, Kenen (2000) showed that the coordination of macroeconomic policies has two main purposes. First and foremost, it seeks to achieve a collective optimum through a reciprocal adjustment of the instruments of economic policy. Moreover, the coordination of macroeconomic policies is justified by the channels of international transmission of economic policies. International mobility of capital through financial effects (interest rates), degree of trade openness via demand effects (imports), sensitivity to changes in relative prices (exchange rates, terms of trade) and budgetary externalities are vectors of international interdependence, which can make national policies less efficient and create situations of detrimental competition (Jacquet, 1999). However, Schalck (2007) showed that macroeconomic policy coordination is not intended to homogenize national policies, but to treat interactions between member countries as a matter of common interest. This idea has given rise to the following concern in the literature: should coordination be structured within a framework of formal rules of macroeconomic policy, or left to the free choice of governments? It is also reportedthat strategic coordination (in a game theory approach) is more discretionary (Hamada, 1986); while rules (coordination by rules) are conducive to the coordination of global public goods.

The originality of these new literatures is to show that macroeconomic policy co-ordination is likely to generate substantial gains for an economy or a monetary union that any other alternative. More specifically, several arguments have been highlighted showing the need for coordination of macroeconomic policies. There are two types of risks related to the coordination of macroeconomic policies. In the first place, coordination between governments leads to the risk that some countries will not participate in the cyclical stabilization effort. Subsequently, the second risk is that the central bank cancels governments' efforts to stabilize the economy by raising (or lowering) interest rates when demand slows down as deficits increase (Schalck, 2007).These two risks were very much present in the economic policy debates and suggest a policy mix because of uncertainty about future policies (Engwerda et al., 2002, Schalck, 2006). Moreover, from a political point of view, the authorities (monetary and fiscal) are collectively responsible for macroeconomic management in the eyes of uninformed opinion.

From an economic point of view, monetary and fiscal policies affect aggregate demand in the short term. A lack of co-ordination of macroeconomic policies gives rise to a non-cooperative game between actors (Nash equilibrium), which could result in sub-optimal equilibrium (Dixit and Lambertini, 2003).In this context; only a coordination of macroeconomic policies can restore a first-rankequilibrium. This result justifies the idea that the link between fiscal policy and monetary policy works both ways. In this context, Benassy et al. (2010) show that fiscal policy affects monetary policy through debt monetization and the restoration of its effectiveness often requires public expenditure. In the short term, monetary and fiscal policies are independent.This is possible in the long term only if the fiscal instrument is viable or if the central bank is not sensitive to the risk of bankruptcy of the State. It follows that in the short term there is no consensus on whether or not to coordinate economic policies within the framework of a policy mix. This has been relayed in a recent contribution highlighting the link between fiscal and monetary instruments. As Benassy et al., (2016) pointed out, two arguments justify the interdependence of monetary and fiscal instruments. When fiscal policy is relaxed, there is an expansion of demand, leading to inflation and a tightening of monetary policy. Thus, the fiscal policy affects other States of the monetary union through the response of monetary policy. In doing so, there is interaction between monetary and fiscal policies. Second, when monetary policy falls on the lower limit of interest rates (zero), fiscal policy should be activated to increase inflation and demand. Thus, fiscal policy can complement monetary policy. Obviously, the theoretical literature on the interdependence or non-independence between economic policy instruments is rich in lessons. The consensus that seems to emerge is the existence of a complementarity or strategic substitutability between these instruments whose effectiveness is conditioned by several factors.

This is one of the major concerns in most of the empirical studies that focused onthe interdependence between monetary and fiscal policy instruments.These studies have been organized around two approaches. The first is that of Nordhaus (1994) based on the theory of games, to which, it is associated the simulations via numerical calibrations. The second and most widespread is based on SVAR modeling (in panel for some studies, and in time series for others).

The work of Combey and Nubukpo (2013) is part of the first approach. Indeed, these authors analyzed the strategic interactions between monetary and budgetary authorities within WAEMU countries, using simulations derived from game theory (Nash equilibrium andStackelberg equilibrium). They concluded that the equilibrium in the coordination situation permits to obtain social optimum levels of the main macroeconomic variables (production, inflation, interest rate and deficit). On the other side, the Stackelberg equilibrium produces relatively lower levels of deficits and interest rates compared to the Nash equilibrium. Even if the results are remarkable, they are debatable with regard to the calibration parameters used for the various simulations. Indeed, the values of the calibration parameters are almost identical to those used in developed countries. Any attempt to use these parameters for the WAEMU economies would obviously bias the results because of structural differences with the industrial countries.

