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Macroeconomic Fluctuations in Sub-Saharan Africa

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Abstract

The sources of macroeconomic fluctuations in sub–Saharan African are examined by comparing the CFA franc countries with the non–CFA franc countries. External shocks, especially terms of trade shocks, appear to have a greater influence on fluctuations of output and the real exchange rate in CFA franc countries. This result does not appear to be associated with differences in the economic structure but may reflect the fixed exchange rate regime, which does not (partially) buffer these countries from external shocks. Macroeconomic fluctuations in non–CFA franc countries are similar to those in other developing countries, particularly in Latin America.

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SUMMARY

The willingness of creditors to lend to risky borrowers and the price of lending depend critically on the percentage of the loan that can be recovered in case of default--the recovery ratio. This paper examines individual and industry recovery ratios, using data for defaulted U.S. corporate bonds. It also analyzes the importance of the industry-average recovery ratio in determining the time to default, or the survival time of corporate bonds.

The research reported in the paper indicates that on the individual level the most important variables determining the cross-sectional distribution of recovery ratios are debt seniority, the growth rate of the industry in which the firm operates, and the type of reorganization attempted after default. By considering a subsample of bonds for which debt restructuring has been informal, the analysis confirms that there are significant violations of the rule that more senior creditors are given priority over less senior ones in the satisfaction of claims.

On an industry level, a somewhat different set of variables is important for the explanation of the cross-sectional distribution of recovery ratios. The proxies for physical asset obsolescence--the ratio of fixed to total assets, industry growth, and industry concentration--are the single most important variables. The ratio of fixed to total assets has a negative sign and industry growth has a positive sign, as is to be expected in both cases, but it is puzzling that more concentrated industries have higher industry recovery ratios.

On an individual level, both the recovery ratios and the time to default (survival time) are mutually dependent. This potential endogeneity is addressed by using average industry recovery ratios, and not individual recovery ratios, in examining the impact of recovery ratios on survival time. The initial time to maturity, the industry average recovery ratio, and the economic conditions at issue are the most important determinants of the cross-sectional distribution of survival times.

I. Introduction

The generally disappointing growth in sub–Saharan Africa over the past 20 years reflects the difficulties posed by institutional and economic factors including the lack of resource endowments, the low level of human capital, the administrative, legal, and institutional framework, the stance of financial policies, and structural policies that have often been distortionary. These factors coupled with an adverse external environment–with significant declines in terms of trade–have *all* contributed to hinder sustained economic growth in the region.

A series of recent studies has pointed to the significance of these factors in explaining *long-run output growth* in sub–Saharan Africa; see among others Ghura and Hadjimichael (1996), and World Bank (1994). Less attention, however, has been paid to the *sources of macroeconomic fluctuations* in the region. Moreover, until the January 1994 devaluation of the CFA franc, member countries had maintained a fixed parity vis-à-vis the French franc for many years (including the whole of the sample period of 1971-93 used in this paper), whereas many non–CFA franc countries had adjusted their exchange rates more frequently or moved towards more flexible exchange arrangements.[2] Thus, these two groups of countries provide an almost ideal experiment to test the effects of alternative exchange rate regimes.

This paper seeks to document the sources of macroeconomic fluctuations in sub–Saharan Africa by measuring the relative importance of domestic versus external shocks, and by comparing CFA franc countries and non–CFA franc sub–Saharan Africa countries during the past 20 years. It is worth noting that during the decade 1975-85, in the CFA franc countries, which maintained a freely convertible exchange rate pegged to the French franc, output growth was twice as high and the rate of inflation was half that in non–CFA franc countries, where exchange rate arrangements offered a *potentially* greater flexibility. During this period, the external environment for these two groups of countries contrasted sharply: for the CFA franc countries, the terms of trade improved considerably, whereas in the non–CFA franc countries they deteriorated (see Figure 1). National saving rates differed markedly as well, averaging about 15 percent of GDP in CFA franc countries and declining to about 10 percent of GDP in non–CFA franc countries.

