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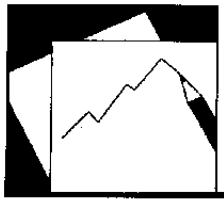

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Budgetary Convergence in the WAEMU: Adjustment Through Revenue or Expenditure?

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Budgetary Convergence in the WAEMU: Adjustment Through Revenue or Expenditure?

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Abstract

A regional convergence pact adopted recently by the Conference of Heads of States of WAEMU provides a framework for fiscal convergence similar to the European Union's Maastricht Treaty. Using bivariate co-integration and error-correction models, this paper investigates the relationship between revenue and expenditure in seven member countries to determine the feasibility and nature of the policy adjustment required to meet the new convergence criteria. The results indicate that, in the long run, there is causality running from revenue to expenditure in Burkina Faso and Senegal, from expenditure to revenue in Benin and Togo, a bidirectional causality in Côte d'Ivoire and Mali, and no causality in Niger.

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I. INTRODUCTION

Faced during the 1980s with persistent fiscal difficulties, that adversely affected the value of their common currency, the member states of the West African Monetary Union signed in the aftermath of the CFA devaluation in January 1994, a treaty establishing the West African Economic and Monetary Union (WAEMU).[2] The central tenet of this treaty is the aim of achieving a convergence of economic policies and performance among member countries through a mechanism of multilateral surveillance. Contrary to the process followed by the European countries in establishing the European Monetary Union (EMU), the West African Monetary Union had existed for over 40 years, but with no formal mechanism to ensure the convergence of macroeconomic policies pursued by the member states and to foster economic integration. The lack of coordination between the economic policy instruments formulated at the national levels and the regional monetary policy resulted in the formulation of expansionary fiscal policies, which led to high levels of public debt and the accumulation of domestic and external payments arrears. These macroeconomic imbalances pointed to the need to go beyond strictly monetary surveillance; with the entry into force of the WAEMU Treaty and the establishment of the WAEMU Commission, regional convergence criteria began to be formulated as a basis for multilateral surveillance of economic policies, so as to underpin the common currency.

The key elements of the convergence criteria implemented during 1994-98 concern the public finances; they called for a level of the civil service wage bill not to exceed 50 percent of tax revenue (lowered to 40 percent from January 1998), a level of pubic investment financed by domestic resources equal to at least 20 percent of tax revenue, a primary basic fiscal surplus equivalent to at least 15 percent of tax revenue, and a declining or unchanged level of domestic and external arrears. Starting in 2000, new convergence criteria have been formulated in the context of a regional convergence pact adopted by the Conference of WAEMU's Heads of State in December 1999. A salient feature of this pact is its emphasis on the observance of a key fiscal criterion, the basic fiscal balance,[3] and on a level of public indebtedness including both domestic and external debt expressed in percent of GDP. More specifically, it calls on member countries to maintain a fiscal position consistent with zero or positive balance and a level of public debt not to exceed 70 percent of GDP over the medium term (Box 1).

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[2] The eight members of WAEMU are: Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau (who joined in May 1997), Mali, Niger, Senegal and Togo. The present study does not include Guinea-Bissau owing to the paucity of data.

[3] The basic budget deficit is defined as total revenue, excluding grants, minus total expenditure, excluding foreign-financed investment.

Box 1. The WAEMU's Convergence, Stability, Growth and Solidarity Pact

The regional **Convergence, Stability, Growth, and Solidarity Pact,** adopted by the Conference of Heads of State of WAEMU in December 1999 as an additional act to the WAEMU Treaty, is a formal agreement among the member countries of the WAEMU aimed at (1) strengthening convergence of the economies of the member countries; (2) reinforcing macroeconomic stability; (3) accelerating economic growth; and (4) enhancing solidarity among the member countries.

A. Convergence Criteria

The pact is based on the observance by member states of a set of convergence indicators pertaining to the public finances, the real sector, the balance of payments, and common currency. Indicators viewed as essential are known as convergence criteria. There are four primary convergence criteria and four secondary indicators supplemented by a host of other indicators (*Tableau de bord)* recommended by the WAEMU Council of Ministers. The norms established with respect to these criteria have to be met by the target date of 2002. The primary criteria are the

- ratio of the basic fiscal balance to nominal GDP (key criterion), which must be 0 percent or more;
- ratio of outstanding domestic and foreign debt to nominal GDP, which must not exceed 70 percent;
- average annual inflation rate, which cannot be more than 3 percent a year; and
- nonaccumulation of domestic and external payment arrears in the current financial period.

The secondary criteria are as follows:

- ratio of the wage bill to tax revenue, which cannot exceed 35 percent;
- ratio of domestically financed public investment to tax revenue, which must be at least 20 percent;
- ratio of the current external deficit excluding grants to nominal GDP, which cannot exceed 5 percent; and
- tax-to-GDP ratio, which must be 17 percent or more.

B. Transitional Provisions

During the transitional period from the date of entry into force of the pact to December 31, 2002, member countries will prepare convergence programs with annual objectives ensuring compliance with said criteria. In assessing semiannual performance reports, the Council of Ministers will monitor progress on the convergence of policies implemented by the member countries. A member country not satisfying one of the primary criteria, as specified in the program, will, in cooperation with the WAEMU Commission and within 30 days of notification of the Council of Minister's resolution, prepare a program of corrective measures. Programs initiated by the member countries in question must include all the measures they intend to take to strengthen fiscal equilibrium and prevent slippage. The WAEMU Commission shall verify that the proposed measures are consistent with the Council of Minister's resolution and the union's economic objectives. If implementation of the program of corrective measures does not result in the desired progress on primary criteria other than the key criterion, a new series of appropriate measures prepared by the WAEMU Commission for the member country in question will be approved by council directive.

C. Mechanism of Sanctions

When the key criterion—relating to the fiscal balance—is part of the convergence criteria that are not being satisfied in accordance with the program of corrective measures, the penalty procedure will be initiated, unless otherwise dictated by "extraordinary circumstances," as defined by council regulation. The penalty procedure is initiated only in cases of noncompliance observed during the assessment of results at end-December in the convergence phase. Noncompliance is determined when progress on the key criterion is deemed unsatisfactory. During the stability phase, programs will be assessed on the basis of structural change in respect of the key criterion, after correction for changes in economic conditions.

The mechanism of sanctions is specified in Article 74 of the WAEMU Treaty. It ranges from moral suasion (publication of findings), and the withdrawal of West African Development Bank (BOAD) financing to the outright suspension of central bank financing. Moreover, some type of binding financial sanctions is envisaged to ensure compliance.

The emphasis on fiscal discipline through budgetary norms for budget deficit and public debt à la European Union's Maastricht Treaty[4] finds its roots in the recognition that the deterioration of public finances in the WAEMU countries over the past decade needs to be stopped and reversed. Public expenditure consistently exceeded receipts in virtually all the member states during the 1980s and early 1990s. The worsening in budget deficits is clearly evident in Figure 1. Up until 1994, the majority of WAEMU countries were plagued with large fiscal imbalances, rises in indebtedness—with the concomitant increases in the cost of debt service—and the accumulation of domestic and external arrears. Government revenues in the union fell from an average of 18 percent of GDP in the late 1970s to 15.2 percent in 1993. At the same time, public spending grew at an unprecedented pace to reach 26.6 percent of GDP on average in 1993. As a result of these trends, the primary fiscal deficit widened to 6.2 percent of GDP, and the public debt rose to levels that were threatening the sustainability of fiscal positions in most member states.