Regarding the second approach, the monetary and fiscal shocks are studied simultaneously using a structural autoregressive vector model (SVAR). This approach uses not only the interaction between economic policy instruments, but also the correlations. The objective is to highlight a possible complementary or substitutable relationship between the instruments of economic policy. This approach was used by Garcia and Verdelha (2001), Schalck (2008), Tsoukalas (2008), Badarau and Ndiaye (2010), SarrFodé (2011) and Konté and Ndiaye (2012). Garcia and Verdelha (2001) focused on the simultaneous analysis of monetary and fiscal shocks within the European Union. The analysis indicates that the interaction between monetary and fiscal policy is compatible with the conclusion of IS-LM model. In the same way, Tsoukalas (2008) noted the existence of a complementary relationship between monetary and fiscal policies in the European Union. These studies assumed a linear relationship in the complementarity between the instruments of economic policy. This postulate is not necessarily obvious. A study by Schalck (2008) adopts a non-linear SVAR model and leads to the result that economic policies are no longer complementary but rather substitutable within the European Union zone. However, once the role of the authority acting as leader is introduced in the analysis, Badarau and Ndiaye (2010) found a strategic complementarity between the economic policy instruments within the European Union, with the central bank playing the leading role. These different contributions show that the interdependence between economic policy instruments is heavily dependent on two factors: in particular the authority that plays the role of leader and non-linearity in the relationship.

For the African countries in the Franc Zone (ACFZ), Dramani (2007) highlighted the interactions between fiscal and monetary policies based on a multi-country model. The study revealed different behaviors between two areas. Fiscal policy behaves as a substitute for monetary policy in the WAEMU zone, whereas in the Central African Economic and Monetary Community (CEMAC) the complementary effect prevails. Once again, the limit of this study is the failure to take into account a main determinant (economic cycle) in order to assess the effectiveness of the behavior in terms of complementarity or substitutability of economic policy instruments.

Few studies on the analysis of the responsiveness of monetary policy and fiscal policies to the various shocks have been carried out within the WAEMU zone. Almost all studies relating to developing countries, in particular African countries, reported that the countercyclical nature of monetary policy is likely to controlthe shocks. On the other side, the pro-cyclical nature of fiscal policy does not generate a fiscal stimulusduring a downturn period. Carmignani (2010) postulates that fiscal policy is responsible for the persistence of volatility in African countries since it do not fulfill the function of stabilization. This is supported byNdiaye (2011) whoassessed the consequences of external shocks on the effectiveness of monetary and fiscal policies in Senegal. Based on the cointegration theory applied to an error correction model (ECM), Ndiaye (2011) found that the responsiveness of monetary and fiscal policies to external shocks is 85% and 47%, respectively. In addition, results from the vector autoregressive (VAR) model showed that fluctuations in variables reflecting external shocks influence monetary and fiscal policies but have more adverse effects on fiscal policy. It follows that the monetary policy serves the interests of Senegal in terms of support for the activity but its effectiveness is very limited in absorbing external shocks. The author justified this result by three factors: the abolition of statutory advances to the public treasury, the fixity of the exchange rate regime and the constraints linked to foreign exchange reserves.

Within the WAEMU, a study conducted by SarrFodé (2011) adopted a SVAR approach to assess the interaction of the rise in interest rates on economic activity and the deficit, shows that a rise in interest rates leads to a fall in activity and increase in budget deficits, whereas a deficit policy only has a short-term effect on activity.

The main limitation of this study is that, unlike previous studies, it does not provide information on the existence or not of a complementarity between economic policy instruments. Although the vector autoregressive model (VAR) approach remains relevant, it nevertheless suffers from some limitations ranging from the loss of information to the static nature of the approach. Moreover, a SVAR can only give partial results as it does not take into account the possibility of simultaneity between the variables, and the economic specificities of countrieswithin the monetary union. Similarly, it does not capture the short-term effects and long-term cumulative effects of exogenous variables on the endogenous. This, of course, leads to a partial analysis of the interaction between economic policy instruments. Thus, a panel VAR model is relevant and takes into account these shortcomings which led to aglobal analysis (Ahortor and Adenutsi, 2009). Konté and Ndiaye (2012) employed a Bayesian VAR panel model in order to evaluate the consequences of shocks on the efficiency of macroeconomic policies (monetary and fiscal) within the WAEMU. They found that fiscal policies adjust to shocks with a very limited room for change.However; the relative effectiveness of monetary policy is reflected in the degree of response to shocks affecting inflation, the import rate and trade. Even if this result is interesting, it remains limited in scope regardingthe Bayesian approach used. Although, it is recognized that the Bayesian VAR gives more precise results than the standard VAR, it relies on the use of the parameters (the Minnesota priorμ = 0.2; φ = 0.5) which are not based on economic or empirical justification. Indeed, the parameters of the model are considered as random variables to which the analyst assigns a priori distributions, in order to make the estimates. It appears that the results are not insensitive to the choice of the a priori distribution in VAR modeling, particularlythe "Minnesota prior".

In this respect, we differentiate ourselves from this methodological approach by specifying a simple panel VAR model that can remedy the aforementioned shortcomings. This paper is a continuation of the methodological approach adopted by Konté and Ndiaye (2012), inclusive of the role of the economic cycle in the identification of a relationship of interdependence or non-independence between instruments of economic policy within the WAEMU zone.

3- Methodological Aspect of the Study

3-1-Motivationof VAR in Panel (PVAR)

The vector autoregressive model (VAR) regression on panel data goes back to the work of Love and Zicchino (2002), which examines the relationship between financial development and dynamics of firms' investment behavior in 36 countries. Given the renewed interest of this new macro-econometric approach, it was subsequently relayed in empirical studies seeking to understand the interaction between the different macroeconomic variables. Hence, for this study, the use of panel VAR is justified in several respects.

