

A Re-Evaluation of Fiscal Cyclicality in WAEMU Countries

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Bezeme Yves Valéry Franck

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Bezeme Yves Valéry Franck

Université Félix Houphouët-Boigny de Cocody-Abidjan

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Abstract

The main goal of this study is to characterize and explain the cyclical behaviour of fiscal policy of countries in the West African Economic and Monetary Union (WAEMU) zone. To carry out the investigation, cyclicity was studied in an empirical manner using theoretical models formulated by Ilzetzki and Végh (2008). We found that the level of fiscal procyclicality varies with the type of budgetary expenditures. The study discusses various factors that could explain why fiscal policy is often procyclical. The results obtained using an econometric model tested in a dynamic panel show that multilateral rules, supported by the work of credible budgetary institutions, the reduction of the rate of external debt, and better access to concessional financing calculated through the flows of public aid to the most important development projects, seem to be necessary for implementation of the anticyclical budgetary policy in the region.

Keywords: Fiscal stabilization, Fiscal process, LSDVC, GMM, WAEMU

1. Introduction

A vast amount of empirical studies¹ on the question of cyclicity of the fiscal process conclude that the fiscal policy of developed countries is counter-cyclical or acyclic whereas that of developing countries is procyclical (Gavin and Perotti, 1997; Talvi and Vegh, 2005; Kaminsky, Reinhart and Végh, 2004; Manasse, 2006); Alesina et al, 2008) and Ilzetzki and Carlos, 2008). Furthermore, the same studies explain this procyclical behaviour by giving several reasons that we could place into two major groups of factors: institutional and political factors (absence of counterweights to power, corruption) which lead to excessive expenditure in an economic boom when there are abundant budgetary resources; and, financial constraints caused by the weakness of internal systems and by limited access to international financial markets, which are severe in periods of low economic growth and which thus lead to a high reduction in expenditure (particularly Gavin and Perotti, 1997). Alternatively, the recent financial and economic crisis has highlighted the fact that a context of high indebtedness could enhance procyclical behaviour in budget policy because it reduces the fiscal space, and the efficiency of a fiscal stimulus (Lledo et al, 2011; World Bank, 2015; Combes et al, 2017).

Regarding West African Economic and Monetary Union (WAEMU) countries, to our knowledge, only the study by Guillaumont-Jeanneney and Tapsoba (2011) focuses on the zone. The authors demonstrate that multilateral rules of the Convergence, Stability, Growth and Solidarity (PCSCS) pact strengthen the procyclical character of fiscal policy. This study distinguishes itself from the previous study in three ways: Firstly, it examines the nature of cyclical behaviour of fiscal policies in member countries of the Union using indicators of cyclicity calculated using a disaggregated approach to public expenditure.² This method allows us to highlight the components of government expenditure that are subjected to procyclicity, and also the probability of success of budget adjustment (Alesina and Perroti, 1995). Then an examination of the cyclicity of the components of public expenditure in tandem with that of the cyclicity of overall expenditure allows us to know if public investment expenditure appears to have become more pro-cyclical since the introduction of the fiscal convergence criteria³ in 1994 (Blanchard and Giavazzi, 2004)⁴. Finally, we examine the explanatory factors of this cyclical behaviour found in member countries of the Union and evaluate the influence of their fiscal process on the capacity of WAEMU countries to operationalize anticyclical fiscal policies. Indeed, most econometrics

studies explaining the procyclical characteristics of fiscal policy using institutional factors and policies often arrive at ambiguous results. For example, studies by Calderón et al (2004 and 2016); Diallo (2009) and Frankel et al (2013) find an impact, whereas Llédó et al (2011) do not find any. However, fiscal performance seems to be affected by fiscal processes and institutions, rather than the implicit notion of institutions when one examines fiscal procyclicality⁵.

Our results indicate that fiscal policy is procyclical in one area; in particular, procyclicality is quite high for public expenditure investments. Furthermore, this fiscal procyclicality is explained by the insufficiency of budgetary leeway (proxied by the rate of indebtedness), which reduces the possibilities of fiscal stimulus, thus the efficiency of relying upon fiscal policy as an anticyclic action. Nevertheless, the definition of more flexible fiscal criteria that favours investments is a major step to take in strengthening the credibility of fiscal policy and the macroeconomic framework in general. Furthermore, fiscal regulations are very effective in stopping procyclical fiscal policies once they are in tandem with the strengthening of the quality of fiscal institutions and processes. Finally, in an economic zone subjected to significant shocks due to the fact that member countries depend on one or two export products, it is important to work towards diversifying the sources of exports by bringing equalization programmes into play to allow for operationalization of a counter-cyclical active fiscal policy.

The rest of the study is organized as follows: The second section deals with the literature review. The third gives a background to the study by presenting the stylized facts of the main macroeconomic developments and the conduct of fiscal policy of the Union. In the fourth section, we present the data and the methodology of the study. The fifth section gives a commentary on the econometric results. Finally, in the last section, we give the conclusion and offer recommendations for economic policy.

2. Literature review

Over the past decade, most studies focusing on fiscal policy have been dedicated to the question of cyclicity. Several factors were proposed to explain the reasons that hamper the capacity of developing countries to adopt optimal policies of stabilization. Two main strands of factors were proposed as determinants of fiscal procyclicality in existing studies.

One of these is related to borrowing constraints, which arise from the imperfection of capital markets. Gavin and Perotti (1997) argue that governments of developing countries are incapable of carrying out counter-cyclical budgetary policies due to rigorous financial constraints that prevent them from borrowing in periods of economic recession. Nevertheless, these governments are compelled to reimburse their debt, which consequently obliges them to adopt a procyclical fiscal policy. Kaminsky, Reinhart and Végh (2004) demonstrate that capital entry flows in developing countries have a procyclical propensity, which makes such countries to have a tendency to borrow during economic boom periods and to refund during periods of economic downturn. This procyclical access to international capital markets has obliged developing countries to adopt procyclical fiscal policies.

Caballero and Krishnamurthy (2004) describe the limits of financial deepening to explain the procyclicality of fiscal policy of developing countries. Consequently, when the economy experiences financial constraints when borrowing, an increase in public expenditure could displace private investments and thus become more restrictive. Furthermore, these researchers emphasize that the absence of the possibility of accessing international capital markets could make the fiscal policy procyclical when the economy is experiencing recession, which is a common characteristic of developing countries. This approach could explain the situation of developing countries in a convincing manner, but it has been criticized in the sense that it could not explain the reason why these countries do not succeed in accumulating sufficient reserves in periods of economic boom to put in place recession-ready fiscal policies in periods of recession (Alesina, Campante and Tabellini, 2008; Ilzetzki, 2011), and also that it is not based on empirical methods. On the contrary, fiscal policy tends to be more often counter-cyclical in countries characterized by high levels of financial development and a fiscal policy that targets inflation (Aghion and Marinescu, 2007) or in economies that are more externally oriented (Afonso, Agnello and Furceri, 2008). However, Bénétrix and Lane (2013), in a recent study, demonstrate that the budgetary cycle is affected by the financial cycle and the production cycle for all the member countries of the Euro zone.

The other series of factors highlighted in the studies emphasize the quality of the institutions on which the studies are based, and on the determinants of economic growth. They demonstrate that the best institutions allow fiscal policy to be less procyclical. Indeed, a procyclical fiscal policy arises from the incapacity of governments to save during periods of economic stability due to a “greed effect” (Tornell and Lane, 1999; Akitoby et al, 2006)⁶, corruption (Alesina et al, 2008), high political pressure to increase public expenditure (Lane, 2003; Abbott and Jones, 2013), diverse preferences regarding distribution of income (Woo, 2006), a high variability of tax bases, and policy incentives that are far removed from the public good (Talvi and Carlos, 2005) or a high volatility in production (Coricelli and Ercolani, 2002; Lane, 2003; Debrun, Faruqee and Beetsma, 2004; Manasse, 2006)⁷. Furthermore, recent studies by empirical researchers find that a strengthening in the quality of institutions is favourable to implementation of anticyclical fiscal policies (Frankel et al, 2013; Calderon et al, 2016).

Diallo (2009) examines the impact of institutions on fiscal policy and notes the existence of procyclical fiscal policies in Sub-Saharan Africa countries, including in WAEMU zones, but concludes that this could be reversed through strong institutions⁸. However, Lledó et al (2011) find that an increase in number of policy making bodies does not have an impact on procyclicality in Sub-Saharan Africa (including all WAEMU member countries). Indeed, these researchers use several indicators to capture institutional modifications and conclude that there is no relationship between policy making bodies and fiscal cyclicity in Sub-Saharan African countries.

Nevertheless, one could focus on fiscal institutions such as budget development systems and budget transparency when examining fiscal procyclicality, because fiscal performance seems to be more affected by fiscal institutions. Yet, this is not addressed in research studies.