While the objective of maintaining fiscal discipline in the union is overwhelmingly shared by member countries, there is the question of the feasibility of the adjustment necessary to meet the convergence criteria. Annex 1 reports a mechanical calculation of the magnitude of fiscal adjustment (in terms of primary gap) necessary in various WAEMU countries to stabilize the public debt ratio at 70 percent (for given values of interest rates on domestic and external debt, and the nominal GDP growth rate). In nearly all countries, additional adjustment is required in order to bring the debt ratio down before stabilizing it. Moreover, the adjustment efforts are not equal across countries, in part reflecting different initial conditions. For example, while only small adjustments are called for in Benin and Senegal, other countries, such as Togo, Mali, and Niger, would have to make substantial efforts in order to comply with the convergence norms.

To the extent that the required adjustment is feasible, there is no unanimity on how effective the different fiscal adjustment strategies would be in individual countries. Specifically, should governments adjust both revenue and spending to correct their fiscal imbalances, or should they let the burden of adjustment fall more heavily on one or the other fiscal instrument? Some people advocate cuts in government spending, rather than tax increases, as the optimal solution to the deficit problem. They reason that governments often spend all that they receive in taxes and perhaps much more. Under this line of reasoning, raising taxes would simply induce more spending, leaving the deficit unchanged (or even larger). Others, however, deny this implied tax-and-spend nexus and argue that it is taxes that adjust gradually to spending. Under this latter scenario, a tax increase will not lead to higher spending and thus could be used as an effective deficit-cutting measure, along with spending cuts. Still others posit that changes in spending and taxes could occur simultaneously. Therefore, they argue, that focusing on one component of the government budget while

[4] The Maastricht Treaty on European Economic and Monetary Union established among others, a set of convergence criteria on fiscal policy, which consisted of capping the general government deficit at 3 percent of GDP and the stock of public debt at 60 percent of GDP.

ignoring its interdependence with the other component would have an ambiguous overall effect on the deficit.

The question of how the budget is balanced is thus closely related to questions about the causality between revenue and expenditure. This paper reviews these questions by taking an explicitly empirical perspective in investigating the interrelationship between the two fiscal variables in the WAEMU countries. Drawing upon the evidence of fiscal data over the period 1976-98 from seven WAEMU countries, it attempts to determine the nature of the relationship between government revenue and expenditure decisions as revealed by the data themselves, using an econometric modeling technique based on co-integration and error-correction models. While fiscal decisions are undoubtedly political, understanding the dynamics of budgetary decisions, as revealed by the historical correlations between the two fiscal variables, should contribute to a better evaluation of the causes of fiscal imbalances and of the consequences for member countries of the fiscal consolidation policies envisaged under the convergence pact.

The paper is organized as follows. Following a brief review of the literature (Section II), Section III highlights the empirical methodology and data used. Section IV presents the empirical results derived from the co-integration and error-correction analyses. Section V discusses the policy implications of these findings in terms of the convergence pact, and concludes.

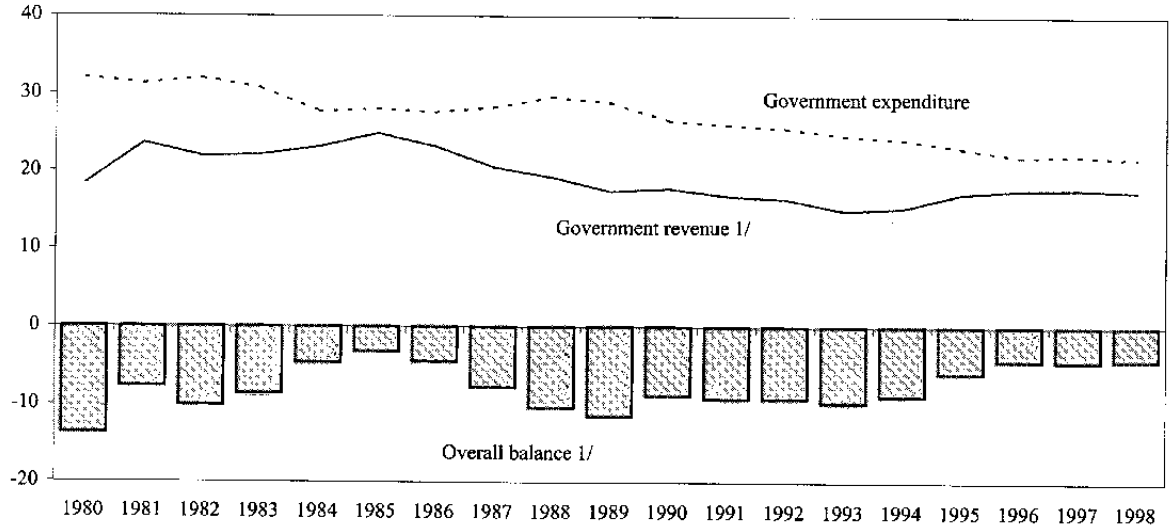
II. Causality Between Revenues and Expenditures: Literature Review

Provided government policy is subject to an intertemporal budget constraint, persistent budget deficits must eventually be followed by higher taxes or lower spending. The question of which of these two methods the government should choose to satisfy the intertemporal budget constraint has recently received considerable academic, as well as political, attention. There are three competing hypotheses regarding the relationship between government expenditures and revenues. First, the **fiscal synchronization hypothesis** suggests that government expenditures and revenues are determined simultaneously (Musgrave, 1969, Meltzer and Richard, 1981). Second, the **tax-and-spend hypothesis** argues that changes in taxes lead to changes in government spending. Economists such as Friedman (1978) and Buchanan and Wagner (1977 and 1978) subscribe to such a view. This view also finds support among supply-side economists (Roberts, 1984).[5] Third, according to the **spend-and-tax hypothesis,** change in spending leads to changes in revenues. Such a