First, the consideration of monetary and fiscal policy indicators in the same VAR model allows to analyze the interaction between the various authorities (Badarau and Ndiaye, 2010). This is very interesting as we seek to analyze the effect of a fiscal shock on the monetary variable and vice versa through interaction between policy instruments.
In econometric terms, the PVAR approach permits to control the individual heterogeneity of ACFZ (Beguy, 2012). The fact that the WAEMU economies are subject to high degree of heterogeneity, the use of this approach is appropriatecompared to another methodological alternative. Love and Zicchino (2006) stipulated that PVAR combines the unobserved individual heterogeneities between the countries while the traditional VAR approach considers all the variables of the system as endogenous. The PVAR approach captures not only the stochastic structure and the co-movement of the variables, but also allows to study the dynamics in terms of deviation from the long-run equilibrium within the sampled countries(Gbenou, 2015).

Outside this scope, the PVAR permits to identify the short-term effects and also the cumulative long-term effects between the variables (Ahortor et al., 2009). Thus, these effects highlighted are instruments of analysis of existing interaction between the different variables of the model. In practical terms, the PVAR provides an opportunity to analyze interaction between different instruments (monetary and fiscal policy indicators).

However, coherence between policy instruments in terms of complementarity or substitutability depends fundamentally on the conjuncture. In practice, there is complementarity in time of recession and substitutability during expansion between these instruments (Badarau and Ndiaye, 2010). In this respect, the analysis of the PVAR in this studyconsiders not only monetary and budgetary variables, but also the economic cycle.

3-2- Modeling

The analysis of the PVAR model combines, not only techniques of panel data treatment, but also those of VAR modeling. In view of these developments, the model can be written following Hristow et al. (2011) and Ravn et al. (2012):

$$Z_{it} = \alpha_i + B_1 Z_{i,t-1} + B_2 Z_{i,t-2} + B_3 Z_{i,t-3} + B_4 Z_{i,t-4} + \dots\dots\dots. + B_p Z_{i,t-p} + \varepsilon_{it} \dots$$

The matrix form of this equation is written:

$$Z_{it} = \alpha_i + \sum_{j=1}^{P} B_j Z_{i,t-j} + \varepsilon_{it}. \qquad \text{N°. 1}$$

With: α_i a matrix of constant terms explaining the potential heterogeneity across units;

$$Z_{it} = \begin{bmatrix} TID_{it} \\ SBB_{it} \\ CF_{it} \\ Cycle_{it} \\ TCR_{it} \end{bmatrix} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.. \quad \varepsilon_{i,t} = \begin{bmatrix} \varepsilon_{i,t}^{TID} \\ \varepsilon_{i,t}^{SBB} \\ \varepsilon_{i,t}^{CF} \\ \varepsilon_{i,t}^{Cycle} \\ \varepsilon_{i,t}^{TCR} \end{bmatrix}$$

- Z_{it} is the matrix comprising the endogenous variables for country i at period t. It includesthe policy rate of the CBWAS(Central Bank of West African States), the ratio of basic fiscal balance to GDP, the ratio of final consumption to GDP, the ratio of output gap to GDPcapturingeconomic conjuncture (cycle) and the real exchange rate. The variables are in logarithms.
- ε_{it} is the matrix of shocks or innovations at period t in country *i.*
- B is the matrix of VAR coefficients in panel and p the optimum number of lags.

$$\mathbf{B}_j = \begin{pmatrix} b_{1,j}^{TID} & b_{1,j}^{SBB} & b_{1,j}^{CF} & b_{1,j}^{Cycle} & b_{1,j}^{TCR} \\ b_{2,j}^{TID} & b_{2,j}^{SBB} & b_{2,j}^{CF} & b_{2,j}^{Cycle} & b_{2,j}^{TCR} \\ b_{3,j}^{TID} & b_{3,j}^{SBB} & b_{3,j}^{CF} & b_{3,j}^{Cycle} & b_{3,j}^{TCR} \\ b_{4,j}^{TID} & b_{4,j}^{SBB} & b_{4,j}^{CF} & b_{4,j}^{Cycle} & b_{4,j}^{TCR} \\ b_{5,j}^{TID} & b_{5,j}^{SBB} & b_{5,j}^{CF} & b_{5,j}^{Cycle} & b_{5,j}^{TCR} \end{pmatrix} \dots\dots.$$

In other words, B is the matrix of coefficients associated with the matrix of lagged endogenous variables of order n. $b_{1,j}^{TID}$ is the coefficient b_1 of the laggedpolicy interest rate (TID) of order j for all countries. Similarly, the other coefficients can be read.

However, it is important to note that the VAR model is only valid on stationary variables. When certain variables are non-stationary in level and there is at least one cointegrationrelationship between them, the analysis will be done on a vector error correction model for panel data. Conversely, in the absence of cointegration between the variables, the VAR modeling is done on stationary variables. In this case, the variables that are not stationary in level but in first differences were taken in difference.