However, several reasons could be given to explain the fact that the budget process could lead to a procyclical fiscal policy. Firstly, fiscal transparency could reduce corruption and it could in turn help in minimizing fiscal procyclicality. Secondly, is the implementation period of fiscal policy as a result of policy and institutional measures such as parliamentary approval. Furthermore, some heads of public expenditure are inflexible, and this hinders the capacity of budgetary adjustment. These characteristics make it more difficult for governments to implement a counter-cyclical fiscal stimulus both in developed and in developing countries. Thirdly, the lack of prediction capacity could be one of the reasons for fiscal procyclicality. It is difficult for policy makers to predict with certainty the state of the economic cycle at a given moment. The policy makers determine the fiscal policy behind a veil of ignorance on the state of the economy in reality (Manasse, 2006), such that they often decide to formulate an expansionist fiscal policy after the economy begins to recover (Burger and Jimmy, 2006). This phenomenon is more frequent in developing countries that have a poor capacity of forecasting the economic situation.

Alternatively, the recent financial and economic crisis shows that resorting to fiscal policy as an anticyclical action could be hindered by insufficient budgetary leeway (Lledo et al, 2011; World Bank, 2015; Combes et al, 2017). Furthermore, the level of fiscal procyclicality could vary according to the expenditure categories (Ilzetki, 2011; Lane 2003). Thus, studies by Auerbach and Gorodnichenko (2012) prove that the multipliers of variables of disaggregated fiscal expenditure behave differently as compared to aggregated multipliers of fiscal expenditure, and that military expenditure has higher multipliers. Consequently, the components of expenditure in each country could lead to a different level of fiscal procyclicality. Developed countries tend to have higher levels of current transfers than developing countries for them to minimize the level of fiscal procyclicality through automatic stabilizers.

In summary, it is evident from literature review that the problem addressed is pertinent and is a current one. Indeed, the budget tool is the main instrument at the disposal of WAEMU countries for economic intervention. Furthermore, although research studies that focus on the question of fiscal cyclicity abound, very few focus specifically on the member countries of the Union. Thus, this study intends to fill the research gap by focusing on member countries of the zone.

3. Stylized facts

The objective of this section is to undertake an analysis of the trends and evolutions in the fiscal positions of WAEMU member states. In this study, we will divide our analysis into three periods: from 1970 to 1993, from 1994 to 1999 and from 2000 to 2013. We acknowledge that the economic history of the member states of the union has been marked by two major events: the devaluation of the Franc CFA in 1994 and the enactment of the Convergence, Stability, Growth and Solidarity (PCSCS) pact in 1999.

1970-1993

This period is characterized by deterioration of public finances of member countries of the Union. Benefiting from an economic boom,⁹ the member countries of the Union undertook expansive fiscal policies that broadened the deficit by 5% of the GDP, on average, between 1975 and 1985. A turnaround in the cost of raw materials (precisely starting from 1982 and the depreciation of the dollar (currency used in their external trade) led to an increase in budget deficits, which reached an average of 7.6% between 1986 and 1993. The member states of the union were forced to adopt Structural Adjustment Programmes (SAPs) during the 1980s to put government finances into better order, both by cutting public expenditure (reducing the number of state employees, reducing subsidies, and privatization) and by raising government income (tax reforms).

1994-1999 (Budgetary consolidation strategies)

As compared to the previous years, the period 1994-1999 was characterized by a successful turnaround in the state of public finance due to the devaluation of the Franc CFA in January 1994. Because budgetary consolidation strategies were carried out in a satisfactory manner, it resulted in a reduction in overall deficit as a percentage of Gross Domestic Product (GDP) from 5.2% in 1994 to 1.4% in 1996. However, in the period 1997-1999, the mechanical effect of devaluation almost disappeared. The adjustment dynamics of the initial years after devaluation came to an end as a result of deterioration in the main budget balance, which reduced from 0.1% of GDP in 1997 to -0,6% in 1999. This situation led to adoption of a multilateral supervisory process, which is PCSCS, on 8 December 1999.

2000-2013

More than 10 years after the operationalization of the WAEMU¹⁰ agreement, considerable progress in budgetary consolidation strategies, and a higher convergence of economic policies were observed in WAEMU countries. Effectively, the analysis of the performance of public finance management, studied through underlying budget balance, has greatly improved as compared to how it was by the end of the 1980s and the beginning of the 1990s. However, the objective of achieving a zero or positive balance has been seesawing, lying within an interval that varies between -5.8% and 2.7%, a variation of 8.5 per cent (Annex 2). These figures show the difficulties faced by these states in terms of meeting the criteria. Thus, one is led to ask whether this is so because of inadequate policies (given the repeated violations) or whether the criteria itself needs to be re-evaluated¹¹.

The question that is raised as a result is the following: Has the quest for balanced budgetary positions also been an obstacle to the counter-cyclicality of fiscal policy due to the existence of a possible conflict between supporting growth and the goal of protecting macroeconomic stability? Only an empirical study can provide us with elements that would provide pertinent answers.

In the subsequent parts of this study, we examine the logical impact of the fiscal process and multilateral supervision on the cyclical behaviour of fiscal authorities and whether the degree of procyclicality varies according to the categories of public expenditure.

4. Econometric analysis

Econometric Approach

This section examines the cyclical properties of government expenditure in WAEMU countries based on a disaggregated approach of the components of public expenditure of the government in general and per country, and then examines the differences in cyclical properties between the periods before and after the introduction of multilateral fiscal rules. Finally, we will establish the reasons for this cyclical behaviour. Particularly, we highlight the role of the quality of budgetary process, the budgetary leeway (proxy of the rate of external indebtedness), of the terms of trade and the level of economic development (captured by the variable on per capita GDP), external aid, and the capacity of the government to undertake anticyclical budget policies.

To do so, our empirical strategy is in two stages: in the first stage, we seek to determine the cyclical character of the fiscal policy in the Union and per country using a disaggregated approach to public expenditure.

In the second stage, we determine factors that could explain the fiscal cyclical nature of the member countries of this zone. To do so, the estimation specification of Alesina et al (2008) is used to explain the fiscal cyclical behaviour.

Nature of fiscal cyclicity in WAEMU countries

Research on cyclicity of fiscal policies has become rich over the past few years. Most often, empirical studies focusing on a country or on a group of countries, are based upon a reaction to fiscal policy, which is generally presented in this manner¹²:

$$Fiscal_{it} = \alpha_i + \gamma Fiscal_{it-1} + \beta \Delta GDP_{it} + \varepsilon_{it} \quad (1)$$

$$Fiscal_{it} = \alpha_i + \gamma Fiscal_{it-1} + \beta \Delta GDP_{it-1} + \varepsilon_{it} \quad (2)$$

$$Fiscal_t = \alpha + \gamma Fiscal_{t-1} + \beta \Delta GDP_t + \varepsilon_t \quad (3)$$

Whereby $Fiscal_{it}$ representing government public expenditure is used as an indicator of fiscal policy for country i during period t . The public expenditure of the government

is used to measure government actions on economic activities because they are more appropriate as instruments of economic policy than the result variables (public revenues) or targets (budget balance) following an argument developed by Kaminsky, Reinhart and Végh (2004)¹³. Indeed, public revenue and the budget balance are less appropriate for measuring the cyclical nature of the fiscal policy because they reflect results that are only partially determined by policy makers and are in themselves likely to be affected by cyclical fluctuations of GDP.

Thus, we examine fiscal cyclicity for the following variables of public expenditure: the government consumption expenditure ($GC_{i,t}$), investment expenditure ($GI_{i,t}$), and total public expenditure ($GT_{i,t}$). This categorization of government expenditure is based on economic classification of public expenditure and is derived from the Government Financial Operations Table (GFOT)¹⁴. $GDP_{i,t}$ is the real GDP of country i at date t , which is the proxy variable used to capture the direction of economic activity.

Equation 1 allows us to capture the overall cyclicity in the economic union through categories of public expenditure. To empirically verify the theoretical hypothesis developed by Ilzetzki and Végh (2008) for the WAEMU zone,¹⁵ we will examine the cyclical nature of the fiscal policy by estimating Equation 2. This allows us to take into account the impact of past economic growth on current expenditure by the government, whereas Equation 3 allows us to determine the fiscal cyclicity according to public expenditure, and per country.

A negative β value implies a counter-cyclical fiscal policy, which signifies that the fiscal authorities are cutting down (increasing) on public expenditure and the increase (lowering) of tax rates in the expansion phase (recession). This policy allows for the stabilization of the economic cycle. A positive value implies a procyclical fiscal policy if the fiscal authorities increase (lower) public expenditure and lower (increase) the tax rate in the expansion phase (recession). This policy is targeted towards strengthening the economic cycle. Finally, a null value indicates an acyclic reaction if the fiscal authorities maintain constant expenditure and tax rates during the economic cycle.

Further to the study of the cyclical behaviour of the fiscal policy in the WAEMU zone, an analysis of the factors of this cyclical behaviour will also be undertaken.