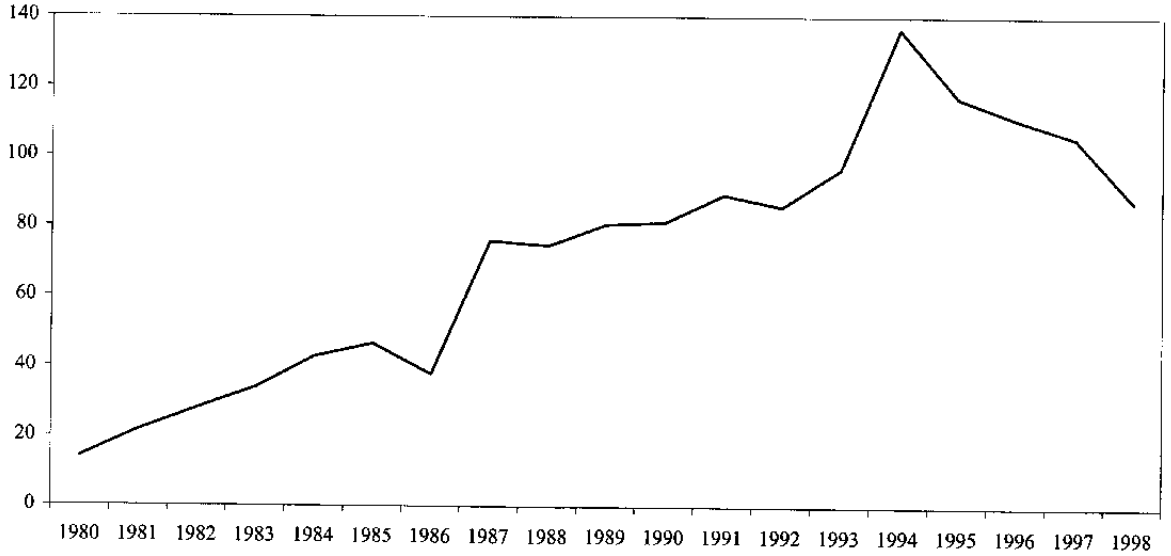
[5] For example, Friedman argues that increases in taxes only result in increased expenditures, rather than in deficit reduction. Supply-side economists argue that cuts in taxes would result in reduced expenditure, leaving the deficit unchanged.

Figure 1. WAEMU: Selected Fiscal Indicators, 1980-98
(In percent of GDP)

Government Finance



External Public Debt



Source: IMF, World Economic Outlook database.
1/ Excluding grants.

view is associated with Peacock and Wiseman (1961 and 1979), who argue that temporary increases in government spending associated with national crises can lead to permanent increases in taxes. The spend-and-tax view is also consistent with the Ricardian-equivalence view of Barro (1974 and 1978).[6]

The empirical evidence derived from testing the validity of these hypotheses, most of which has focused almost exclusively on the United States and other large industrialized Organization for Economic Cooperation and Development countries is inconclusive.[7] Recent studies have used co-integration analysis and error-correction models (ECM). Using such methodology, Miller and Russek (1990) find a bidirectional causality between taxes and spending in the US economy, thus supporting the fiscal synchronization hypothesis; Jones and Joulfaian (1991) find a unidirectional causality from expenditure to revenues in the short run with feedback causality between them in the long run.

Using ECMs, Bohn (1991) finds in the annual U.S. data evidence in favor of both the tax-and-spend and the spend-and-tax hypotheses. Owoye (1995), utilizing annual data for the Group of Seven Industrialized Countries over the period 1961-90, finds that taxing-and-spending decisions are jointly determined in the United States, France, Germany, the United Kingdom, and Canada, but that in Japan and Italy fiscal imbalances are corrected by adjusting spending. Darrat (1998), based on data from Turkey and using both bivariate and multivariate models, concludes that revenues "Granger cause" negative changes in spending. Finally, in the most recent work of Antioch (1998), ECM estimates lead to the conclusion that a unidirectional causality runs from revenue to outlays in New Zealand, while bidirectional causality characterizes fiscal data in Australia.

III. Causality Tests Between Revenues and Expenditures: Evidence from the WAEMU Countries

A. The WAEMU Context

With the adoption of the Convergence, Stability, Growth, and Solidarity Pact aimed at ensuring budgetary discipline to underpin the stability of the common currency, fiscal imbalance is being tackled with renewed vigor across the WAEMU countries. An important question is whether, in a such a monetary union, constraints should be imposed on the fiscal

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[6] Barro argues that, if agents do not suffer from fiscal illusion (as assumed under rational expectations hypothesis), they will recognize that the current level of debt-financed expenditure ultimately implies an increase in current and future taxation; therefore, it is implicitly assumed that expenditure changes cause corresponding revenue changes.

[7] See Blackley (1986), Manage and Marlow (1986), Ram (1988), von Furstenberg and Green (1985), Anderson and Wallace (1986), and Joulfaian and Mookerjee (1990) for the case of United States and Ram (1988), Joulfaian and Mookerjee (1990), Owoye (1995), Darrat (1998), and Antioch (1998) for the case of other industrialized countries.

policies of member states.[8] From a theoretical standpoint, in a monetary union in which member countries no longer have an independent monetary policy, fiscal policy becomes the only instrument available to them to protect themselves against exogenous shocks. On this ground, it can be argued that strict budgetary rules, by tying the fiscal authorities' hands, may impose a heavy burden on countries in the event of large, idiosyncratic shocks. However, constraints on fiscal policy, such as the deficit ceiling, can be useful if in their absence deficits would tend to be excessive from the national or regional perspective. The experience of WAEMU countries over the past decade supports the view that budgetary policy did not follow the policy prescriptions of the "tax-smoothing" theory,[9] which allows for the accumulation of debt during recessions but requires debt reduction during periods of expansionary growth. On this ground, it can be argued that convergence criteria on deficit and debt ceilings are a blunt device to impose fiscal discipline in the union, particularly if they are backed by an external enforcement mechanism.

One way to establish fiscal policy is to examine the relationship between revenues and expenditure in the framework of Granger causality.[10] This framework allows the data to discriminate between the history of individual time series according to their ability to predict the current value of government revenues and expenditure, without testing directly behavior-based hypotheses and imposing any priors about the determination of the variables. While the results of Granger causality tests are generally consistent with more than one hypothesis, they provide an objective statistical basis to form empirical judgements about the correlations underlying the fiscal variables. Four hypotheses are tested: (1) revenue Granger causes expenditure; (2) expenditure Granger causes revenue; (3) there is a bidirectional causality between revenue and expenditure; and (4) there is no causality. Each hypothesis about the causality structure of government spending and revenue has its own implications. For example, if the causality structure is found to be running from expenditure to revenue, the government may be seen as setting expenditure objectives and subsequently establishing the

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[8] An alternative approach would be to ensure fiscal discipline through market forces. With the establishment of the Regional Securities Exchange and the adoption of the current monetary policy guidelines aimed at the near-term reduction or even complete elimination of monetary financing of the fiscal deficit, countries will be forced to seek alternative sources of financing, in particular through public offerings on the regional financial market. Under these conditions, countries with very high levels of indebtedness will be subject to extremely heavy financing constraints, owing to the higher interest rates that will be charged on their borrowing operations. In the absence of exchange rate risk, investors will pay particular attention to the basic indicators of internal and external balance, the stock of debt, and the country's overall financing gap in setting their risk premiums.

[9] Under this theory, there is no reason why government debt as a share of GDP should show a pronounced upward trend in the long run.

[10] Granger causality does not indicate causality in the more common use of the term but is simply a statistical property reflecting the information content of the data. Variable X is said to Granger cause variable Y if variable Y can be predicted better by past values of variables X and Y rather than by past values of Y alone.

revenue needs to meet these spending commitments. However, if causality is found to be running from revenue to expenditure, it is possible to argue that the government undertakes spending only when revenue is available.