Economic performance changed dramatically, however, in the period following (1985-93): output stagnated in the CFA franc countries, while output growth in the non–CFA franc countries increased to an annual average rate of 2 3/4 percent. The dramatic turn of

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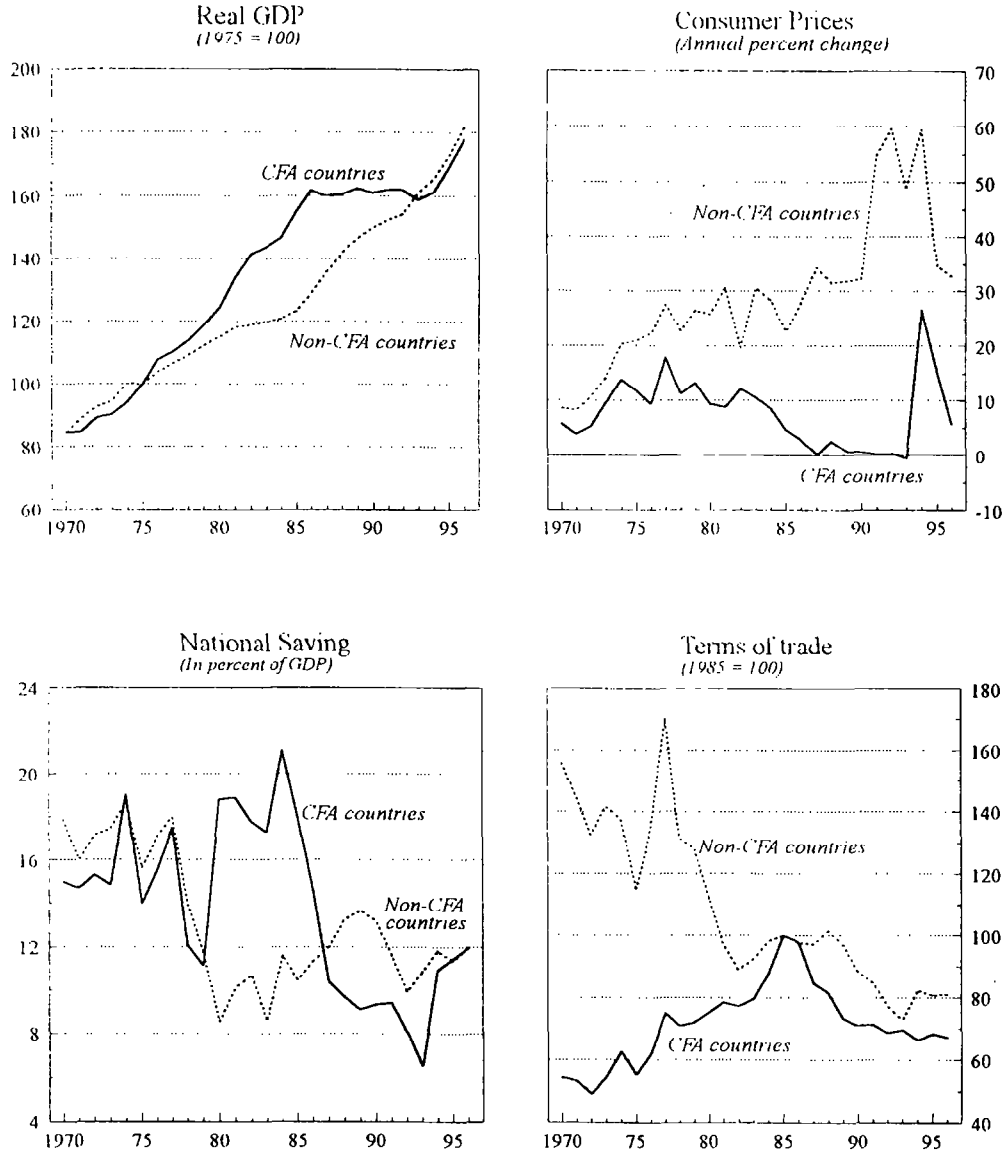
[2]There are 23 sub–Saharan African (SSA) countries in the sample. This sample is divided into 2 subsamples: one group comprises eight members of the CFA franc zone (Burkina Faso, Cameroon, Congo, Côte d'Ivoire, Mali, Niger, Senegal, and Togo), and the other group comprises 15 non–CFA franc countries (Botswana, Burundi, Ethiopia, Gambia, Ghana, Lesotho, Liberia, Madagascar, Mauritius, Mozambique, Rwanda, Sierra Leone, Swaziland, Tanzania, and Uganda).