Determinants of budgetary behaviour

$$Fiscal_{it} = \alpha_i + \gamma Fiscal_{it-1} + \lambda Z_{it} * \Delta GDP_{it} + \varepsilon_{it} \quad (4)$$

Equation 4 allows us to explore the factors determining procyclicality of public expenditure of WAEMU governments. The econometric specification of Alesina et al (2008) is used to determine the role played by factors such as the quality of budgetary processes, the rate of indebtedness, development aid, external shocks (measured by the terms of trade), the level of economic development (captured by the variable GDP per capita), and the rules of multilateral supervision (PCSCS). Thus, Z represents the

vector of all the variables that could explain the fiscal procyclicality included in the model. The choice of these variables is motivated by factors likely to influence the adjustment capacity of member countries of the Union independent of the evolution of production. To verify the extent to which fiscal policy reacts to sustainability factors, we include the previous rate of foreign indebtedness¹⁶ ($DEBT_{i,t-1}$) to the equation (Wyplosz, 2002); Gali and Perotti (2003); and Cimadomo (2005). This obligation applies more particularly to WAEMU member countries through the Convergence, Stability, Growth and Solidarity (PCSCS) pact, and has thus been integrated among the convergence criteria, which limits the rate of indebtedness of member states. It is in relation to a ceiling in the ratio of outstanding internal and external public debt at 70% of the nominal GDP and the non-accumulation of outstanding internal and external payments, which are among the first-level criteria of PCSCS. Furthermore, public aid for development¹⁷ ($ODA_{i,t-1}$), standardized by the product, contributes to financing public expenditure. However, its favourable impact could be hindered by its irregularity. Thus, the volatility and unpredictability of aid increases GDP disruptions (Bulir and Hamann, 2003).

To control fluctuations of terms of trade (TEit), which are the main sources of exogenous shocks on public income and expenditure, these are represented by the relative gap in the level of terms of trade observed at their trend level¹⁸. This specification assumes that only an unexpected variation of terms of trade — in other words, a deviation regarding their trend — affects fiscal policy in the short term. By introducing fluctuations in terms of trade, one partially controls for the existence of automatic stabilizers. Income per capita measured through the per capita GDP ($PIBT_{i,t}$) should have a significant positive effect on the explanation of the fiscal procyclicality of the countries in our sample. Indeed, this variable allows us to empirically test the hypothesis according to which developing countries have a procyclical fiscal policy in general.

The fifth explanatory variable likely to influence the capacity of budgetary adjustment are the institutional variables, which are generally composed of the Political Risk Index (RP), the Economic Risk Index (RE) and the Financial Risk index (RF). Only the Economic Risk Index (RE) and the Financial Risk index (RF) would be retained in the subsequent part of this paper in so far as the two indexes are comprised of factors that are more influential in regard to the efficiency of the budgetary process. Consequently, the standardized economic and financial composite risk index (IREFN) is used as a proxy to appreciate the efficiency of the fiscal process of WAEMU member countries. This institutional indicator varies from 0-100 and is comprised of 10 factors. The IREFN composite index reflects per capita GDP, the real growth rate, the annual inflation rate, the budget balance as a percentage of GDP, the current account as a percentage of GDP, the servicing of external debt as a percentage of exports of goods and services, the level of external debt as a percentage of GDP, the current account as a percentage of exports of goods and services, the stability of the exchange rate, and net liquidity as months of import cover. It is constructed through a weighting of scores scalable from 0 to 5, from 10 to 15 points maximum regarding the risk factors

under consideration¹⁹. The total sum of the score of various factors constitutes the perception of the level of the economic and financial risk index of the country. The higher the total of points for a country, the lower its economic risk²⁰. This factor will reduce fiscal procyclicality the more the budgetary process is of good quality. The assumption of the influence of the rules of multilateral supervision on fiscal cyclicity of member states is evaluated by a dummy variable PCSCS, which takes the value 1 of 2001 to 2013 and 0 previously²¹.

Finally, the interaction term (PCSCS_IREFN)²² allows us to measure both the impact of multilateral budgetary rules of PCSCS and an improvement of the quality of the budgetary institutional framework of the government in reduction of fiscal procyclicality. Indeed, to measure the net impact of PCSCS multilateral regulations on fiscal procyclicality, we should control the quality of fiscal institutions that monitor the application of these rules and are supposed to guarantee secure budgetary processes within member countries of the area.

All the variables of vector Z are in interaction with the cycle of activity to estimate the effect of these variables on fiscal cyclicity. The coefficient of control variables indicates that the effect of each control variable on the level of fiscal cyclicity observed.²³ The coefficient λ of the interaction term between the control variables and the GDP growth rate corresponds to the variation in the level of the fiscal cyclicity when the control variable changes by a unit. Consequently, a drop in procyclicality is a function of the value of coefficient λ and the variations of the control variable. Thus, a drop in the level of the control variable diminishes (increases) procyclicality if $\lambda > 0$ ($\lambda < 0$) and is significant.

The symbol Δ expresses a variable of variation between two consecutive periods. ε_{it} designates the error term. *i* and *t* represent the country and the years, respectively.

Econometric treatment of the estimation models

The econometric model²⁴ used is that which allows us to characterize and rigorously explain the cyclical behaviour of fiscal policy within WAEMU member countries.

This sub-section presents Least Squares Dummy-Variable-Corrected (LSDVC) method and then discusses the use of alternative methods related to the presence of autocorrelation, heteroskedasticity or endogeneity of an explanatory variable.

Nickell (1981) demonstrated that an estimation using the dynamic model on panel data using OLS (Ordinary Least Squares) estimators and LSDV (Least Squares Dummy Variables) is biased when $N \rightarrow \infty$ and *T* are fixed, since the lagged endogenous variable is correlated with the error term.

Economics literature has developed several consistent estimators that use Instrumental Variables (IV) methods of Anderson and Hsiao (1982) and those of Dynamic Panel General Method of Moments (GMM) of Arellano and Bond (1991). These estimators have the advantage of proposing an efficient estimation of dynamic models in the presence of endogenous variables. However, these estimators have good properties when $N \rightarrow \infty$ and *T* are fixed, and when the instruments used are not

weak or in too large numbers. Another way of giving efficient estimation of dynamic models on panel data consists on correcting the bias of the LSDV estimator. Indeed, the LSDV estimator contains a small sample bias that makes it inconsistent. Kiviet (1995) uses a technique to approximate this bias in an asymptomatic manner and finds a correction formula. To put it into operation, he proposes to replace the bias parameters with those of the consistent estimator. Bruno (2005) uses a consistent estimator such as those of Anderson and Hsiao (1982) (AH), Arellano and Bond (1991) (AB) and Blundell and Bond (1998) (BB), which he introduces in the simplified formula of Bun and Kiviet (2003) and Bun and Carree (2006). Also, we use Anderson and Hsiao's (1982) GMM consistent system estimator (AH) to correct the bias of the LSDV estimator (Bruno, 2005).

The advantage of this method is twofold because the LSDV estimator often has a weaker variable than other estimators, and a bias correction in the LSDV estimator allows us to give a consistent estimation for all the panel dimensions. Besides, the Monte-Carlo simulations undertaken by Kiviet (1995) and Bruno (2005) show the superiority of the corrected LSDV estimator compared to the IV and GMM estimators regardless of the RMSE (Root Mean Squared Error) bias terms. Judson and Owen (1999), Bun and Kiviet (2003) and Bruno (2005), among others, advocate for the use of this estimator when the size of the cross-sectional sample is small. This method is greatly favoured by current econometrics studies.

However, contrary to the previous estimators (IV and GMM), which allowed for an efficient estimation in the presence of endogenous regressors, the LSDVC estimators expect, in the minimum, low exogeneity. Furthermore, the LSDV estimator with bias correction, initially proposed by Kiviet (1995), is also inappropriate because it is based on a hypothesis of the strict exogeneity of regressors, whereas in this study we state that the fiscal reaction of the state to variations in economic activity sometimes current (hence the LSDVC estimator is inappropriate because we have the current real GDP values). Nevertheless, the solution according to various authors (for example, Afonso and Hauptmeier, 2009) or Debrun et al, 2008) is to use the lagged values of real GDP in the equations²⁵. Consequently, we undertake an estimation of models 1 and 2 using the LSDV method, but only the results derived from the estimation of model 2 will be used for the analysis. Yet, the specification of model 1 is an essential characteristic of our study.

Indeed, the short-term budgetary policy aims to act in the short-term while reacting to its development²⁶. The possibility of endogeneity of variability of the fiscal policy of the government in the estimation model calls for an estimation using instrumental variables or dynamic panels estimated using the General Method of Moments (GMM). Furthermore, the fact that it could be argued that the first is at the origin of the second or vice versa could put in doubt the cyclic nature found in the study. This is precisely the argument advanced by Jaimovich and Panizza (2007) who state that the fiscal procyclicality found in developing countries could be questioned if we perfectly control questions of endogeneity. The dynamic panel General Method of Moments

(GMM) is a methodology that is also well adapted to circumvent problems of reverse causality and obtain the best estimation. Indeed, besides addressing the problem of omitted variables and the question of reverse causality, the GMM method also corrects the selection bias.

We also use this method²⁷ for the estimation of models (precisely Equations 1,2, and 4). The two-step GMM method is asymptotically efficient and robust for taking into account the heteroskedasticity²⁸. Nevertheless, many instruments could greatly weaken the Sargan/Hansen test of overidentification of restrictions (Bowsher, 2002). Another possible problem of GMM estimators is that they are consistent and without bias when the cross-sectional sample size (N) is large (Judson and Owen, 1999; Bun and Kiviet 2003; Bruno, 2005), whereas in smaller size or finished samples, the characteristics of the two-step GMM estimator could be problematic. Indeed, the problems of too many instruments discussed above are particularly serious in small samples (as is the case with our sample), since it is exactly in such cases when the rapid growth of the instrument count is to be expected most. Between the two estimators discussed above, this problem is expected to be more serious for the system GMM, since it uses more instruments than difference GMM (Hayakawa, 2007). Roodman (2009a) notes that in small samples there is usually some correlation between the instruments and the endogenous components of instrumented variables, which yields biased estimates.