B. Empirical Methodology and Data Used

The empirical methodology used to disentangle the relationship between government revenue and expenditure in the seven WAEMU countries is the co-integration and the error-correction methodology (ECM). Co-integration tests and error-correction models are econometric frameworks ideal for analyzing relationships between variables that economic theory suggests should not deviate too far from each other in the long run. The main reason for the popularity of co-integration analysis is that it provides a formal background for testing and estimating short-and long-run relationships among economic variables. Furthermore, the ECM strategy provides an answer to the problem of spurious regressions. According to Engle and Granger (1987), co-integrated variables must have an ECM representation. Moreover, in a co-integrated system of two series expressed by an ECM representation, causality must run in at least one direction (Granger, 1988).

Let R_t and G_t be government revenue and expenditure at current prices, expressed in logarithmic terms. If R_t and G_t are considered as stochastic trends and if they follow a common long-run equilibrium relationship, then the two variables should be co-integrated. Co-integration exists between two nonstationary time series if there is a linear combination of the two series that is stationary. Theories of the term structure of budget deficits indicate a long-run relationship between R_t and G_t. If the gap between the two variables is large relative to the long-run relationship, it can be reduced by either an increase in revenue or a decrease in expenditure; a rise in revenue that will be larger than the rise in expenditures, or a decrease in expenditure that will be larger than the decrease of budget revenue.

In the context of ECMs, one can investigate the short- and long-run movement of R_t and G_t. If R_t and G_t are co-integrated, an ECM representation could have the following form:

$$\Delta R_t = a_0 + \sum_{i=1}^{n} a_{1i}\Delta R_{t-i} + \sum_{i=0}^{m} a_{2i}\Delta G_{t-i} + c\pi_{t-1} + \varepsilon_t \quad (1)$$

$$\Delta G_t = b_0 + \sum_{i=1}^{m} b_{1i}\Delta G_{t-i} + \sum_{i=0}^{n} b_{2i}\Delta R_{t-i} + d\lambda_{t-1} + \eta_t \quad (2)$$

where π_{t-1} and λ_{t-1} are error-correction terms that capture disequilibrium responses and m and n represent the number of lags. For example, if the coefficient c in the revenue equation is statistically significant, it means that revenue catches up to outlays to ensure both variables

do not drift too far apart in error. Likewise, if d in the outlays equation is statistically significant, outlays catch up to revenues. The coefficients on the lagged values of ΔR_t and ΔG_t are short-run parameters measuring the immediate impact of independent variables on revenue and expenditure. Within the ECM formulation of (1) and (2), G_t does not Granger cause R_t (in either the short run or long run) if all $a_{2i} = 0$ and $c = 0$; equivalently R_t does not Granger cause G_t if all $b_{2i} = 0$ and $d = 0$.

The data, whose time-series properties are discussed in the next section, are in nominal terms; they comprise government revenue including grants, and total government expenditure (including net lending) from the World Economic Outlook (WEO) database. Nominal, rather than inflation-adjusted, data were used since budgetary figures are generally defined in current values. The data periodicity is annual, dictated by availability; in addition, annual data are appropriate since budgetary exercises in the WAEMU countries are principally conducted annually.

IV. Empirical Results

A co-integrating relationship exists within a set of nonstationary time series when a linear combination of the variables can be identified that yields a stationary result. Because one of the important features of co-integration is that the time series of the system must be integrated of the same order, the time-series properties of each variable must be investigated before proceeding to the econometric modeling. To test formally for the presence of a unit root and determine the order of integration of the data series to be analyzed, the augmented Dickey-Fuller (ADF) tests are conducted.

A. Unit Root Tests

The ADF test is performed by running the following regression for each variable:

$$\Delta Z_t = \mu + \gamma t + (\rho - 1)Z_{t-1} + \sum_{i=1}^{k} \phi_i \Delta Z_{t-i} + \omega_t \tag{3}$$

where ΔZ are the first differences of the series Z, k is the lag order, and t stands for time. The ADF test is a test of the null hypothesis of $\rho = 1$ against the alternative hypothesis of $\rho < 1$. All equations are estimated here with five lags. Table 1 indicates that, for all seven countries, revenue and expenditure are not stationary in levels, that is, they contain a unit root. However, the first difference of these variables is stationary, suggesting that the variables are integrated of order one. This finding implies that it is reasonable to proceed with tests for co-integrating relationships among these series.

B. Co-integration Tests

Generally speaking, a nonstationary variable will tend to wander extensively, given enough time. But some combination of nonstationary variables can be expected to evolve in such a way that they do not drift too far apart. Consequently, if revenue and expenditure tend not to drift too far apart, as the ADF test suggests, there is a long-run relationship between them; that is, they are kept together by an error-correction mechanism. To test for co-integration between the two series, we follow here the two-step procedure suggested by Engle and Granger (1987).[11] This procedure consists first of estimating the underlying co-integrating equations, using the variables in their nonstationary level form. In the second step, the estimated residuals from the optimal co-integrating equation are recovered and checked for nonstationarity, using the ADF test. If the regression residuals are stationary, that is, I(0), then revenue and expenditure are co-integrated. This means that revenue and expenditure move together in the long run, but deviate in the short term from each other. However, should the residuals be nonstationary, then the linear combination of revenue and expenditure is not I(0), and there does not exists a long-run equilibrium relationship between the two.

Thus, co-integration is assessed here by estimating the following co-integrating regressions and testing their residuals for stationarity:

$$R_t = \beta_0 + \beta_1 G_t + \pi_t \tag{4}$$

$$G_t = \alpha_0 + \alpha_1 R_t + \lambda_t \tag{5}$$

Table 2 presents test statistics for the two-step procedure of Engle and Granger (1987). The estimation period covers the annual period 1968-94. For all countries, the ADF co-integration test indicates that the residuals π_t and λ_t are stationary. The CRDW statistics also indicate that the residuals from the co-integrating regressions are stationary at the 5 percent level of significance. Note that the coefficients of the co-integrating relationship (α or B) allows the direct measurement of the expenditure and revenue multipliers. These are long-run parts of the co-integrating relationship. If each of the respective multipliers has a value of one, the fiscal policy would have the property of a balanced budget. In this case, the deficit (the difference between revenue and expenditure) would be stationary, and shocks to revenue or expenditure would be transitory in their effect on the fiscal deficit; in other words, the deficit process would be mean reverting. Because our interest is in looking at such concepts, we test for the restriction that the co-integrating vector is [1, -1]. The chi-square

[11] An alternative approach is the Johansen procedure, which tests better and more efficiently for cointegration based on the well-accepted likelihood ratio principle. This method also has the advantage of not requiring Gaussian errors. However, the Engle Granger two-step procedure has proved to be simpler and more useful in bivariate formulation.

test results suggest that this restriction is satisfied in all countries but Niger (Table 2, column 5). The interpretation of this finding is that the deficit is stationary in all countries except in Niger, implying, in turn, that there is no co-integration between the revenue and expenditure series in Niger. The apparent lack of co-integration in the case of Niger may suggest that, in the sample under consideration, there are other forces generating budget imbalances. These results are confirmed below in the error-correction analysis, which offers an alternative approach to testing for co-integration between two time series.