Figure 1. Sub-Saharan Africa: Selected Indicators



Source: IMF, World Economic Outlook database.

events in the CFA franc countries began with the appreciation of the CFA franc, which mirrored that of the French franc against the U.S. dollar. However, the U.S. dollar subsequently retreated from its historical high of 1985, and by 1987 the real exchange rates of CFA franc countries had returned to levels comparable to those before the historic appreciation of the U.S. dollar. These developments were, in turn, exacerbated by mounting internal imbalances that became particularly evident as national savings plummeted in 1985. Despite repeated attempts in the CFA franc countries to address these imbalances, efforts to rein in wage costs and restructure the public sector were mostly unsuccessful and per capita incomes fell steadily. Government wage expenditures in these countries claimed an increasing share of government revenues, transfers to public enterprises rose, and public sector financing requirements grew, crowding out private sector investment. Large domestic and external payments arrears accumulated, aggravating the difficulties of the productive sectors, and weakening their banking systems (see Clément, et al. (1996)).

The pickup of output growth in non–CFA franc countries was fueled by a modest increase in private investment facilitated by the improvement in savings beginning in 1985 Acceleration of output growth greater in countries where *public savings* improved, usually aided by tax reforms and a broadening of the tax base, which allowed fiscal deficits to decline, in some cases even as public sector expenditures rose. Likewise, in countries where reforms aimed at alleviating a broad range of structural, legal, and administrative constraints were implemented, the efficiency of private investment was enhanced. These reforms included the lifting of exchange and trade controls, the removal of controls on retail and producer prices and on marketing arrangements for agricultural products, and the restructuring and privatization of public enterprises. The range, depth and effectiveness of the various structural reforms varied significantly across countries.[3] It is quite revealing that despite the contrasting economic performance of CFA and non–CFA franc countries *both* groups faced similar terms of trade loses; domestic policies were critical to their differential economic performance

Before proceeding with the formal analysis of the macroeconomic fluctuations in these countries, it is useful to examine some of the basic data on economic fluctuations in sub–Saharan Africa. Data on changes in key macroeconomic aggregates for the sample and subsample country groups are presented in Table 1 for the period 1971-93. Several factors stand out from an examination of these data. First, terms of trade fluctuations (measured by the standard deviation) appear to be roughly comparable across the subsamples. And, while the coefficient of variation is larger for CFA franc countries due to the much smaller annual average percentage change of the terms of trade, the shocks (conditional on the historical data) to the terms of trade which are relevant for macroeconomic fluctuations, are larger for non–CFA franc countries. Second, output fluctuations are very similar across the subsamples on all accounts. Third, the real exchange rate displays significantly more variability for the non–CFA franc sample countries, especially when conditioned on the historic data. And

[3]See Hadjimichael and Ghura (1995), and Hadjimichael, et al. (1995).

Table 1. Sub-Saharan Africa, CFA Franc, and non-CFA Franc Countries: Stylized Facts, 1971-93

(Annual percentage change, unless otherwise noted)

	Terms of Trade			Output			Real Exchange Rate			Absorption/Y			Prices		
	SSA	CFA	Non-CFA	SSA	CFA	Non-CFA	SSA	CFA	Non-CFA	SSA	CFA	Non-CFA	SSA	CFA	Non-CFA
Mean	-1.6	-0.6	-2.1	2.8	2.2	3.2	0.6	1.2	0.2	0.3	--	0.5	13.7	6.4	17.6
Standard Deviation	19.0	14.2	21.0	6.5	6.2	6.7	17.4	12.7	19.5	6.8	7.9	6.1	16.7	7.2	18.9
Coefficient of Variation	11.9	23.6	9.9	2.3	2.9	2.1	31.4	10.3	100.9	19.6	1166.1	11.4	1.1	1.1	1.1
Shock	3.1	1.6	3.7	0.3	0.3	0.3	2.4	0.2	3.2	0.4	0.5	0.3	1.1	0.2	1.4

Sources: IMF, *International Financial Statistics* and World Economic Outlook database, and author's estimates.