To address the proliferation of instruments, we follow steps taken by Roodman (2009b) to limit the number of instruments using the “collapse” command. Indeed, the number of instruments should not exceed the number of individuals in the panel (Roodman, 2009b). Furthermore, after the theoretical calculation and digital simulations of bias in small samples, Hayakawa (2007) concluded that the GMM estimator leads to a weaker bias than that obtained using Difference and level GMM estimators. Finally, by relying on Monte Carlo, Soto (2010) simulations, we conclude that in the small samples at high inertia of the dependent variable (as is the case with variables of public expenditure) system, GMM is better than a wide range of other estimators in terms of bias and efficiency, and that it is quite reliable in terms of strength and significance of the statistical tests. Considering all these theoretical and empirical studies, we prefer the two-step system GMM method as our estimation method.

Furthermore, system GMM is based upon two hypotheses:

1. The instruments used are valid, in other words non-correlated to the error term ϵ_{it} . This hypothesis is tested by using the Sargan/Hansen overidentification test.
2. The absence of an autocorrelation to the order of 2 (AR(2)) in the residuals and negative autocorrelation to the order of 1 (AR1). It is the Arellano-Bond test, which is used to test the last hypothesis.

Thus, for each estimation we test this hypothesis and verify the pertinence of instruments. We delay the p-values associated with autocorrelation tests and for the Hansen J test for the validity of instruments. The various results obtained confirm the absence of autocorrelation and the validity of the instruments.

The estimation results by the three methods given (LSDVC, GMM and DLS “Double Least-Squares” (used for the estimation of Equation 3) are presented and analyzed in the following section.

Calculation of variables

Our data²⁹ focuses on a panel of seven WAEMU countries (Benin, Burkina Faso, Ivory Coast, Mali, Niger, Senegal and Togo) and covers the period between 1970 and 2013. The exclusion of Guinea Bissau is due to the unavailability of complete series on the budgetary variables. The choice of the period is dictated by the availability of data and these are annual. These data will be for the most part derived from World Development Indicators (WDI) of the World Bank. Nevertheless, they could, if necessary, be completed using a database derived from the Central Bank of West African States (CBWAS) economics and financial statistics. The variable on the quality of the budgetary process was constructed from the data on institutions issued by the International Country Risk Guide (ICRG, 2013).

5. Results and discussions

Results

Results of stationarity tests for panel data

Some precautions were necessary before the estimation. Indeed, the standard theory of statistical interference in classical economics relies on the hypothesis that the data used is stationary. This is more important and pertinent for this study because the variables used in the model are all macroeconomic variables, which ordinarily would be non-stationary. We thus first conducted stationarity tests for the stationarity of the variables used. The results presented in Table 1 indicate that all the variables are not stationary at level except for public development aid. Nevertheless, all the variables become stationary in first differences. We, therefore, included the first differences of variables in our models in order to proceed to an estimation of General Method of Moments (GMM)³⁰.

Table 1: Results of stationarity tests for panel data

	LLC	IPS	Breitung
At level			
Specification of model: constant and level			
GC	1.9354 (1,0000)	4.5948 (1,0000)	4.7735 (1,0000)
GI	3.0427 (1,0000)	6.3233 (1,0000)	4.7976 (1,0000)
GT	3.5749 (1,0000)	7.3111 (1,0000)	6.6027(1,0000)
GDP	8.5818 (1,0000)	12.0048 (1,0000)	8.2742 (1,0000)
DEBT	-3.7048 (0,6798)	0.3956 (0,6538)	-1.7684 (0,0385) **
ODA	-6.9418 (0,0026) ***	-3.0805 (0,0010) ***	-3.2465 (0,0006) ***
PIBT	3.1055 (1,0000)	7.6440(1,0000)	6.3168 (1,0000)
First Difference			
Specification of model: constant and level			
ΔGC	-12.9958(0,0000) ***	-9.9501 (0,0000) ***	-8.9763 (0,0000) ***
ΔGI	-10.9795(0,0000) ***	-7.6628 (0,0000) ***	-8.6155 (0,0000) ***
ΔGT	-10.3267 (0,0000) ***	-7.0748 (0,0000) ***	-7.7842 (0,0000) ***
ΔGDP	-6.9815(0,0009) ***	-3.8618 (0,0001) ***	-4.0717 (0,0000) ***
ΔDEBT	-10.2412 (0,0000) ***	-6.7070 (0,0000) ***	-7.6781 (0,0000) ***
ΔODA	-16.8148 (0,0000) ***	-13.8992(0,0000) ***	-7.5414 (0,0000) ***
ΔPIBT	-9.4185 (0,0000) ***	-5.9282 (0,0000) ***	-6.0898 (0,0000) ***

Source: Author calculations

Notes: The values between parentheses are the probabilities (p-value). The others are t-statistics. If the probabilities (p-values) are lower than 1%,5% or 10%, we accept the hypothesis of stationarity of the variables. LLC, IPS and Breitung stand for the Root unit tests of Levin et al (2002), Im et al (2003) and Breitung (2000) and Breitung and Das (2005), respectively. All the tests examine the null hypothesis of non-stationarity and follow a normal distribution.

Nature of the budget cycle in the WAEMU zone

Table 2: The cyclical properties of the fiscal policy of WAEMU zone (LSDVC)

Dependent variable: Variation of the various categories of public expenditure						
	(1)	(2)	(3)	(4)	(5)	(6)
	Consumption	Consumption	Investment	Investment	Total expenditure	Total expenditure
GDPT	0.217*** (0.022)		0.695*** (0.043)		0.459*** (0.038)	
GDPT-1		0.074** (0.036)		0.254*** (0.074)		0.227*** (0.064)
Dependentet-1	-0.114** (0.056)	-0.147** (0.062)	-0.256*** (0.046)	-0.282*** (0.058)	0.142*** (0.055)	0.026 (0.063)
Number of countries	7	7	7	7	7	7

Source: Author calculations

Note: GDP is the real GDP. All the variables have been deflated (Lane, 2003) and are expressed in difference. The bootstrap gaps are in parentheses (the Anderson-Hsiao estimator is used to correct the bias). The statistical significance at thresholds of 1%, 5% and 10% is represented by (***), (**) and (*), respectively. The sampled period is 1970-2013. The data is annual.

LSDVC: Least Squares Dummy-Variable-Corrected (LSDVC) estimator

Table 3: The cyclical properties of the fiscal policy of WAEMU zone using the system GMM method (GMM-S)

Dependent variable: Variation of the various categories of public expenditure						
	(1)	(2)	(3)	(4)	(5)	(6)
	Consumption	Consumption	Investment	Investment	Total expenditure	Total expenditure
GDPT	-0.226** (0.004)		0.767*** (0.01)		0.284*** (0.021)	
GDPT-1		0.363*** (0.032)		1.406*** (0.072)		-0.575*** (0.016)
Dépendentt-1	-0.514*** (0.013)	-1.229*** (0.173)	-0.143*** (0.011)	-0.867*** (0.046)	-0.443*** (0.027)	-0.566*** (0.021)
Hansen J test (p-value)	0.768***	0.719***	0.409***	0.321***	0.868***	0.382***
Autocorrelation test (p-value)	0.065***	0.329	0.242	0.220	0.106	0.273
AR (1) Autocorrelation test (p-value)	0.267***	0.156***	0.635***	0.245***	0.273***	0.293***
AR (2)						
Number of observations	294	294	294	294	294	294
Number of countries	7	7	7	7	7	7
Number of instruments	7	7	7	7	7	7
Fisher test (p-value)	(0.000)***	(0.000)***	(0.000)***	(0.001)***	(0.000)***	(0.000)***

Source: Author calculations

Hansen J or Sargan test: Ho: Non-correlation of instruments with the residuals (test of instrument validity);

Arellano and Bond test: Ho: Absence of an AR effect on the residuals. The statistical significance at thresholds of 1%, 5% and 10% is represented by (***), (**) and (*), respectively. The sampled period is 1970-2013. The data is annual.

The Hansen test shows that one cannot reject the null hypothesis, which stipulates that the error terms are not correlated with the instruments for models 1 to 6 (Table 3). In these different models, the validity of instruments is thus confirmed. The six models pass the Arellano-Bond tests with success and thus the validity of the null hypothesis of the absence of autocorrelation to the second order. Furthermore, the various models estimated are generally significant regarding the Fisher statistic ($p\text{-value} < 5\%$). Also, the explanatory variables are statistically significant.