C. Error-Correction Models and Causality

Unable to reject the stationarity property of the deficit in all countries except Niger, we examine next the error-correction representation of the revenue and expenditure data, with a view to drawing inferences about causality between the two series. Within an ECM, Granger causality can arise from two sources. First, short-run dynamics are captured by the lagged differences, and conventional tests of causality may be based on the significance of these terms. More interesting for our purpose here, however, is the significance of the error-correction term, which determines the direction of long-run causality.

The system of equations (1)-(2) comprises a bivariate vector autoregression (VAR) in first differences, augmented by the error-correction terms measuring budgetary disequilibrium. The size and statistical significance of the coefficients on the budgetary disequilibrium term in each ECM equation measure the tendencies of each fiscal variable to restore budgetary equilibrium. Tables 3-9 provide for each country summary statistics for the revenue and outlays ECM using Hendry's general-to-specific strategy. One advantage of the general-to-specific technique is that the possibility of a dynamic misspecification appearing in the final, restricted ECM model is considerably reduced. A lag structure of five was initially chosen and decreased recursively if the null hypothesis was not initially rejected, yielding a parsimonious model of revenue and expenditure in all seven countries. The restricted ECM estimates in the last two columns pass a series of diagnostic tests, including serial correlation and omitted variables such as time trend and other lags. In addition, the model is evaluated through both misspecification tests (such as normality, autocorrelation, and heteroscedascity) and Chow stability tests; recursive estimation has been utilized to investigate parameter constancy of the restricted ECM estimates.[12]

The estimates from the ECMs summarized in Tables 3-9 are subject to two different interpretations. As pointed out by Granger (1988), in an error-correction model, the causal impact of one variable on another can take place in two ways. One way is through the impact of lagged changes on the independent variable. The second is through the error-correction term, which may be viewed as occurring at very low frequencies, that is, over the long run. In terms of equations (1) and (2), this means that there is no long-run causality if the

[12] Although not reported here, tests for model stability and parameter constancy can be obtained from the authors upon request.

coefficients c and d are zero; there is no short-run causality if the coefficients $a_{1i} = 0$ and $b_{2i} = 0$. The direction of short-term causality is assessed by a Wald test on the independent set of variables. These tests indicate that there is a feedback causality between revenue and expenditure in the short run in all countries except Niger.

In the long run, we find that for nearly all countries there exists some causality between the two fiscal variables. The t-statistics on the error-correction terms are significant for all countries except Niger. This may be taken as another piece of evidence that there is no co-integrating relationship between the two series in Niger, thus suggesting that there can be no causal relationship between revenue and expenditure. Two alternative explanations can be offered. First, the evidence suggests that, over the period considered in this study, there was a significant break in the fiscal series in Niger, particularly as regards the revenue data, thus making it impossible to unravel any causal relationships between the two variables. Indeed, since the 1980s, there has been gradual decline in the international price of energy (uranium), the main source of government revenue in Niger. As a result, export receipts declined, and government revenue as a share of GDP fell from an average of 15 percent of GDP in the early 1980s to below 10 percent in the 1990s. Second, as in other countries, it is possible that both revenue and expenditure are driven by a third variable, such as national income or GDP.

V. Conclusions

Fiscal data from the seven WAEMU member countries provide substantial support, on the basis of a bivariate model, to the notion that there is interdependence in budgetary decisions which have implications for fiscal performance. The main findings on the direction of long-run causality between expenditure and revenue is as follows. In Burkina Faso and Senegal, causality is unidirectional from government revenues to expenditure. In Benin and Togo, a bidirectional causality cannot be excluded; however, further evidence using stability and recursive tests, suggests that causality is most likely to be running from expenditure to revenue. Bidirectional causality characterizes fiscal data in Côte d'Ivoire and Mali in the long-run, while there is no evidence of causality among the two variables in Niger (Table 10). In the short run, both revenue and spending respond to budgetary equilibria in all countries except Niger.

An implication of these results is that governments in the WAEMU will need to enact different strategies to correct fiscal imbalances and achieve the convergence norms. The results suggest that fiscal adjustment in Burkina Faso, and Senegal, where revenue Granger cause expenditure, will require control of government spending, holding the revenue side of the budget constant. In this group of countries, raising revenue through increased taxation will not be effective, as the increased revenue will translate into higher expenditure. The results also indicate that in Benin and Togo, where expenditure Granger causes revenue, revenue can be an effective instrument of the budgetary process, as raising it will not necessarily increase the level of spending. For Côte d'Ivoire and Mali, the results suggest that spending cuts will ultimately lead to revenue reductions; and revenue increases will correspondingly lead to expenditure increases, thus raising questions about the feasibility of

fiscal adjustment based on policies affecting the revenue and expenditure side of the budget independently of each other. In the case of Niger, the evidence suggests that there may be other forces leading to budget imbalances.

Fiscal policies as depicted here by the time series of revenue, expenditure and deficits also appear to reflect country-specific reactions to common shocks. As a result, inter-country differences in fiscal performance could be accounted for by differences in fiscal institutions and procedures which shape the response of each member state to these shocks. To a certain degree, this is consistent with the institutional view of fiscal performance.[13] Thus, besides looking at the history of the fiscal process, the institutional mechanisms which drive the direction of causality between the fiscal variables need to be understood in order to make sound judgments about the required policy instruments. For example, the direction of causality from revenue to expenditure in Senegal and Burkina Faso may be explained by the fact that these two countries receive a large amount of grants (included in the revenue series); thus revenue availability may be thought of in this case as constraining spending. In Benin and Togo, which are relatively small and more open to trade, spending decisions may be thought to be made before the revenue needs are subsequently found.

As a caveat, it should be noted that a bivariate model may not identify precisely the causal relationship if a higher dimension model is appropriate; therefore, it may be necessary to introduce other potentially relevant variables such as GDP in a multivariate ECM formulation so as to better capture any additional channel of causality between the two fiscal variables.

[13] Proponents of this view argue that budgetary procedures and institutions play an important role in determining fiscal outcomes. See von Hagen (1992) for a discussion of the evidence of this view in the context of European Union countries.

Table 1. WAEMU Countries: Unit Root Tests

	Variables	ADF Statistic	Lag Length	Sample Period
Benin				
Revenue	R	-2.8	1	1966-98
	ΔR	-5.4**	0	1967-98
Expenditure	G	-3.1	0	1966-98
	ΔG	-7.2**	0	1967-98
Burkina Faso				
Revenue	R	-2.2	0	1966-98
	ΔR	-8.6**	0	1967-98
Expenditure	G	-1.6	0	1966-98
	ΔG	-6.0**	0	1967-98
Côte d'Ivoire				
Revenue	R	-2.3	1	1966-98
	ΔR	-3.6*	0	1967-98
Expenditure	G	-1.4	1	1966-98
	ΔG	-4.4**	0	1967-98
Mali				
Revenue	R	3.3	0	1966-98
	ΔR	-7.2**	0	1967-98
Expenditure	G	2.7	0	1966-98
	ΔG	-8.8**	0	1967-98
Niger				
Revenue	R	-3.4	1	1966-98
	ΔR	-4.8**	0	1967-98
Expenditure	G	3.1	1	1966-98
	ΔG	-5.8**	0	1967-98
Senegal				
Revenue	R	-3.9*	1	1966-98
	ΔR	-5.6**	0	1967-98
Expenditure	G	-2.5	1	1966-98
	ΔG	-4.5**	0	1967-98
Togo				
Revenue	R	-2.5	2	1966-98
	ΔR	-6.6**	0	1967-98
Expenditure	G	-2.2	2	1966-98
	ΔG	-6.7**	0	1967-98

Notes: All tests are performed including both a constant and linear trend. ADF statistics refers to results of augmented Dickey-Fuller test. Test statistics marked with * and ** indicate rejection of unit roots at the 1 percent and 5 percent confidence levels, respectively. Critical test values are tabulated by MacKinnon (1981).