Note: There are 23 sub-Saharan African (SSA) countries in the sample. This sample is divided into 2 subsamples: one group comprises 8 member countries of the CFA franc zone (Burkina Faso, Cameroon, Congo, Côte d'Ivoire, Mali, Niger, Senegal, and Togo), and the other group comprises the 15 non-CFA franc countries (Botswana, Burundi, Ethiopia, Gambia, Ghana, Lesotho, Liberia, Madagascar, Mauritius, Mozambique, Rwanda, Sierra Leone, Swaziland, Tanzania, and Uganda). The coefficient of variation is the sample standard deviation as a percent of the absolute value of the mean. The shocks are the standard error (multiplied by 100) of the reduced-form innovations of the near-VAR models discussed in the text.

fourth, performance on the inflation front is noticeably better (in terms of mean and standard deviation) in the CFA franc group subsample.

This preliminary discussion of the data suggests that the sources of macroeconomic fluctuations and the policy responses may differ between CFA franc countries and non–CFA franc countries. In the sections to follow (Sections II, and III) we examine whether this may indeed be the case more formally. As noted before, the CFA franc countries maintained a fixed exchange rate regime whereas the non–CFA franc countries generally did not; in Section V therefore we consider the hypothesis that real structural dissimilarities between the subsamples are probably insufficient to explain the differences in the results we obtain with respect to macroeconomic fluctuations. Rather, we attribute the difference in the results in large part to exchange arrangements and the domestic economic policies followed in the subsample groups. Section V concludes this study by summarizing the main differences between the subsamples of countries and comparing the sources of fluctuation of sub–Saharan Africa with other developing countries.

II. Modeling Macroeconomic Fluctuations in Small Open Economies[4]

The macroeconomic fluctuations in the developing countries of sub–Saharan Africa are modeled following the structural vector autoregression (structural VAR) approach proposed by Blanchard and Quah (1989), Shapiro and Watson (1988), and extended to large open economies by Ahmed, et al. (1993), and Clarida and Gali (1994). One of the advantages of this methodology is that it mainly relies on long-run restrictions stemming from economic theory. This study uses the structural VAR model developed in Hoffmaister and Roldós (1997) which in turn is based on a (long-run) small open economy model in the spirit of Dornbusch (1989). That structural VAR model is particularly useful because it permits measurement of the importance of external versus domestic shocks. It also recovers the adjustment of the economy following standard economic shocks, namely world interest rate, terms of trade, supply, fiscal, and nominal shocks. A brief description of the model and its structural VAR implementation follows.

A. The Long-run Economic Model

Consider a small open economy that produces an exportable (Y_x) and a nontradable good (Y_n) using imported intermediate inputs. Optimal production and consumption decisions determine an equilibrium real exchange rate (Q) that is used to define total GDP as $Y_t = Y_x + QY_n$. Using lower-case letters to denote the logs of upper-case variables, an expression for the (log) of total GDP can be obtained:

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[4]A more detailed description of this modeling strategy is found in Hoffmaister and Roldós (1997).

$$y = \alpha_1 a_x - \beta_1 p_{m_t} + \gamma_1 k_t + \delta_1 (k_t - l_t) \qquad (1)$$

The first two terms in equation (1) are supply shocks that enter symmetrically because, as Bruno and Sachs (1985) pointed out, an increase in the price of intermediate inputs (p_m) acts like negative technological progress. For sub–Saharan Africa countries, changes in a_x could also be weather-related crop successes/failures. The second term can be decomposed into the world price of intermediate inputs, p_m^*, and the tariff rate, τ. This allows us to model supply responses to structural reforms such as trade liberalization (see Lee (1993)) as well as the impact of terms of trade shocks. In general, an improvement in the terms of trade and/or a structural reform that removes distortions leads to a positive response in total GDP in the long run. The last two terms are the (log) capital stock, k, and the (log) capital/labor ratio, k-l, that respond endogenously to the different shocks.