Tables 2 and 3 present the nature of fiscal cyclicity in the WAEMU zone according to the various econometric techniques. The results of Table 2 are obtained from the LSDVC estimator,³¹ which assumes a weak exogeneity. However, this estimator does not take the problems of bias, simultaneity and reverse causality into account for the specification of model 1. Thus, the information that we can draw from the results of Table 2 is that: the relationship between the various categories of public expenditure and real GDP are positive. By relying on the results derived from a specification of model 2 with the delayed real GDP for a period, we note that the coefficient associated with the public expenditure investment variable is higher than the coefficients associated with other categories of public expenditure.

The results in Table 3 obtained using GMM estimators allow us to have an efficient estimation in the presence of endogenous regressors.³² This leads us to highlight in our commentary the results in Table 3. The results of the nature of cyclicity of government expenditure in Table 4 tells us that public expenditure of consumption, investment and the totals in the WAEMU zone are procyclical. This result tells us that the total expenditure on public expenditure and consumption increase by an average of 0.23 and 0.28 percentage points, respectively, when growth increases by a point³³. We can also observe that the prior GDP rates generally positively impact upon the growth of public expenditure (rate varies between 0.36 and 0.57). This result is reasonable considering that the current fiscal policy is affected by past economic growth in the facts, because a considerable percentage of tax revenue is determined by past economic performance. Furthermore, this result allows us to empirically verify the theoretical hypothesis of Ilzetki and Végh (2008), who assume a current reaction by government to GDP variations and a delayed fiscal reaction by government in the WAEMU zone.

Furthermore, we can state that public expenditure in investment is more procyclical³⁴ (investments increase by 0.76 percentage points when growth increases by a point) than consumption expenditure and total public expenditure. This means that in expansion periods or recessions, an adjustment of expenditure prioritizes investment expenditure more. This could hinder the implementation of crucial reforms (undertaking of social infrastructure) necessary for poverty eradication, which affects all the countries in the zone.

Finally, we also find for a negative and significant coefficient for the variable of public expenditure for the previous period (FISCALit-1) in all the estimations. This reflects the influence of initial budgetary conditions on budgetary decisions for a given period, in particular the inertia observed in the evolution of fiscal policy variables due

to implementation delays or regulations that are difficult to reverse in the functioning of the fiscal policy of countries in the WAEMU zone (Table 3).

Nature of fiscal cyclicity according to countries and types of public expenditure

With the help of Equation 3, we determine the nature of the budgetary cycle in various WAEMU countries for each type of public expenditure. We use a Two-Stage Least Squares estimator to correct the possible endogeneity biases inherent to this type of specification. Furthermore, we use lagged explanatory variables as instruments (Gali and Perotti, 2003; Lane, 2003; Lledó et al, 2011). The results are presented in Table 4.

Table 4: Compiled results of the estimations per country of the cyclicity of fiscal policy³⁵ (2SLS)

Dependent variable: Variation of the various categories of public expenditure ³⁶						
	Consumption		Investment		Total expenditure	
	Before PCSCS	After PCSCS	Before PCSCS	After PCSCS	Before PCSCS	After PCSCS
Benin	0.052**	0.149***	0.152***	0.292***	-0.037*	0.263***
	0.025	(0.058)	(0.043)	(0.106)	(0.02)	(0.074)
Burkina Faso	0.058	(0.184)**	0.133**	0.367***	0.119***	0.333**
	(0.044)	(0.058)	(0.050)	(0.104)	(0.042)	(0.116)
Ivory Coast	0.057**	0.108**	-0.013	0.455***	0.019	0.421***
	(0.022)	(0.042)	(0.032)	(0.104)	(0.041)	(0.065)
Mali	0.102**	-0.143***	(0.100)**	0.322***	(0.112)***	-0.324***
	(0.039)	(0.054)	(0.043)	(0.072)	(0.040)	(0.063)
Niger	0.080 [†]	0.036	0.034	0.413 [†]	0.069	0.395**
	(0.04)	(0.033)	(0.066)	(0.204)	(0.058)	(0.164)
Senegal	0.005	0.145***	(0.049)*	0.367**	0.068**	0.435**
	(0.01)	(0.065)	(0.028)	(0.141)	(0.024)	(0.140)
Togo	0.162***	0.234	0.160	0.267	0.089	0.531 [†]
	(0.056)	(0.159)	(0.184)	(0.298)	(0.122)	(0.259)

Source: Our calculations

Note: GDP is the real GDP. All the variables have been deflated (Lane, 2003) and are expressed in difference. The standard deviations are in parentheses. The statistical significance at thresholds of 1%, 5% and 10% is represented by (***), (**) and (*), respectively. The sampled period is 1970-2013. The data is annual: Two-Stage Least Squares estimator (2SLS).

These results confirm that, in a general manner, fiscal expenditure is procyclical in WAEMU countries. Furthermore, the coefficients of this fiscal procyclicality are higher during the sub-period associated to implementation of the PCSCS regulations of multilateral supervision regardless of the category of public expenditure used for the estimation. This means that PCSCS regulations led to a procyclical bias in the orientation of the fiscal policies of WAEMU countries. These results agree with those arrived at by Sorensen and Yosha (2001), Schick (2003), Tanner (2004) and Manasse (2005). Indeed, these researchers also highlight that a balanced budgetary positions rule³⁶ encourages procyclical fiscal policy. Finally, the period associated with the implementation of the PCSCS project led to a bias against investment expenditure in all the member countries of the zone seeing that we find high and significant coefficients comparative to those obtained using public expenditure and consumption.

To complete our analysis of the fiscal cyclicity in the WAEMU zone, we are going to look for factors that influence this procyclical fiscal behaviour.

Results of determinants of fiscal procyclicality in WAEMU zone

In Table 5, we present the results of the regression of six sets of variables that we have assumed to be capable of influencing the cyclical nature of total public expenditure³⁷ in WAEMU countries.

Table 5: Determinants of fiscal cyclicity with total public expenditure as the dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP	0.875*** (0.073)	-0.624*** (0.041)	-0.620*** (0.01)	-0.143*** (0.024)	-0.592*** (0.017)	0.118** (0.034)	0.207*** (0.032)
All the variables below are in interaction with the real GDP (GDP)							
Debt _{t-1}	0.043*** (0.002)						
ODA _{t-1}	-0.106*** (0.007)						
PIBT	6,35 ^{e-06} *** (5,43 ^{e-07})						
TE	0.003*** (0.001)						
PCSCS	-0.345*** (0.024)						
IREFN	-0.244*** (0.051)						
PCSCS_IREFN	-0.353*** (0.045)						
Hansen J test (p-value)	0.289***	0.339***	0.629***	0.692***	0.842***	0.231***	-0.261***
Autocorrelation test (p-value) AR (1)	0.207	0.201	0.002***	0.034**	(0.088)	0.206	0.206
Autocorrelation test (p-value) AR (2)	0.751***	0.312***	0.299***	0.600***	0.300***	0.352***	0.379***
Number of observations	294	294	294	238	294	174	174
Number of countries n	7	7	7	7	7	6	6
Number of instruments	7	7	7	7	7	5	5
Fisher test (p-value)	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.001)***	(0.000)***

Source: Author calculations

Hansen J or Sargan test: Ho: Non-correlation of instruments with the residuals (test of instrument validity).

Arellano and Bond test: Ho: Absence of an AR effect on the residuals. The statistical significance at thresholds of 1%, 5% and 10% is represented by (***) (***) and (*), respectively. The sampled period is 1970-2013. The data is annual.

The results in Table 5 show that the coefficient of the variable ($Debt_{t-1}\Delta GDP$) gives a positive and significant sign, which translates into the fact that a reduction in the level of external debt would reduce the procyclical character of total public expenditure. Indeed, a high level of indebtedness could reduce the incentive to an increase in expenditure and lead to worries about the reality of fiscal viability (Huart, 2011). As highlighted by Lledó et al (2011), the World Bank (2015), and Combes et al (2017), a sufficient fiscal space (proxy for the rate of indebtedness) contributes to a reduction in procyclicality of public expenditure. Consequently, the PCSCS regulations on the level of indebtedness play the role of budgetary stabilization. However, the positive and significant coefficient of the variable ($PCSCS\Delta GDP$) fights in favour of a softening of the rigidity of the PCSCS regulations. Indeed, the criterion of a positive and null underlying budget balance does not encourage States to carry out a counter-cyclical fiscal policy. Also, governments are tempted to reduce their investments during recession or increase them during expansions.

Finally, this result is in conformity with those found in Table 3 and 4 which, respectively, demonstrated that procyclicality of government investment expenditure of WAEMU countries has become more procyclical after introducing the PCSCS rules by comparing the fiscal stance before and after introducing the PCSCS rules.

The variables capturing the budgetary process of WAEMU countries ($IREFN$) are negative and significant. This is due to the fact that the strengthening of the budgetary process would reduce fiscal procyclicality. This result goes to confirm the hypothesis that only institutional variables that capture the budgetary process have an impact on fiscal procyclicality and not variables that measure policy making bodies. Indeed, Thornton (2008) and Lledó et al (2011) demonstrate that changes in policy making institutions have an impact on fiscal procyclicality in Sub-Saharan Africa. Guillaumont-Jeanneney and Tapsoba (2011) also use several proxies to capture the political and economic institutional framework of WAEMU countries. They find that they do not have any impact on fiscal procyclicality. Moreover, the coefficient of the interaction term ($PCSCS_IREFN$) being negative and significant demonstrates that an improvement in the quality of the institutional framework of the budgetary process in countries, together with the implementation of credible multilateral rules allows for a reduction in the procyclical nature of public expenditure. These results agree with Frankel et al (2013), who show that strengthening of institutional frameworks (such as transparency in the training of managers in mid-term expenditure, the capacity of the government to define credible budgetary rules...) has allowed some developing countries to reduce the procyclical nature of their expenditure and enabled them to formulate counter-cyclical fiscal policies.