3-3- Preliminary Tests

Also called diagnostic tests, preliminary tests wereperformed prior to the estimation of the PVAR. Among these, the following tests were employed:

- (i) - Pesaran (2004) test of stationarity on panel data;
- (ii) - Akaike and Schwarz information criterion that allow to determine the optimum number of lags for the model;
- (iii) -Cointegrationtest of Pedroni (1999) in the case where the variables are not stationary in level. This test was performed at that stage and not directly after thetest of stationaritybecause it uses the optimum number of lags determined;
- (iv)- The causality test on panel data followingDumetriscu and Hurlin (2011). This test allows for individuals heterogeneity in terms of non-causality in the sense of Granger. The null hypothesis testedis that of non-homogeneouscausality, against the alternative that there is at least a causality between the variables of the model. This causality test permitted to determine the exogeneity or endogeneity of the variables include in the PSVAR. This is necessary for the structural shocks modeling since it determines how variables interact in the short and long term.

3-4-Validation Tests

After estimating the PSVAR, a series of tests was carried out to validate the results through analysis of variance decomposition and impulse response functions. Among these tests, the following were executed: (i) PSVAR stability test; (ii) autocorrelation test. Note that, to move from a single VAR panel to a structural vector autoregressive (SVAR), it is necessary that the innovations vector be correlated so that the impulse response functions are interpretable. Otherwise (absence of autocorrelation), a simple VAR with the impulse response functions may be used. By cons, in the presence of a SVAR (presence of autocorrelation), in order to interpret the impulse response functions, the literature advocates to conduct an orthogonalizationof innovations in the system (because of a likely correlation of innovations). Cholesky decomposition is the most popular method for this purpose. This is based on statistical and mathematical constraints. In thisstudy the method of shock identification recently proposed by Jacobs and Wallis (2007) was used for the interpretation of shocks from impulse response functions. Jacobs and Wallis (2007) proposed to identify the cointegration relationships using a vector error correction model and used these relationships as shocks identification tools. This technique relies on the existence of cointegrationbetween variables.

However, for the purpose of this study, the analysis was limited to the impulse response functions; that of decomposition of the variance have been obscured. In fact, analysis of the impulse responses functions denotes the sign and the time horizon of the response of a variable in the modelafter a shock on another variable. It analyzes the dynamic behavior of target variables from the shock simulations on the variables of interest. Regarding the methods of estimation, the ordinary least square (OLS) are inappropriate because of the combination of the fixed effects and the lagged endogenous variables, and the existence of possible residue correlation among countries (Ravn et al., 2012). To avoid these risks, the Generalized Least Squares (GLS) was usedto estimate the PSVAR.

3-5-Extraction procedure of the economic cycle

The study adopts the smoothing method ofHodrick-Prescott (HP) which is used in most empirical studies to identify the permanent and transitory components of macroeconomic series. However, the use of this filter is subject to controversy regarding the smoothing parameter used which is based on various assumptions (Gbenou, 2015). To address these critics, the improved filter ofHodrick-Prescott based on the approach ofKimbambuKabuyaKalala (2012) was used. Actually, Kimbambu Kabuya Kalala (2012) adoptedan univariateHodrick-Prescott filter based on the six (6) neoclassical assumptions for extraction of the permanent and transient component of the series. These assumptions give six different values of the smoothing parameter (λ).

In this approach, the authors recommended as smoothing parameter the mean ($\lambda=27$) obtained based on the six assumptions or six values of the smoothing parameter.

3-6- Data Source

The paper used essentially secondary data from two sources: World Development Indicators (WDI) and the various reports of the CBWAS. Data on basic fiscal balance andpolicy interest rate are extracted from the various reports of the CBWAS. Those relating to investment ratios, final consumption, real exchange rate and economic cycle were calculated using data from WDI database. The study used data covering theperiod from 1980 to 2013.It coversall theWAEMU countries with the exception of Guinea Bissau. The variables include in the model are:

- o Basic fiscal balance (SBB) ratio to GDP;
- o Short term average interbank market rate was used to capture the policy interest rate (TID) ofthe CBWAS;
- o Economic cycle or output gap (X) defined as a ratio to GDP of the gap between observed and potential GDP;
- o Real exchange rate (TCR) in each country taking France as partner or foreign country. TCR=E.P_e/P_i., with $P_i$the domestic prices,$P_e$the Foreign prices (France), and E represents the nominal exchange rate between CFA and Euro. The use of the nominal exchange rate is justified by the fact the European Union countries are the main trading partners of the WAEMU countries. The ideal would be to use the real effective exchange rate, but these data are not available for each country.
- o Final consumption expressed as the ratio of final consumption of households and State to GDP.

4-Results

Results of the preliminary and validation tests are presented in Annex (Tables 1, 2, 3 and 4). These results lead to the specification of a SVAR model in panel, allowing to proceed with the analysis of the impulse response function. The focus was on analysis of impulse response functions after a monetary shock (budgetary) in the business cycle. Figure 1 presents for WAEMU countries, the responses of the CBWASpolicy rate and the basic fiscal balance after a shock of monetary and fiscal policies.

Figure 1: Response functions (policy rate, basic fiscal balance) after a negative shock of 1% of monetary policy (fiscal policy).