In order to introduce demand shocks, it is convenient to assume that government spending, *g*, falls mostly on nontradable goods. The main effect of a fiscal expansion is then to change the *composition* of demand—and hence production—towards nontradable goods, with an ambiguous effect on *total* GDP.[5] As is shown in Hoffmaister and Roldós (1997), for standard parameter values an increase in *g* leads to a decline in the capital stock. However, this decline has an ambiguous effect on total GDP as the coefficient γ_1 is zero in the benchmark case. Given the ambiguity of the impact of government spending on GDP, we do not impose a sign on the long-run impact of fiscal policy on GDP, rather we assume that it is small and not very different from zero.[6]

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[5]Indeed, this is consistent with Blanchard (1997) who notes that the effect of fiscal spending on output is not significant. For their part, Ahmed et al. (1993) note that a fiscal expansion could also entail an increase in distortionary taxes that would tend to reduce total output in the long run. Moreover, the focus of our study is on cyclical developments output not long-run growth. For a discussion and empirical evidence on the impact of fiscal policy on long-run growth, see Barro (1997).

[6]More importantly, in connection with the empirical strategy used in this study, Blanchard and Quah (1989) demonstrate that the identification of the shocks is robust provided that the effect of fiscal policy on long-run output is small relative to the long-run effects of other shocks.

Individuals in this economy have access to international capital markets, where they borrow an amount, D, at the world interest rate, r*.[7] The effect of world interest rate shocks is captured by the fourth term in equation (1) because in the long run the marginal productivity of capital–determined by the capital/labor ratio–equals r* under perfect capital mobility. An increase in world interest rates tends to have a contractionary effect on total GDP as the decrease in the capital/labor ratio is multiplied by a positive coefficient in equation (1).

The dual nature of the responses of the real exchange rate and the trade balance is well understood: excess demand pressures lead to real exchange rate appreciation and trade deficits. The long-run response of the (log) real exchange rate, q, to the different shocks is summarized by the following equation:

$$q_t = \alpha_2 a_{x_t} - \beta_2 p_{m_t} + \gamma_2 k_t + \delta_2 (k_t - l_t), \qquad (2)$$

which is the analog of equation (1) for the relative price. A positive supply shock, due either to technological progress in the tradable sector, to a good crop or to trade liberalization, as well as a terms of trade improvement, leads to a real exchange rate appreciation under plausible parameter values. This is due to the fact that positive wealth effects of these shocks lead to a higher demand for nontradables, which is met by a reallocation of labor to the nontraded goods sector induced by the increase in the relative price of the nontraded good.

An increase in government spending also leads to a real exchange rate appreciation. Despite having a negative wealth effect, the fact that government spending is biased towards nontradable goods requires an increase in the relative price of the nontraded good to reach a new equilibrium. The fiscal expansion leads to a decline in the capital stock, which has a first order effect on the real exchange rate, but a negligible effect on the level of total GDP.[8] It also causes a reduction in the trade surplus as the decline of the capital stock leads to a lower steady-state level of external debt and interest payments. An increase in world interest rates leads to a larger trade surplus, as the fall in domestic absorption relative to output accommodates the increased interest payments.

The model described so far does not have a role for nominal variables. Following the common practice in the literature on the sources of macroeconomic fluctuations, we assume long-run neutrality of money and/or the nominal exchange rate and include in the model a

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[7]We are assuming that individuals have time-separable constant rate of time preference utility functions and that the rate of time preference equals the world interest rate.

[8]Under general parameter assumptions the response of the real exchange rate is more than twice that of GDP, as shown in Hoffmaister and Roldós (1997).

general unspecified equation for the evolution of the price level.[9] Owing to the different exchange rate regimes followed by some of the countries considered in this study, it is difficult to establish whether the evolution of the price level is determined by the money supply, the nominal exchange rate, or both. It is, nonetheless, likely that the inflation rate will be affected by the other variables of the economic system, either via a direct effect through money demand or through some feedback rule the authorities follow on the chosen nominal anchor.[10]

B. The Structural VAR Model

The structural VAR model uses the long-run properties of the long-run model described above to recover the underlying economic shocks and estimate their relative importance as well as their cyclical effects. Blanchard and Quah (1989) show how to use the long-run effects from an economic model together with the conditions needed for the independence of shocks (orthogonality conditions) to recover or "identify" the economic shocks from a reduced-form model.[11]

The advantage of this methodology and its identification procedure are twofold. It allows the researcher to leave the short-run dynamics of the model unrestricted, thus the results can be interpreted either as the result of transitional equilibrium dynamics of capital accumulation and labor supply in response to the economic shocks, or as the disequilibrium dynamics implicit in a model with wage/price stickiness. In principle, this also means that the results stem from restrictions that are somewhat less controversial, at least when compared to empirical evidence that relies on short-run or impact restrictions.