Table 2. WAEMU Countries: Test Statistics for Stationarity of Co-integrating Equation Residuals

	Residuals of	ADF Statistic on Π	Lag Length	Value of B	Chi-square statistics for B=1	Sample Period
Benin	R on G	-3.1*	0	0.98	0.0[0.94]	1976-98
Burkina Faso	R on G	-3.9*	0	0.80	1.15[0.28]	1976-98
Cote d'Ivoire	R on G	-3.1*	2	1.07	0.15[0.69]	1976-98
Mali	R on G	-4.5*	0	0.98	0.01[0.93]	1976-98
Niger	R on G	-3.6*	0	0.07	7.46[0.00]	1976-98
Senegal	R on G	-5.1*	1	0.84	0.96[0.33]	1976-98
Togo	R on G	-3.2*	0	1.23	0.92[0.33]	1976-98

Notes: R is government revenue and G is government expenditures. ADF refers to augmented Dickey-Fuller test.
* and ** denote rejection at the 5 percent and 1 percent critical values, respectively.

Table 3. Benin: Estimates of ECM, 1976-98

Error-Correction Model (ECM) Dependent Variables	Unrestricted		Restricted	
	ΔR	ΔG	ΔR	ΔG
Constant	-1.64	0.509	-0.853	0.54
	(-2.17)	(0.75)	(-3.95)	(3.4)
ΔR	...	0.511	...	0.61
		(2.82)		(4.6)
ΔR (-1)	1.5	-0.128	0.558	...
	(1.7)	(-0.17)	(3.38)	
ΔR (-2)	0.90	0.338	...	...
	(1.1)	(0.51)		
ΔR (-3)	0.56	0.369	...	0.47
	(0.7)	(0.65)		(2.4)
ΔR (-4)	0.55	0.273	...	...
	(0.9)	(0.60)		
ΔR (-5)	0.42	-0.108	0.199	...
	(0.9)	(-0.30)	(1.48)	
ΔG	0.91	...	1.072	...
	(2.8)		(6.29)	
ΔG (-1)	-1.1	-0.479	...	-0.56
	(-1.0)	(-0.58)		(-3.1)
ΔG (-2)	-0.93	-0.632	...	-0.25
	(-0.90)	(-0.81)		(-1.5)
ΔG (-3)	-0.47	-0.377	...	-0.39
	(-0.6)	(-0.62)		(-1.9)
ΔG (-4)	-0.36	-0.184	...	...
	(-0.7)	(-0.50)		
ΔG (-5)	-0.16	0.167	...	...
	(-0.4)	(0.59)		
Π(-1)	-1.962	...	-0.990	...
	(-2.2)		(-4.45)	
λ(-1)	...	0.543	...	0.6
		(0.67)		(3.5)
R^2	0.76	0.85	0.71	0.74
F(a,b)	2.317	4.16	8.361	6.13
SER	0.132	0.098	0.107	0.10
DW	2.27	1.79	2.18	2.23

Notes: See Section III for definitions of variables. See Section II for definitions of variables. Asymptotic t-statistics in parentheses. The error-correction term is the lagged budget deficit. SER is the standard error of regression, and DW is the Durbin-Watson statistic.

Table 4. Burkina Faso: Estimates of ECM, 1976-98

Error-Corrction Model (ECM) Dependent Variables	Unrestricted		Restricted	
	ΔR	ΔG	ΔR	ΔG
Constant	-0.465	0.295	-0.260	0.684
	(-1.28)	(0.33)	(-1.13)	(2.71)
ΔR	...	0.670	...	0.595
		(2.30)		(3.34)
ΔR (-1)	-0.089	0.261	...	...
	(-0.24)	(0.26)		
ΔR (-2)	-0.609	0.457	-0.650	...
	(-1.33)	(0.54)	(-2.54)	
ΔR (-3)	-0.462	0.616	-0.649	...
	(-0.81)	(0.84)	(-2.39)	
ΔR (-4)	0.047	0.682	...	0.359
	(0.08)	(1.13)		(2.08)
ΔR (-5)	0.380	0.035	...	...
	(0.70)	(0.08)		
ΔG	0.858	...	0.955	...
	(2.13)		(3.91)	
ΔG (-1)	0.478	-0.359	0.562	...
	(0.67)	(-0.46)	(2.11)	
ΔG (-2)	0.242	-0.289	0.451	...
	(0.27)	(-0.49)	(1.51)	
ΔG (-3)	0.344	-0.407	0.664	...
	(0.44)	(-0.91)	(2.01)	
ΔG (-4)	-0.257	0.055	...	...
	(-0.47)	(0.15)		
ΔG (-5)	-0.073	-0.034	...	...
	(-0.17)	(-0.14)		
Π(-1)	-0.402	...	-0.211	...
	(-1.38)		(-1.22)	
λ(-1)	...	0.260	...	0.630
		(0.33)		(3.72)*
R^2	0.70	0.69	0.64	0.56
F(a,b)	1.682	1.613	3.221	5.871
SER	0.148	0.199	0.13	0.169
DW	1.76	1.98	2.25	2.05

Notes: See Section III for definitions of variables. See Section II for definitions of variables. Asymptotic t-statistics in parentheses. The error-correction term is the lagged budget deficit. SER is the standard error of regression, and DW is the Durbin-Watson statistic.

Table 5. Côte d'Ivoire: Estimates of ECM, 1976-98

Error-Correction Model (ECM) Dependent Variables	Unrestricted		Restricted	
	ΔR	ΔG	ΔR	ΔG
Constant	-0.019	0.080	-0.071	0.116
	(-0.10)	(0.65)	(-0.49)	(1.71)
ΔR	...	0.446	...	0.376
		(2.79)		(4.07)
ΔR (-1)	0.921	-0.214	0.719	...
	(1.99)	(-0.60)	(2.40)	
ΔR (-2)	0.893	-0.440	0.558	-0.294
	(1.92)	(-1.33)	(2.22)	(-2.50)
ΔR (-3)	0.207	0.010	...	...
	(0.52)	(0.03)		
ΔR (-4)	0.512	-0.140	0.397	...
	(1.42)	(-0.55)	(1.42)	
ΔR (-5)	0.255	-0.027	...	...
	(0.66)	(-0.11)		
ΔG	1.04	...	1.087	...
	(2.8)		(3.39)	
ΔG (-1)	-0.936	0.340	-0.695	...
	(-1.70)	(0.85)	(-1.74)	
ΔG (-2)	-0.485	0.108	...	...
	(-0.90)	(0.29)		
ΔG (-3)	-0.20	0.054	...	...
	(-0.45)	(0.18)		
ΔG (-4)	-0.655	0.111	-0.491	...
	(-1.47)	(0.34)	(-1.39)	
ΔG (-5)	-0.589	0.236	-0.371	0.190
	(-1.31)	(0.75)	(-1.18)	(1.03)
Π(-1)	-1.265	...	-0.953	...
	(-2.31)		(-3.387)*	
λ(-1)	...	0.555	...	0.404
		(1.34)		(3.70)*
R^2	0.73	0.68	0.70	0.64
$F(a,b)$	1.87	1.49	3.37	6.102
SER	0.13	0.08	0.114	0.065
DW	1.89	1.98	2.03	1.55