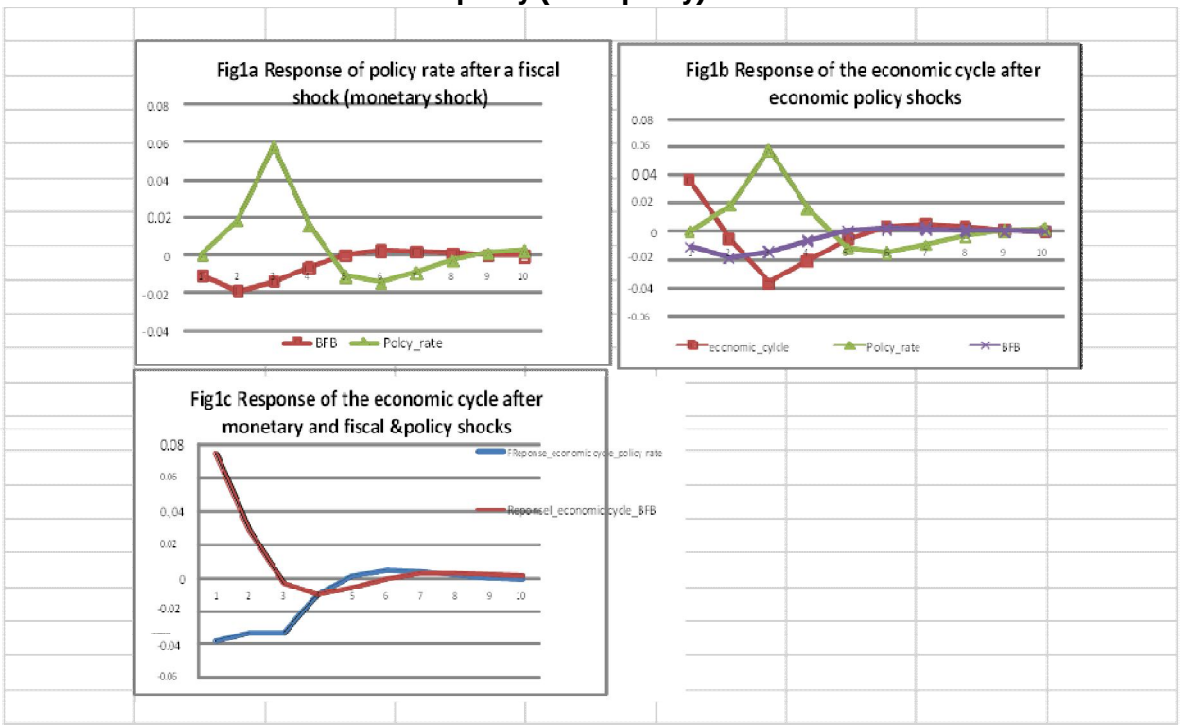


Figure 1.a shows the reaction of the policy rate as a result of a fiscal shock and *vice versa*. These different trends indicate that economic policy instruments were substitutable in the first eight (08) periods as a result of the advent of a shock. This is clearly amplified in the first four (04) periods. However, the extent of this substitutability was markedly reduced from the 5th to the 8th period which corresponds to the post-devaluation period of the WAEMU countries. Therefore the studysuggests that the devaluation of the CFA franc in the 1994s has helped to reduce the incoherence of the economic policies formerly observed. Moreover, the analysis of impulse response functions shows that economic policy instruments become complementary, or even recurrent, after the ninth period once these shocks have disappeared. This result could be partly due to the effects of the mechanism of Convergence, Stability, Growth and Solidarity Pact (PCSCS) which reinforced the various reforms undertaken by the CBWAS in

order to ensure better coordination of economic policies within the WAEMU. However, as pointed out by Badarau and Ndiaye (2010), the consistency between the policy instruments in terms of complementarity or substitutability depends on the economic cycle. Indeed, in practice, there is complementarity between instruments in thetime of recession and substitutability during expansion period. To better appreciate this consistency, we associate with the previous analysis the cyclical condition (recession vs. expansion) through the response of the economic cycle as a result of economic policy shock (Figure 1.b).
Based on this, three observations are made:

- (i) - when the economic policy instruments are substitutable with an accentuated magnitude, the economic cycle is in recession ;
- (ii) - when the economic policy instruments are non-accommodating with a small scale, the economic cycle is expanding ;
- (iii) - when the economic policy instruments are accommodating or complete the economy is stabilizing.

Once again, these different results showedthe non-consistency of economic policy instruments for economic stabilization in WAEMU countries. This agrees with Demirel (2010) who found that in the franc zone countries, monetary and fiscal policy instruments are not effective in stabilizing function. Contrary to our expectation, there is no complementarity (substitutability) between monetary and fiscal instruments in a recession (expansion). Thus, there is a lack of explicit coordination of the objectives (conflict of objectives) between the different authorities in charge of the economic policy. This derives from the heterogeneity of preferences, and may not only undermines the guarantee of non-inflationary growth (SarrFodé, 2011), but also the macroeconomic stability or long-term economic growth (Combey, 2014).