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[9]Roldós (1993, 1995) and Uribe (1995) show how a successful stabilization can lead to a permanent output expansion, and Easterly (1996) provides evidence in favor of this hypothesis. Thus, the assumption that nominal shocks are neutral in the long-run may underestimate the importance of nominal shocks in explaining output fluctuations, particularly for high inflation countries. Nonetheless, Blanchard and Quah (1989) note that the identification process is robust even when the effect of nominal shocks is not zero but small compared to the effect of real shocks.

[10]This study does not attempt to separately identify nominal shocks, as in Gali (1992) where money demand and supply shocks are modeled as distinct sources of macroeconomic fluctuations. It does, however, allow for a differential response of fiscal policy in the short-run under alternative exchange rate arrangements, as argued by Tornell and Velasco (1994).

[11]Specifically, they show that the economic shocks can be recovered by exactly identifying the elements of a square matrix of an order equal to the number of variables in the system. For a detailed description of the Blanchard-Quah identification for small open economies, see Hoffmaister and Roldós (1997).

The basic structural VAR model in this study contains five variables–the world real interest rate, the terms of trade, output, the real exchange rate, and prices–which means that a total of 25 independent restrictions are needed to identify the underlying economic shocks. The model can be summarized as:

$$\Delta x = A(L)\epsilon, \tag{3}$$

where the Δx is the vector containing the five variables in this study, A(L) is a matrix of lag polynomials that summarize the dynamics of the model, and ϵ is a vector of shocks or innovations. The small open economy assumption provides six restrictions–domestic shocks (supply, fiscal, and nominal) do not affect the world interest rate or the country's terms of trade. In addition, the long-run model provides four additional restrictions: (1) fiscal shocks can affect the real exchange rate and hence the composition of output between traded and nontraded goods, but not the long–run level of output; (2) the long–run neutrality of nominal shocks provides two restrictions such that nominal shocks do not affect output or the real exchange rate; and (3) terms of trade shocks do not affect world interest rates in the long–run.[12] Orthogonality of the economic shocks provides the 15 additional restrictions needed to exactly identify the impact of the economic shocks.

This study also looks at the empirical evidence provided by a second structural VAR model. This second model has the same basic structure described above, but instead of the real exchange rate the model includes the trade balance. As noted before, general equilibrium effects in the small open economy model suggest that economic shocks will have joint dual effects on the real exchange rate and the trade balance. Hence, the identification strategy described above would be complicated in a model that contains both of these variables. By introducing these variables separately in two different structural VAR models allows us to recover two sets of empirical results that can be used to check the robustness of the empirical results.

III. Measuring Macroeconomic Fluctuations in Sub–Saharan Africa

This section presents the main empirical results for key macroeconomic variables (output, real exchange rates, trade balances, and prices) for countries in the sub–Saharan Africa sample. The discussion focuses on the relative importance of external shocks (to the terms of trade and the world interest rates) and domestic shocks (to supply, fiscal and monetary variables), summarized by the variance decomposition, as well as on the dynamics of adjustment, summarized by the impulse responses.

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[12]Note that these restrictions apply to the sum of the short-run coefficients contained in matrix A(L) in equation (3).

A. Data Sources

The data consist of two balanced panels on annual observations from 1971 through 1993; these panels contain eight countries that are members of the CFA franc zone, and 15 countries that are not.[13] Most series were taken from the *International Financial Statistics (IFS)*: (1) output was measured as GDP at 1990 prices (line 99b.p); (2) the real exchange rate was calculated as the relative price of nontraded goods in terms of traded goods, proxied by the ratio of the CPI (line 64) divided by the product of the nominal exchange rate (line ae) and the PPI (line 63) of the United States; (3) the domestic price level was measured by CPI; and (4) the real world interest rate was measured as the Libor rate on a six month U.S. dollar deposit (line 601de) deflated by the PPI of the United States. The rest of the data series were taken from the *World Economic Outlook (WEO)* database: (1) the terms of trade (TT); and (2) the trade balance proxied by the ratio of absorption (NTDD) to GDP (NGDP). For a few countries where the *IFS* data were incomplete, the *WEO* data were used instead.