Notes: See Section III for definitions of variables. See Section II for definitions of variables. Asympt t-statistics in parentheses. The error-correction term is the lagged budget deficit. SER is the standard error of regression, and DW is the Durbin-Watson statistic.

Table 6. Mali: Estimates of ECM, 1976-98

Error-Correction Model (ECM) Dependent Variables	Unrestricted		Restricted	
	ΔR	ΔG	ΔR	ΔG
Constant	-0.898	0.942	-1.009	0.859
	(-1.52)	(1.79)	(-5.81)	(3.05)
ΔR	...	0.695	...	0.763
		(3.41)		(4.72)
ΔR (-1)	0.425	-0.747	0.475	-0.497
	(0.64)	(-1.29)	(2.89)	(-2.02)
ΔR (-2)	-0.071	-0.523	...	-0.281
	(-0.11)	(-0.91)		(-1.20)
ΔR (-3)	-0.073	-0.218	...	...
	(-0.12)	(-0.40)		
ΔR (-4)	-0.005	-0.393	...	-0.272
	(-0.01)	(-1.05)		(-1.66)
ΔR (-5)	-0.156	0.125	...	...
	(-0.48)	(0.41)		
ΔG	0.810	...	0.807	...
	(3.41)		(5.76)	
ΔG (-1)	-0.524	0.522	-0.476	0.347
	(-0.94)	(1.02)	(-2.11)	(1.08)
ΔG (-2)	-0.061	0.430	...	0.285
	(-0.11)	(0.88)		(1.12)
ΔG (-3)	0.053	0.189	...	...
	(0.09)	(0.37)		
ΔG (-4)	0.103	0.400	...	0.201
	(0.20)	(0.88)		(1.11)
ΔG (-5)	0.314	-0.048	0.148	...
	(0.86)	(-0.14)	(1.11)	
II(-1)	-1.471	...	-1.613	...
	(-1.94)		(-6.47)*	
λ(-1)	...	1.377	...	1.314
		(1.96)		(3.164)*
R^2	0.88	0.83	0.86	0.80
F(a,b)	5.278	3.589	16.839	5.933
SER	0.037	0.0317	0.0436	0.038

Notes: See Section III for definitions of variables. See Section II for definitions of variables. Asymptotic t-statistics in parentheses. The error-correction term is the lagged budget deficit. SER is the standard error of regression, and DW is the Durbin-Watson statistic.

Table 7. Niger: Estimates of ECM, 1976-98

Error-Correction Model (ECM) Dependent Variables	Unrestricted		Restricted	
	ΔR	ΔG	ΔR	ΔG
Constant	-0.529	0.501	-0.063	0.127
	(-1.70)	(0.98)	(-0.49)	(0.90)
ΔR	...	0.620	...	0.506
		(2.04)		(1.58)
ΔR (-1)	-0.402	0.275	...	...
	(-0.99)	(0.49)		
ΔR (-2)	-0.588	0.435	...	...
	(-1.62)	(0.81)		
ΔR (-3)	-0.332	0.422	...	...
	(-0.99)	(0.92)		
ΔR (-4)	-0.166	0.346	...	0.153
	(-0.54)	(0.97)		(1.18)
ΔR (-5)	-0.638	0.361	...	...
	(-2.33)	(0.61)		
ΔG	0.509	...	0.486	...
	(2.14)		(1.34)	
ΔG (-1)	0.718	-0.694	...	-0.274
	(1.71)	(-1.12)		(-1.38)
ΔG (-2)	0.761	-0.760	...	-0.299
	(1.86)	(-1.08)		(-1.41)
ΔG (-3)	0.188	-0.450	...	...
	(0.54)	(-0.99)		
ΔG (-4)	-0.182	-0.09	-0.324	...
	(-0.57)	(-0.23)	(-1.48)	
ΔG (-5)	0.117	-0.080	...	...
	(0.27)	(-0.16)		
Π(-1)	0.354	...	-0.135	...
	(0.84)		(-0.97)	
λ(-1)	...	-0.179	...	0.153
		(-0.37)		(1.18)
R^2	0.62	0.54	0.30	0.44
F(a,b)	1.17	0.842	1.977	2.149
SER	0.13	0.153	0.135	0.127
DW	2.54	1.92	1.95	2.03

Notes: See Section III for definitions of variables. See Section II for definitions of variables. Asymptotic t-statistics in parentheses. The error-correction term is the lagged budget deficit. SER is the standard error of regression, and DW is the Durbin-Watson statistic.

Table 8. Senegal: Estimates of ECM, 1976-98

Error-Correction Model (ECM)	Unrestricted		Restricted	
Dependent variables	ΔR	ΔG	ΔR	ΔG
Constant	0.153	0.075	0.092	0.198
	(0.70)	(0.28)	(0.99)	(2.41)
ΔR	...	0.801	...	0.747
		(2.78)		(4.64)
ΔR (-1)	0.243	-0.425	...	...
	(0.67)	(-0.99)		
ΔR (-2)	-0.693	0.067	-0.586	
	(-1.88)	(0.13)	(-2.77)	
ΔR (-3)	0.123	-0.423	...	...
	(0.28)	(-0.82)		
ΔR (-4)	-0.326	0.330	...	...
	(-0.98)	(0.81)		
ΔR (-5)	-0.133	-0.027	...	...
	(-0.30)	(-0.05)		
ΔG	0.544	...	0.526	...
	(2.78)		(3.65)	
ΔG (-1)	-0.257	0.388	...	...
	(-0.94)	(1.2)		
ΔG (-2)	0.300	0.131	0.309	...
	(0.95)	(0.33)	(1.64)	
ΔG (-3)	0.968	0.185	...	...
	(0.01)	(0.56)		
ΔG (-4)	0.111	-0.057	...	...
	(0.43)	(-0.18)		
ΔG (-5)	0.067	0.289	...	...
	(0.23)	(0.88)		
Π(-1)	-0.137	...	-0.093	...
	(-0.48)		(-0.59)	
λ(-1)	...	0.567	...	0.379
		(1.92)		(2.50)*
R^2	0.76	0.73	0.69	0.63
F(a,b)	2.507	2.163	8.127	11.699
SER	0.061	0.090	0.080	0.124

Notes: See Section III for definitions of variables. See Section II for definitions of variables. Asymptotic t-statistics in parentheses. The error-correction term is the lagged budget deficit. SER is the standard error of regression, and DW is the Durbin-Watson statistic.