The impact of budget constraints (represented through foreign aid as a percentage of GDP) on fiscal cyclicity is negative and significant regardless of the category of public expenditure. This implies that the affirmation that foreign aid is in itself procyclical and leads to procyclicality in public expenditure in developing countries is not evident in the case of WAEMU countries. This result is in agreement with that arrived at by Akitoby et al (2006) and Lledó et al (2011).³⁸ Indeed, Akitoby et al (2006) did not find any proof about dependency on public finance, leading to more procyclical

budget policies. Llédó et al (2011) find that an increase in the flows of public aid in the direction of Sub-Saharan countries allows them to reduce the procyclical nature of their public expenditure.

Finally, external shocks and the development level explain the procyclicality of public expenditure.

6. Conclusion and policy recommendations

In this study on a re-evaluation of fiscal cyclicity in the WAEMU zone, we were driven by the desire to examine the nature of budgetary behaviour in WAEMU member countries using a disaggregated approach to public expenditure and to explain this. The results obtained following our estimations have confirmed that fiscal procyclicality in the WAEMU zone is empirically verified. Procyclicality is particularly high in public expenditure on investment. This procyclicality could be explained by the rate of indebtedness, the national budgetary process framework, and the multilateral rules on regional surveillance (PCSCS).

The extremely sensitive behaviour of public investment towards fluctuations of GDP reveals the weakness in the management of public finance in WAEMU countries. Indeed, member states by choosing, without doubt, to follow the rules so as to consolidate their public finance positions, end up instead reducing their public expenditure (expenditure on social services and infrastructure development) during downwards periods in the economic cycle. Yet, these reductions in expenditure could hamper their development agenda in the long term, especially because member countries of the Union have a low human development index level.

Incidentally, in light of the empirical results obtained, it is important that each member country works towards strengthening their macroeconomic governance (improve the quality of fiscal institutions and budgetary processes). This could be done through actions undertaken in the fight against corruption, the efficient management of public resources (fruitful investments, reduction in recurrent expenditure, etc), and transparency in the management of public finance.

Three key areas of future research on the subject could be identified at this point:

- Firstly, an immediate expansion of our study would be to examine how variations in the level of procyclicality affect the volatility of production and economic growth in the region.
- Also, our study deliberately left out the impact of fiscal adjustments according to their rate. In this context, rate refers to the sensitivity of the various budgetary instruments to the dynamism of public debt.
- Finally, an examination of the size and the impacts of fiscal multipliers in the WAEMU zone would provide more information on the impact of fiscal policy on real economic activity of member countries of the Union.

Notes

- 1 We see fiscal cyclicity as the extent of the reaction by fiscal policy to variations in economic activities. It is a question of examining to what extent fiscal policy exerts a stabilizing or destabilizing influence on economic activities.
- 2 More specifically, we determine the nature of the fiscal cyclic behaviour of WAEMU countries using the government total expenditure (including the breakdown into consumption and investment) variable as indicators of fiscal cyclicity.
- 3 The Convergence, Stability, Growth and Solidarity (PCSCS) Pact between member countries of WAEMU was adopted by additional Act No. 04/99 of 08 December 1999. It sets out eight standards to attain fiscal convergence in WAEMU: 1 - the budget criteria, measured as a ratio of the underlying budget balance, excluding grants as a percentage of the nominal GDP (min. 0%); 2 - the inflation criterion (max. 3%); 3 - the debt criterion (total outstanding debt, 70% max. of the nominal GDP); 4 - the criterion of non-accumulation of outstanding interest payments; 5 - the standards of social expenditure through the ratio of the wage bill as a proportion of tax revenues (max. 35%); 6 - that of public investment financed by internal resources (min. 20% of fiscal revenue); 7 - the criterion of resource mobilization, which fixes the minimum rate of tax burden (17%) and; 8 - the criterion of external coverage rate of the economy for which the current external deficit excluding donations as a percentage of the nominal GDP must be at the worst -5%.
- 4 Indeed, the constraints related to PCSCS do not specify which type of public expenditure should be reduced to achieve specific fiscal objectives. Thus, in WAEMU, in the period of 2000-2002, Ivory Coast on average met the conditions of the key criteria, which is the underlying budget balance. Public deficit was indeed reduced, but at the expense of cutting down on higher expenditure on investment, thus scaling down on the level of the tax burden (Tanimoune and Plane, 2005). This leads us to observe that it is important to not only focus on the budget balance, but also the components of public expenditure.
- 5 Fatás (2010) suggests that fiscal rules are a more constrained manner of evaluating fiscal processes and institutions. Indeed, he uses transparency, the

- role of the legislature, and the degree of centralization of fiscal policies as proxies that evaluate fiscal institutions and processes.
- 6 The “greed” of various influential pressure groups is such that high tax revenues than expected lead to an almost proportional increase in public expenditure.
- 7 A higher degree of economic volatility increases the probability that the projected revenues and expenditure would be erroneous.
- 8 The effect of democracy in itself on fiscal cyclicity could, however, be ambiguous; see Alesina, Campante and Tabellini (2008).
- 9 The costs of raw materials were favourable to member states of the zone.
- 10 For information on the recent convergence in the zone, see the Quarterly report on implementation of multilateral supervision by the WAEMU Commission, June 2013 or a summary in Annex 1.
- 11 The criteria on convergence are given as follows: three first-level criteria namely the ratio of the overall budget balance including donations as a percentage of the nominal GDP (standard $\geq -3,0\%$), the rate of inflation (standard $\geq -3\%$), and the current total public debt as a percentage of the nominal GDP ($\leq 70\%$) and two second-level criteria, namely the rate of tax burden (standard $\leq 20\%$) and the ratio of the wage bill as a percentage of tax revenue (standard $\leq 35\%$).
- 12 The most simple specification is that of Talvi and Végh (2005), who use the simple correlation coefficient between fiscal variables and the variable of economic cycle. Wyplosz (2002) and Gali and Perotti (2003) use a more elaborate estimation by regressing the fiscal aggregates (standardized to the product) on the variables of the cycle by adding a certain number of control variables. Alternative to the direct estimation of the impact of the economic cycle on fiscal policy, Lane (2003), Alesina, Campante and Tabellini (2008) and Thornton (2008) adopt a two-step method. They, in the first step, configure using a regression per country, calculate the elasticity of fiscal variables in relation to the product, then in the second step they evaluate the obtained determinants of elasticity.
- 13 Another indicator that we could have used to measure the cyclical character of the fiscal policy is the tax rate, but the unavailability of data for our sample prevents us from using the tax rates as dependant variables.

- 14 Because of the unavailability of data series in certain categories (transfers and subsidies), they were ignored in our analysis.
- 15 The approach used by Ilzetzki and Végh (2008) is based on theoretical models that assume an immediate reaction from the government to variations in GDP and a delayed fiscal reaction from the government.
- 16 Besides, while conscious of the problems brought about by excessive internal debt, an emphasis is placed upon external debt in our study of budgetary stabilization in the monetary union, which is justified by power relationships (to the creditor by the debtor) and of dependency (of the debtor in relation to their creditor) that they bear (Berr and Combarrous, 2007).
- 17 In WAEMU, capital expenditure was financed by an average of 49% through external financing, in particular Official Development Assistance (ODA) in the course of the period between 2005 and 2013. Furthermore, ODA is very important for WAEMU countries in general and particularly for Sahelian countries within the Union.
- 18 We measure fluctuations in terms of trade by calculating the relative gap in the index of the terms of trade (base 100 in 2000) in relation to its trend level (\bar{t}). The trend level of terms of trade is obtained through the Hodrick and Prescott (1997) filter with a smoothing parameter of 100.
- 19 See Annex 3 for a description of the points by factors.
- 20 The standardized index makes it that the closer the total of points is to 1, the more the budgetary process is of good quality.
- 21 We assume a period of one year for the effective implementation of the PC-SCS regulations.
- 22 The idea is that having several high quality fiscal institutions and multilateral fiscal regulations is a mechanism that considerably reduces fiscal procyclicality.
- 23 Indeed, when we include control variables in the equation indicating the fiscal cyclicality, the coefficient of control variables indicates the effect of each control variable on the changes of the variable that captures fiscal policy and not the impact of the control variable on the level of fiscal procyclicality itself (see for example, Alesina, Campante and Tabellini 2008; Diallo, 2009).
- 24 In other words, Equations 1 to 4 involve two important sources of endogeneity, which should be treated correctly: a dynamic specification and the simultaneity between variables of public expenditure and the real current GDP.

25 Furthermore, this allows us to empirically verify the theoretical hypothesis of Ilzetki and Végh (2008) who assume a current reaction by government to GDP variations and a delayed fiscal reaction by government for WAEMU zones.