Our results also confirmed those obtained by Dramani (2007) that, in the WAEMU zone, despite provision of the mechanism of Convergence, Stability, Growth and Solidarity Pact (PCSCS), fiscal policies act as substitutes for monetary policy. Figure 1.c shows evidence of such a result. Indeed, when a fiscal shock generates a recessive effect on the economic cycle in the first four (04) periods, a monetary shock generates an expansionary effect. These effects converge and stabilize for the two instruments from the 7 th period.

Figure 2 provides information on the instrument (monetary or fiscal) that has the most impact on theeconomy cyclicality, and on the policy interest rate and the basic fiscal balance respectively.

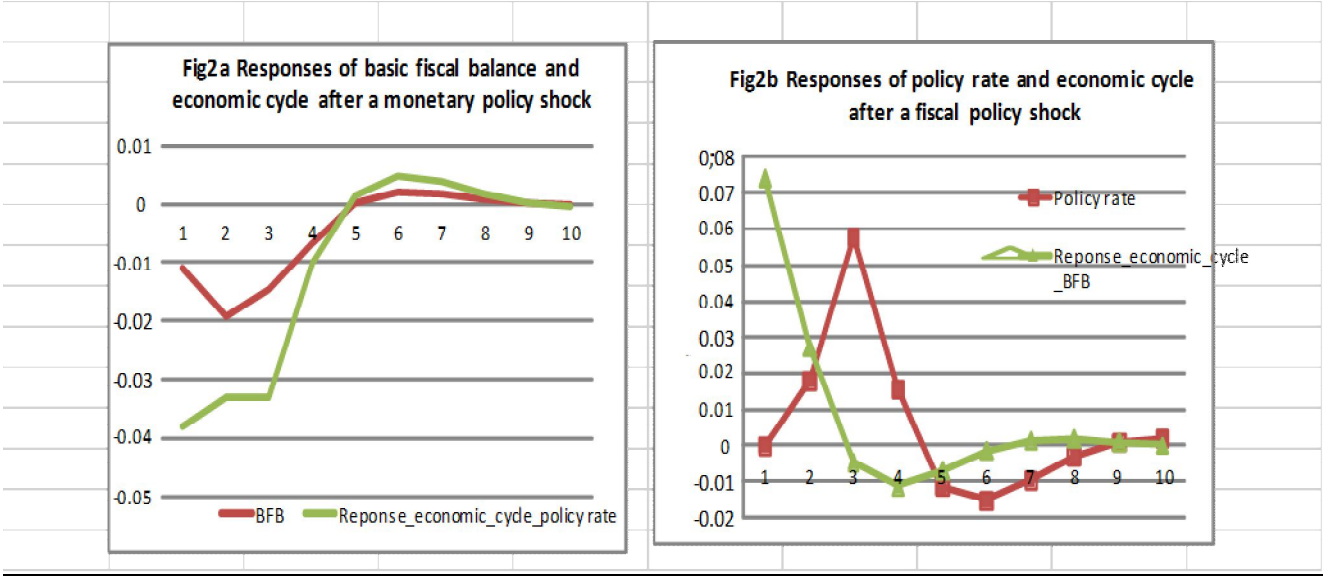


Figure 2: Response Functions (policy interest rate, basic fiscal balance, economic cycle) as a result of a negative shock of 1% of monetary policy (fiscal policy).

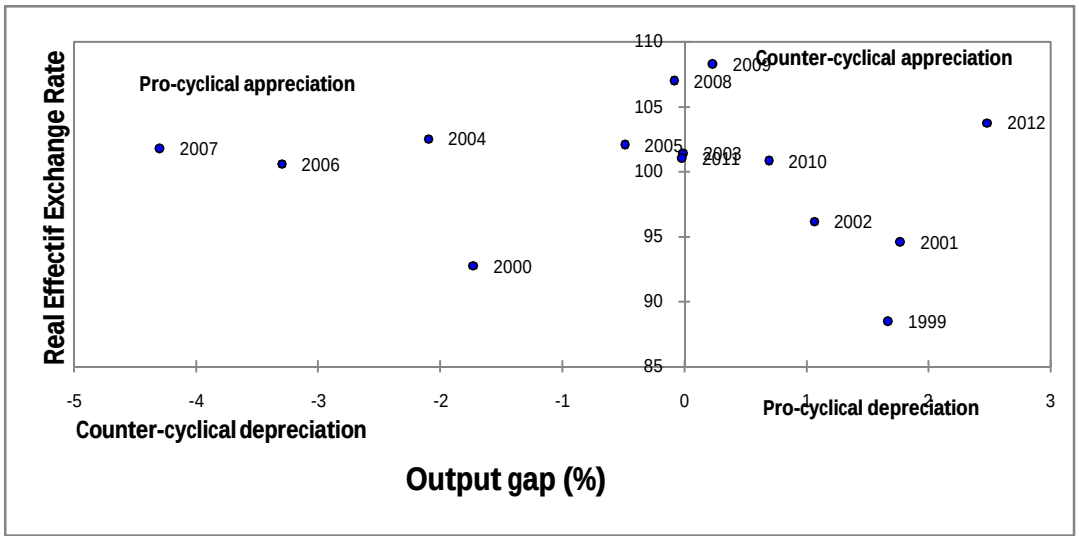
The analysis of the impulse response functions (Figure 2.a) shows that a monetary policy shock has a negative effect on the basic fiscal balance inthe first five (5) periods and stabilizes thereaftera slight improvement between the fifth and the seventh period. Similar result was observed for the economic cycle which experiences a recession and thereafter, a slight expansion.