Table 9. Togo: Estimates of ECM, 1976-98

Error-Correction Model (ECM) Dependent Variables	Unrestricted		Restricted	
	ΔR	ΔG	ΔR	ΔG
Constant	0.129	0.08	0.065	0.079
	(0.46)	(0.51)	(0.45)	(0.79)
ΔR	...	0.380	...	0.381
		(2.34)		(3.25)
ΔR (-1)	0.298	0.210	0.222	...
	(0.24)	(0.28)	(1.17)	
ΔR (-2)	0.350	0.258	0.222	...
	(0.30)	(0.35)	(1.26)	
ΔR (-3)	0.169	0.235	...	...
	(0.16)	(0.37)		
ΔR (-4)	-0.159	0.399	...	...
	(-0.13)	(0.56)		
ΔR (-5)	-0.100	0.262	...	...
	(-0.09)	(0.39)		
ΔG	0.996	...	1.021	...
	(2.34)		(4.11)	
ΔG (-1)	-0.173	-0.364	...	-0.200
	(-0.14)	(-0.50)		(-1.20)
ΔG (-2)	-0.127	-0.438	...	-0.098
	(-0.11)	(-0.64)		(-0.56)
ΔG (-3)	-0.231	-0.577	...	-0.341
	(-0.20)	(-0.83)		(-1.85)
ΔG (-4)	0.096	-0.380	...	...
	(0.08)	(-0.56)		
ΔG (-5)	0.214	-0.396	...	...
	(0.22)	(-0.67)		
Π(-1)	-0.987	...	-0.863	...
	(-0.76)		(-3.16)*	
λ(-1)	...	0.058	...	0.322
		(0.07)		(2.01)
R^2	0.656	0.66	0.62	0.62
F(a,b)	1.321	1.381	5.559	4.382
SER	0.426	0.162	0.470	0.1846
DW	2.06	2.24	2.09	1.92

Notes: See Section III for definitions of variables. See Section II for definitions of variables. Asymptotic t-statistics in parentheses. The error-correction term is the lagged budget deficit. SER is the standard error of regression, and DW is the Durbin-Watson statistic.

Table 10. WEAMU Countries: Summary Results of the Granger Causality Tests

	Short Run			Long Run		
	Causality structure	From revenue to expenditure	From expenditure to revenue	Causality structure	From revenue to expenditure	From expenditure to revenue
Benin	B	yes	yes	U	no	yes
Burkina Faso	B	yes	yes	U	yes	no
Côte d'Ivoire	B	yes	yes	B	yes	yes
Mali	B	yes	yes	B	yes	yes
Niger	N	no	no	N	no	no
Senegal	B	yes	yes	U	yes	no
Togo	B	yes	yes	U	no	yes

Note: B=bidirectional, U=unidirectional, and N=no causality.

Scale of Budgetary Adjustment

In this annex, we examine the magnitude of the fiscal adjustment required to bring the fiscal positions of member countries to sustainable levels. Fiscal policy is often considered to be sustainable if it can lead to a sustainable level of public debt. More generally, a sustainable level of public debt is defined in terms of convergence toward a steady state debt-to-GDP ratio, taken here as the stabilization of public debt at 70 percent of GDP. Following the approach discussed in Blanchard (1990), which starts from the government's budget constraint, it can be shown that, expressed in terms of GDP ratios, the change in the net debt-to-GDP ratio satisfies the following identity:

$$\Delta d = pb + \frac{(r-g)}{(1+g)} d, \tag{A1}$$

where pb is the primary balance in percent of GDP, and g and r denotes the real GDP growth rate and the real interest rate, respectively. It can be seen that for constant values of r and g, equation (A1) can be rewritten as (A2), which states that, for fiscal policy to be sustainable at the current debt ratio, it should be offset by the sum of expected future discounted primary budget surpluses (exclusive of interest payments):

$$d = \int be^{-(r-g)} dt. \tag{A2}$$

Thus the primary balance (pb^*) required to stabilize the debt ratio at d^* is given by the following equation (with θ representing a grant element):

$$pb^* = d\frac{(r-g)}{(1+g)} - \theta. \tag{A3}$$

Because the WAEMU countries receive many grants or subsidized loans from official (bilateral or multilateral) institutions, the availability of such concessional financing needs to be incorporated into sustainability analyses. Moreover, the debt ratio should be defined in terms of fiscal revenue, which better captures the capacity of governments to meet their debt obligations. Another important element is the consideration of both domestic and external debt in the evaluation of sustainable fiscal positions, with both measured not in nominal terms, but rather in net-present-value terms expressed as a ratio of fiscal revenue. Using such concepts, equation (A3) can be rewritten as:

$$pb^* = \frac{NPVD_r(r-g_r)}{\alpha(1+g_r)}(Rev/GDP) - \theta, \tag{A4}$$

where $NPVD$ is the net present value of overall debt expressed in percent of total revenue (Rev) and $(1-\alpha)$ is the degree of concessionality (grant element).

The difference between the optimal (pb^*) and the actual primary balance measures the deviation of current policies from a sustainable fiscal path. This indicator, commonly referred to as the primary gap (PG), represents the magnitude of fiscal adjustment that is required to bring the fiscal positions to sustainable levels. Table A1 shows the scale of adjustment in various WAEMU countries necessary to stabilize the net present value of public debt at 70 percent of GDP. The calculation is based on assumptions made about interest rate and nominal GDP growth rate. In some cases (Benin, Burkina Faso, and Senegal) where the debt ratio is already below the threshold value, it is assumed that the aim is to stabilize the debt ratio at its 1990-93 level. In other cases, additional adjustment is required in the transitional period in order to bring the debt down before stabilizing it.

WAEMU Countries: Primary Balance Required to Stabilize the Overall Debt Ratio 1/

(In percent of GDP)

	Public External Debt		Overall Fiscal Balance		Primary Fiscal Balance		Required Primary Balance	
	1990-93	1998	1990-93	1998	1990-93	1998	Scenario 1 2/	Scenario 2 3/
Benin	65.5	56.9	-4.5	-1.3	-0.3	0.0	1.1	1.3
Burkina Faso	18.4	52.2	-7.4	-9.8	0.7	-8.4	1.0	1.3
Côte d'Ivoire	124.9	98.0	-2.6	-2.6	-1.1	1.8	1.9	2.3
Mali	100.5	117.6	-8.4	-8.3	-0.6	-7.3	2.2	1.9
Niger	55.0	77.3	-7.8	-7.7	-2.4	-5.0	1.5	1.3
Senegal	56.1	69.4	-0.3	-3.3	2.3	-2.0	1.3	1.3
Togo	81.1	94.8	-5.7	-7.2	-2.0	-4.6	1.8	1.5

1/ Assuming a wedge of 2 percent between the interest rate and the nominal growth rate (with real growth of 5 percent).
2/ For scenario 1, external debt is stabilized at the 1998 levels.
3/ For scenario 2, external debt is stabilized at 70 percent of GDP.

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