26 A risk of simultaneity bias is evident.

27 The GMM method and the reasons for choosing this estimator are explained in Annex 3.

28 Blundell and Bond (1998) through Monte Carlo simulations show that the two-step estimation (GMM two-step) is more efficient than a one-step approach; the variance covariance matrix being more robust.

29 The data used in this study and their definitions are indicated in Annex 4.

30 In research studies, the equations (1, 2 or 3) are estimated either at level (See Gali and Perotti, 2003; Cimadomo, 2005;) or in first difference (See Wyplosz, 2002; Catão and Sutton, 2002; Alesina, Campante and Tabellini, 2008; Bénétrix and Lane, 2013). We opt for that in difference due to the results of our stationarity tests. Furthermore, through this specification: Firstly, the explanatory power of the model and the statistical significance of the coefficient of the variable of delayed public expenditure are not artificially inflated by the component due to inertia (which, in turn is a major part of the unexplained phenomena). Secondly, the extent of government actions captured by the dependent variable of public expenditure is measured through some approximation. Assuming that policy makers are more or less aware of these effects at the time of budget formulation seems quite obvious. The specification at level implicitly requires that policy makers are capable of adjusting the level of public expenditure while real GDP changes direction, a hypothesis that we consider to be too strong.

31 The LSDVC estimators assume a weak exogeneity at least. Faced with the problem of endogeneity, various authors (for example, Afonso and Hauptmeier (2009) or Debrun et al (2008) suggest model 2 to examine the fiscal cyclicity.

32 The two-step GMM-S method that we use allows for the taking into account the heteroskedasticity between individual autocorrelation of error terms and the simultaneity bias of measurement errors.

33 The value of the coefficient of total public expenditure is quite different and always lower than the obtained value of the sum of coefficients of public expenditure on consumption and investment in all the estimations. This could

- be due to the fact that the other categories of expenditure (interest payments on debt and transfers and public subsidies...) not taken into account due to the fact of insufficiency in statistics seem to be of a counter-cyclical nature.
- 34 The results of the coefficients of different categories of public expenditure given in Table 3 agree with that result.
- 35 Estimations also include the lagged dependent variable as explanatory variables.
- 36 The key criterion of PCSCS, measured by the basic ratio of the budget balance excluding grants as a percentage of the nominal GDP must be positive or null.
- 37 The results of the determinants of fiscal cyclicity in the WAEMU zone are practically the same regardless of the type of public expenditure. Furthermore, the procyclical nature of public expenditure has been verified empirically regardless of the expenditure category. We choose to address those regarding total public expenditure — the variable often used to study fiscal cyclicity (Kaminsky, Reinhart and Végh, 2004). Nevertheless, the other results are presented in Annex 8.
- 38 Chauvet and Guillaumont (2009) demonstrate that the argument that public aid is systematically procyclical in developing countries is not one that can be applied generally.

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Annex 1: Number of countries in non-conformity with the PCSCS convergence criteria of WAEMU

	2011	2012	2013	2014	2015	2016	2017	2018	2019
	Projections								
First-level criteria									
Overall budget balance including donations/nominal GDP ($\geq -3,0$)	5	2	3	4	6	6	5	4	2
Rate of inflation ($\leq 3\%$)	5	3	0	0	1	0	0	0	0
Outstanding total public debt/Nominal GDP ($\leq 70\%$)	0	0	0	0	0	0	0	0	0
Second-level criteria									
Wage bill/ tax revenue ($\leq 35\%$)	5	6	5	6	5	5	5	5	4
Tax income/ Nominal GDP ($\leq 20\%$)	8	8	8	8	8	8	7	7	6

Sources: 2014 Quarterly report on multilateral supervision (WAEMU) and IMF projections (IMF report No.15/100 on policies of member States)

Annex 2: Evolution of the underlying budget balance as a percentage of nominal GDP in WAEMU¹, 2000-2013

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Underlying budget balance/ GDP (≥ 0 %)														
Benin	1.7	-3.0	-2.8	-0.1	-0.5	-1.4	0.1	1.5	-1.1	-1.5	1.5	-0.2	0.4	0.4
Burkina Faso	-1.1	-2.5	-3.7	-2.9	-3.2	-3.5	-4.5	-5.8	-4.9	-1.9	0.4	1.2	-0.8	0.2
Ivory Coast	-0.1	1.1	-0.4	-1.7	-1.3	-1.6	-1.6	-0.6	-1.6	-1.0	-1.6	-4.0	-3.8	-0.6
Guinea Bissau	-16.9	-6.9	-5.8	-7.0	-12.0	-7.2	-6.2	-7.7	-6.7	3.2	1.0	2.9	1.5	-1.0
Mali	-0.8	-1.7	-1.3	-0.3	-0.7	-1.2	-0.4	-1.2	-1.2	0.4	0.2	-1.1	-1.1	-0.4
Niger	-3.4	-3.7	-1.9	-2.1	-2.2	-1.5	1.1	-0.2	1.9	-2.8	-1.0	-0.1	0.9	1.3
Senegal	1.3	-1.2	1.2	0.2	-0.5	-1.2	-4.7	-2.6	-2.4	-2.1	-1.8	-4.2	-3.0	-2.4
Togo	-2.8	1.5	0.3	2.7	1.4	-2.0	-2.8	-2.7	-0.7	-1.4	1.3	-1.7	-4.2	0.7
WAEMU (mean) ²	-0.3	-0.8	-0.9	-1.1	-1.3	-1.8	-2.1	-1.6	-1.8	-1.3	-0.6	-2.1	-2.0	-0.5
Number of countries in violation	6	6	6	6	7	8	6	7	7	6	3	6	5	4

Source: 2000 to 2013 quarterly reports on multilateral supervision (WAEMU commissions)

¹ Total of fiscal revenue, excluding grants, less the total expenditure excluding investment expenditure financed by external resources. From 2009, the total fiscal revenue including donations related to fiscal aid in addition to PPTE/JADM compensation for current expenditure and capital expenditure less current expenditure in capital finance using local resources.

² The average underlying budget balance of WAEMU is obtained from the budget balance of the various countries weighted to the nominal GDPs of States within the Union.

Annex 3: Dynamic panel General Method of Moments

A dynamic model is one in which one or several lagged variables feature as explanatory variables. Unlike dynamic panel GMM, technical econometric standards such as OLS do not allow for the obtaining of unbiased estimations in such a model, due to the presence of the lagged dependence variable to the right of the equation. It therefore follows that the estimations are biased. The GMM method is based on orthogonality conditions between the lagged variables of the error term, and first-level differences. When the dynamic model is expressed in first differences, the instruments are in level and vice versa. In the estimated model, the use of lagged variables as instruments differs according to the nature of explanatory variables:

- (a.) For exogenous variables, their current values are used as instruments.
- (b.) For the predetermined or weakly exogenous variables (variables that could be influenced by the past values of the dependent variable, but which remain uncorrelated to future outputs of the error term), the lagged values of at least one period could be used as instruments.
- (c.) For endogenous variables, their lagged values over two periods and more could be valid instruments.

There are two variants of the dynamic panel GMM estimator: The first-difference GMM estimator, and the system GMM estimator.

Thus, the following equation:

$$Y_{it} = \alpha Y_{it-1} + \beta X_{it} + u_i + \varepsilon_t + \omega_{it} \quad (1)$$

Whereby Y_{it} represents the logarithm of real GDP per capita, X represents the explanatory variables of the model, u the specific country effect, ε the specific temporal effect and ω the error term, i is the country index and t the time index.

The model will be written in first difference in the following manner:

$$Y_{it} - Y_{it-1} = \alpha(Y_{it-1} - Y_{it-2}) + \beta(X_{it} - X_{it-1}) + (\omega_{it} - \omega_{it-1}) + (\varepsilon_t - \varepsilon_{t-1}) \quad (2)$$

The first difference eliminates the effect of specific countries and consequently the bias of invariant variables omitted over time. Through construction, the error term $(\omega_{it} - \omega_{it-1})$ is correlated with the lagged variable in difference $(Y_{it-1} - Y_{it-2})$. The first differences of explanatory variables of the models are instrumentalized through lagged values (at level) of these same variables. The aim is to reduce the simultaneity bias and the bias introduced by the presence of the lagged dependence variable in difference to the left-hand side of the equation.

The orthogonality conditions on which the estimation of the model relies upon when the variables are weakly exogenous (they could be influenced by past values of growth rates, but remain uncorrelated to future outputs of the error term) are:

$$E(\Delta Y_{-2}' \cdot \Delta \omega) = 0 \quad (3)$$

$$E(\Delta X_{-2}' \cdot \Delta \omega) = 0 \quad (4)$$

$\Delta \omega$ represents the perturbation vector of the model written in first difference. The estimator obtained through this method is in this case consistent. Unfortunately, these estimators prove to be quite unsatisfactory in practice and frequently lead to outliers in parameter values. Indeed, even though the estimators are consistent, their asymptotic value is high (Arrelano and Bond, 1991; Sevestre, 1985).