This is obviously because a negative basic fiscal balance (amplification of the balance) leads to economic recession. By cons, animprovement of the basic fiscal balance would stimulate the economy through expansion. Concerning the effect of fiscal shock on the interest rate and economic cycle (Figure 2.b), two observations were made: (i) it generates a recessive effect on the economy in the first five periods before stabilizing thereafter with a slight expansion of economic activity; (ii) it generates an instantaneous positive effect on the policy rate during the first three periods. Subsequently, the effect decreases.

It follows that a negative shock on the basic fiscal balance entails an increase in the policy interest rate of the CBWAS in the first three periods with its recessionary effects on economic activity. A fiscal shock has more effect on monetary policy and the economic cycle compared toany monetary shock. This result justifies the main argument in favor of fiscal discipline (through the mechanism of PCSCS); which is based on the risk of monetary instability that an unsustainable fiscal policy in a state poses to the Union.

Denouncing the non-coherence of economic policy instruments, the adoption of a policy-mix centered on the cyclical position of WAEMU economies is necessary in maintaining the macroeconomic stability within the union. However, whenwe include the level of competitiveness (measured by real effective exchange rate) reached by the WAEMU economies, two major results arise(Figure 3). WAEMU countries found themselves between two situations over four, including the pro-cyclical and counter-cyclical appreciation. The first (pro-cyclical appreciation) is characterized by joint action of increasing fluctuations in aggregate demand (both policies were recessive) and an overvaluation of the average real effective exchange rate of the WAEMU zone; which inevitably leads to poor performance. The second situation (counter-cyclical appreciation) is characterized by attenuation of fluctuations in demand (reduction of the economic slowdown through monetary policy and expansionary fiscal policy) to which is added an appreciation of the real effective exchange rate.

Figure 3: Competitiveness and economic cyclicality within WAEMU.



Three observations were made from the figure 3: (i) the first four years (2000-2003) that followed adoption of PCSCS, the WAEMU zone was in the process of counter-cyclical appreciation as US while the euro zone was in pro-cyclical depreciation (Benassy et al., 2010); (ii) the next five years (2005-2008) were in turn, characterized by a phase of pro-cyclical appreciation; (iii) from 2009 to 2012, the WAEMU zone was again in a counter-cyclical assessment phase. In total, it is clear from evaluations, that there is a strong dominance in a counter-cyclical appreciation within WAEMU economies. This counter-cyclical appreciation could have a real sensitivity to the stimulant capacity of sustained and non-inflationary economic growth in the WAEMU zone.

5-Conclusion

Both theoretical and empirical literaturesreveal that the degree of interdependence between monetary and fiscal policy depends primarily on the cyclical position of the economy. From a structural vector auto-regression in panel, the study sought to verify if there is consistency of economic policy instruments for economic stabilization purposes within WAEMU countries. The results show that there is no complementarity (substitutability) between monetary and fiscal instruments in a recession (expansion). This result shows the non-consistency of economic policy instruments for the purpose of economic stabilization in the WAEMU countries. Also, the fiscal shock has more effect on the monetary policy and the economic cycle than any monetary shock.This justifies the main argument in favor of fiscal discipline; which is based on the risk of monetary instability that an unsustainable fiscal policy poses to the Union.

Overall, this study points out that, for any economic policy in WAEMU to be effective, itmust not only be coordinated between monetary and fiscal authorities, but taking into account of the economy cyclicality (in terms of recession or expansion). Furthermore, a strengthening of the mechanisms ensuring fiscal discipline through the PCSCS, is more necessary than ever in order to maintain the monetary stability within WAEMU zone.

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Appendix

Table 1: Descriptive statisticsof variables used in the model

Variables	**Number of observations**	**Mean**	**Standard error**	**Min**	**Max**
Basic fiscal balance(BFB)	245	-7.34	4.58	-31.07	2.87
Policy rate (PR)	245	3.37	5.44	-17.92	11.64
Real exchange rate (RER)	245	0.21	4.01	-16.72	12.52
Final consumption (FC)	245	90.70	7.61	70	112
Economic cycle(EC)	245	2326	2401	238	12460

Table 2: Matrix of correlation coefficient

Variables	SBB	TID	TCR	CF	OG
BFB	1				
PR	-0.1	1			
RER	-0.1	-0.4*	1		
FC	0.1	-0.3*	0.02	1	
EC	0.3*	-0.2*	-0.1	0.07	1

Note:*significant at 5% ; there is a weak correlation between variables of the model, then the risk of multicollinearty remains low

Table 3: Stationarity tests of Pesaran (2004)

	Test at level	First difference test
VAR variables in Panel	Statistics (p-value)	Statistics (p-value)
Policy interest rate	-4.71 (0.23)	**3.42 (0.001) ****
Basic fiscal balance	**-1.308 (0095) ***	**-2.38 (0.005) ****
Final consumption	**-3.294 (0006) ****	**4.72 (0.000) ****
Real exchange rate	-2.86 (0.19)	**1.325 (0.002) ****
Economic cycle (output gap)	**-3.056 (0001) ****	**-5.056 (0000) ****

Source: Author, from the estimation in Stata 12.1 / / Values in parentheses are p values associated with each statistic. * And ** respectively indicate stationarit at the 5 and 10%.

From this table, it appears that all of our variables are stationary in level except the policy interest rate and the real exchange rate. However, all of them are stationary in first difference. These results lead us to test the presence of cointegration between the variables. Before this, the AIC and SC tests had been conducted in order to determine the optimal lag. It appears from the test information criteria (AIC, SC) that the optimal lag is two (2).

Table 4: Result of cointegration test of Pedroni (1999)

		Statistique	P-value
Dimension intra	Panel v-Statistic	-1.616110	0.9892
	Panel rho-Statistic	-1.790512	0.1276
	Panel PP-Statistic	**-3.978006**	**0.0009**
	Panel ADF-Statistic	-0.780163	0.2766
	Group rho-Statistic	-0.416322	0.3386
Dimension inter	**Group PP-Statistic**	**-3.474558**	**0.0003**
	Group ADF-Statistic	-0.304321	0.3804

Source: Author, from the estimation in *Eviews 8.1*

Pedroni (1999) proposes seven tests: four based on dimension "within" (intra) and three on the dimension "between" (Inter). The null hypothesis of the test is the lack of co-integration. The rejection of this hypothesis allows the conclusion of the existence of a cointegration relationship between the variables.

These tests are based on the null hypothesis of no intra-individual co-integration for both homogeneous and heterogeneous panels. In this study, two of the seven cointegration test statistics of Pedroni have a probability less than 5 %, suggesting the absence of cointegration between the variables of study.

Conclusion: No cointegration; which allows the use of a simple VAR on stationary variables.

Table 5: Errors autocorrelation test

VAR Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Date: 08/20/16 Time: 20:16
Sample: 1980 2013
Included observations: 238

Lags	LM-Stat	Prob
1	40.02082	0.0290
2	54.03231	0.0007
3	46.78536	0.0052
4	31.32497	0.1785
5	23.14020	0.5694

Source: Author, from the estimation in *Eviews 8.1*

The results of the auto-correlation tests indicate a probability less than 5%.

Conclusion: Presence of auto correlation of errors, suggesting the use of the Structural VAR in panel (PVARS) through the method of shocks identification proposed by Jacobs and Wallis (2007). This technique relies on the existence of cointegration relationships between variables.

Table 6: Panel data causality test and DumetriscuHurlin (2011)

Pairwise DumitrescuHurlin Panel Causality Tests
Date: 08/20/16 Time: 20:43
Sample: 1980 2013
Lags: 2

Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
PR does not homogeneously cause FC	7.22091	-5.03016	0.0059
FC does not homogeneously cause PR	2.25362	1.18894	0.8707
BFB does not homogeneously cause FC	3.56763	1.36643	0.1718
FC does not homogeneously cause BFB	5.06483	2.91908	0.0035
BFB does not homogeneously cause PR	1.91451	-0.34792	0.7279
PR does not homogeneously cause BFB	9.19222	7.19934	6.E-13
BFB does not homogeneously cause RER	1.86808	-0.39607	0.6921
RER does not homogeneously cause BFB	2.09119	-0.16470	0.8692
BFB does not homogeneously cause CYCLE	7.65912	5.60946	2.E-08
CYCLE does not homogeneously cause BFB	2.94013	0.71569	0.4742
RER does not homogeneously cause CYCLE	2.90161	0.67574	0.4992
CYCLE does not homogeneously cause RER	4.61453	-2.65901	0.0029

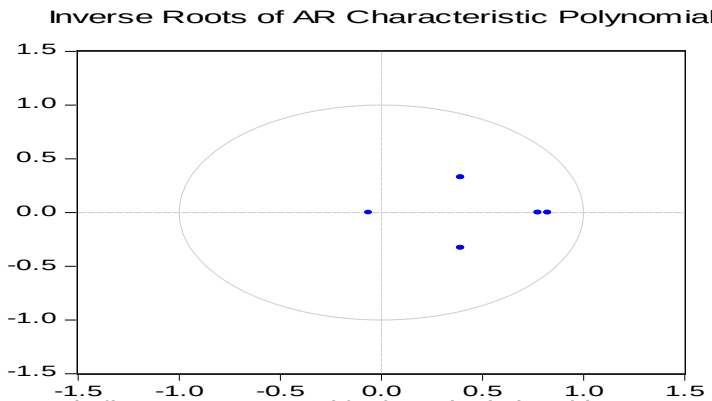
Note: The non-causality hypothesis is rejected at 5%.

The assumption of non-homogeneous causality is rejected at a probability of less than 5%.

The results of DH (2011) causality test direct us to adopt the following order in our VAR model in panel:

PR → FC → BFB → CYCLE → RER NB: → : precede.

Figure 1: Stability Test



This stability test of the PSVAR indicates no root outside the unit circle. This suggests the stability of the PSVAR model.