Arrelano and Bond (1991) propose an estimator that aims at avoiding two of the causes of inefficiency of the first instruments,¹ which are the low number of instruments and the failure to consider the autocorrelation of disturbances in the first-difference model. According to Arrelano and Bond, there are instruments other than those used by Anderson and Hsiao (1982). If the model is comprised on $K+1$ exogenous variables, the “downward multiplication” of instruments composed of lagged values of Y_{it} leads to having a total of $K + 1 + T(T - 1) / 2$ instruments, whereby T represents the number of periods of the sample less one period (because by convention the first observation is related to period one, $t = 0$). Thus, the orthogonality conditions used by Arrelano and Bond are:

$$E(Y_{it-s} - \Delta \omega_{it}) = 0, \quad t = 2, \dots, T, \quad s = 2, \dots, t \quad (5)$$

$$E(\Delta X_{it}' \cdot \Delta \omega_{it}) = 0 \quad (6)$$

Lagged variables in level are good instruments for the difference equation in so far as they are correlated to explanatory variables and are not correlated to the error terms. The estimator thus obtained is referred to as the in-difference estimator. However, these estimators by Arrelano and Bond (1991) suffer from an instrumental weakness, which leads to considerable biases in the finite samples, and their precision is asymptotically weak. More specifically, the delayed values of explanatory variables are weak instruments of the first difference in level equation. Moreover, we also have the loss of information associated with the differentiation of the level equation.

To limit the effect of this weaknesses in correlation of instruments and regressors in the first-difference model, Blundel and Bond (1998) suggest another General Method Moments estimator called system GMM. This estimator combines a first-difference equation and a level equation. The first difference equation (Equation 2) is estimated simultaneously with the level equation (Equation 1), through the GMM. In the level equation, the variables are instrumentalized by their first-differences². System GMM

1 The first instruments were proposed by Anderson and Hsiao (1981).

2 Only the most recent first-difference is used; the use of other lagged fist-differences would lead to a redundancy in the conditions of moments (Arrelano and Bover, 1995).

is a lot more efficient than difference GMM, particularly with a higher persistence of the dependent variable and a lower time dimension (Blundell and Bond, 1998), which are typical features of macroeconomic data.

For the level equation, we use additional conditions of moments by assuming that the explanatory variables are stationary.

$$E[(Y_{it-s} - Y_{it-s-1}) \cdot (u_i + \omega_{it})] = 0 \text{ for } s = 1 \quad (7)$$

$$E[(X'_{it-s} - X'_{it-s-1}) \cdot (u_i + \omega_{it})] = 0 \text{ for } s = 1 \quad (8)$$

The conditions of moment below (5 to 8) combined with the General Method of Moments allow for an estimation of the coefficients of the model.

To test the validity of our lagged variables as instruments, Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998) suggest the use of the Sargan/Hansen over-identification test. Through construction, the error term in first-difference is correlated with first order, but it should not be to the second order. To test this hypothesis, these same researchers suggest a second order correlation test.

Annex 4: Sources and definitions of variables

Variables	Definitions	Sources/Calculations of data
Government final consumption expenditure (GC)	These different variables of public expenditure are used as a proxy of action of the fiscal policy of the government on economic activity	World Development Indicators (WDI, 2015)
Government investment expenditure (GI)		World Development Indicators (WDI, 2015)
Total government expenditure (GT)		CBWAS data base taken from Economic and Financial Statistics
Gross Domestic Product (GDP)	GDP is the indicator of economic activity	World Development Indicators (WDI, 2015)
Real Gross Domestic Product per capita (PIBT)	PIBT is the proxy used to measure the level of economic development	World Development Indicators (WDI, 2015)
The rate of internal debt ($DEBT_{it-1}$)	$DEBT_{it-1}$ allows us to capture the sustainability of fiscal policy	World Development Indicators (WDI, 2015)
Public aid for development (ODA)		World Development Indicators (WDI, 2015)
Gap related to the terms of trade index (TE)		Calculations from data derived from World Development Indicators (WDI, 2015)
The budgetary process (IREFN)	The index measures the quality of the budgetary process close to a value of 1 for a good quality budgetary process and close to 0 for poor quality	Calculations are taken from data derived from the International Country Risk Guide (ICRG, 2013) data base

Multilateral supervision (PCSCS)	PCSCS allows us to evaluate the influence of multilateral rules on the budgetary behaviour of member States of the union	
Lagged dependent variables ($Fiscal_{it-1}$)	-Fiscal _{it-1} for the capture of inert behaviour of the fiscal policy	Our calculations

Annex 5: Economic risk components

Components	Points max
A Foreign debt as a percentage of GDP	10
B Foreign debt as service as a percentage of XGS*	10
C Current account as percentage of XGS	15
D Net liquidity as months of import cover	5
E Exchange rate stability	10
Total	50

Annex 6: Financial risk components

Components	Points max
A GDP per head of population	5
B Real annual GDP growth	10
C Annual inflation rate	10
D Budget balance as percentage of GDP	10
E Current account balance as percentage of GDP	15
Total	50

XGS*= Exports of Goods and Services

Source: International Country Risk Guide (ICRG)

Annex 7: Description of variables

Variable	Obs	Mean	Std. Dev.	Min	Max
gc	308	3.91e+09	4.20e+09	0	1.82e+10
gi	308	4.54e+09	4.80e+09	0	2.59e+10
gt	308	6.12e+09	7.75e+09	4.28e+08	3.78e+10
gdp	308	2.49e+10	2.92e+10	1.24e+07	1.35e+11
debt	308	61.21505	37.34473	4.873702	209.2358
oda	308	10.66849	5.317299	.5338624	27.19804
pibt	308	166030.1	148276.6	60.47566	714985.9
te	238	121.3229	42.52044	21.27743	259.6154
pcscs	308	.3181818	.4665285	0	1
irefn	174	.6114942	.0804561	.39	.77

Annex 8: Determinants of fiscal cyclicity with consumption expenditure as the dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP	0.379*** (0.069)	-0.325** 0.113**	-0.350*** 0.025	-0.048 (0.014)	-0.262*** (0.013)	1.098*** (0.148)	0.769*** (0.023)
All the variables below are in interaction with the real GDP (GDP)							
Debtt-1	-0.076 (0.004)						
ODAt-1		-0.151*** (0.028)					
PIBT			0.00002*** (5.44e-07)				
TE				0.0031*** (0.00006)			
PCSCS					0.948*** (0.097)		
IREFN						-0.915** (0.317)	
PCSCS_IREFN							-0.428*** (0.079)
Hansen J test (p-value)	0.416***	0.437***	-0.354***	0.480***	0.476***	(0.167)***	0.252***
Autocorrelation test (p-value) AR (1)	0.279	0.229	0.222	0.242	0.226	0.277	0.285
Autocorrelation test (p-value) AR (2)	0.286***	-0.354***	0.101***	0.321***	0.197***	0.283***	0.379***
Number of observations	294	294	294	238	294	174	174
Number of countries	7	7	7	7	7	6	6
Number of instruments	7	7	7	7	7	5	5
Fisher test (p-value)	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***

Source: Author calculations

Hansen J. or Sargan test: Ho: Non-correlation of instruments with the residuals (test of instrument validity).

Arellano and Bond test: Ho: Absence of an AR effect on the residuals. The statistical significance at thresholds of 1%, 5% and 10% is represented by (***), (**) and (*) respectively. The sampled period is 1970-2013. The data is annual.

Annex 9: Determinants of fiscal cyclicity with investment expenditure as the dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP	0.509*** (0.017)	-0.624*** (0.056)	-0.670*** (0.012)	-0.251*** (0.038)	-0.439*** (0.029)	0.089** (0.026)	0.422** (0.111)
All the variables below are in interaction with the real GDP (GDP)							
Debt-1	0.019*** (0.0009)						
ODAt-1		-(0.043)*** (0.005)					
PIBT			4,92e-06*** (1,54e-07)				
TE				0.0011*** (0.00004)			
PCSCS					0.163*** (0.018)		
IREFN						-0.148*** (0.032)	
PCSCS_IREFN							-0.305** (0.118)
Hansen J test (p-value)	0.573***	0.846***	-0.557***	0.161***	0.550***	-0.443***	0.570***
Autocorrelation test (p-value) AR (1)	0.174	0.271	(0.004)***	0.199	0.155	0.259	0.337
Autocorrelation test (p-value) AR (2)	0.380***	-0.251***	0.263***	0.250***	0.271***	(0.191)***	0.476***
Number of observations	294	294	294	238	294	174	174
Number of countries n	7	7	7	7	7	6	6
Number of instruments, i	7	7	7	7	7	5	5
Fisher test (p-value)	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.005)***

Source: Author calculations

Hansen J. or Sargan test: Ho: Non-correlation of instruments with the residuals (test of instrument validity).

Arellano and Bond test: Ho: Absence of an AR effect on the residuals. The statistical significance at thresholds of 1%, 5% and 10% is represented by (***), (**) and (*) respectively. The sampled period is 1970-2013. The data is annual.



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African Economic Research Consortium
Consortium pour la Recherche Economique en Afrique
Middle East Bank Towers,
3rd Floor, Jakaya Kikwete Road
Nairobi 00200, Kenya
Tel: +254 (0) 20 273 4150
communications@ercafrica.org