B. Estimation Issues

VAR models estimated using panel data are subject to the well know problems associated with estimating dynamic models with panel data (see Holtz-Eakin, Newey, and Rosen (1988), and Nickell (1981)). The main problem is that the least square dummy variable (LSDV) estimator does not provide consistent estimates as the number of individuals/countries increases for a given number of observations per individual/country. Thus, for a typical panel data set that contains a large number of individuals with relatively few observations per individual, the LSDV estimator is usually inappropriate. The LSDV estimator, however, is consistent as the number of observations per individual increases for a given number of individuals and is asymptotically equivalent to the maximum likelihood estimator (see Amemiya (1967)). Thus, the empirical evidence discussed below is based on LSDV estimates because the panel data set used in this study contain a relatively small number of countries (15 or less) compared to the number of observations for each country (24 annual observations) so that it is likely that the Nickell-bias is not very large (see Quah and Rauch (1990)).

C. Macroeconomic Fluctuations in Sub–Saharan Africa

The sources of *output growth fluctuations* are shown for the subsample of CFA franc countries and the non–CFA franc countries in Tables 2 and 3 respectively. Domestic shocks explain an important part of output fluctuations in both subsample country groups, more so in the latter than in the former group. While terms of trade and world interest rate shocks have some impact on output growth movements in the CFA franc country group, the minimal impact of such shocks on output growth movements in the non–CFA franc country group is

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[13]For country details see Table 1.

Table 2. CFA Franc Countries: Variance Decomposition of Domestic Variables[1]

(Standard errors in parenthesis)

	Model 1										Model 2									
	External				Domestic						External				Domestic					
	ϵ^{1*}		ϵ^{tt}		ϵ^{s}		ϵ^{f}		ϵ^{n}		ϵ^{1*}		ϵ^{tt}		ϵ^{s}		ϵ^{f}		ϵ^{n}	
Years	Percentage of the variance of domestic output due to:																			
1	0.0	(2.9)	8.7	(8.6)	88.0	(12.5)	3.0	(3.8)	0.2	(8.9)	0.1	(4.1)	11.2	(9.0)	81.7	(12.9)	0.2	(2.0)	6.9	(9.0)
2	6.4	(4.6)	10.2	(8.6)	80.5	(11.3)	2.7	(3.2)	0.2	(6.9)	4.8	(4.5)	12.6	(8.9)	76.2	(11.2)	0.3	(1.8)	6.1	(7.0)
3	7.4	(5.4)	11.7	(8.6)	78.0	(11.1)	2.6	(3.4)	0.2	(6.4)	5.9	(5.2)	14.6	(8.8)	73.2	(10.9)	0.3	(1.8)	6.0	(6.6)
4	7.6	(5.4)	11.7	(8.6)	77.8	(11.0)	2.7	(3.5)	0.2	(6.5)	6.2	(5.2)	14.5	(8.8)	72.8	(10.8)	0.3	(1.8)	6.1	(6.7)
5	8.0	(5.4)	11.6	(8.5)	77.4	(10.9)	2.7	(3.5)	0.2	(6.5)	6.7	(5.3)	14.4	(8.8)	72.4	(10.7)	0.3	(1.8)	6.2	(6.7)
10	8.2	(5.5)	11.6	(8.5)	77.2	(10.9)	2.7	(3.5)	0.2	(6.5)	6.9	(5.3)	14.3	(8.7)	72.2	(10.7)	0.3	(1.8)	6.2	(6.6)
	Percentage of the variance of the real exchange rate due to:										Percentage of the variance of the trade balance due to:									
1	0.0	(5.1)	14.5	(8.4)	6.4	(5.1)	78.4	(12.2)	0.5	(7.2)	0.2	(3.1)	27.7	(10.2)	6.1	(5.1)	65.5	(11.4)	0.5	(4.7)
2	45.6	(5.1)	35.4	(7.9)	4.5	(4.7)	14.3	(11.3)	0.1	(6.8)	2.5	(4.0)	27.6	(10.1)	6.5	(5.0)	63.0	(11.0)	0.5	(4.9)
3	44.3	(5.1)	37.2	(7.6)	5.0	(4.6)	13.2	(11.0)	0.1	(6.5)	2.4	(3.9)	29.3	(9.6)	6.9	(5.0)	60.8	(10.5)	0.5	(4.8)
4	44.7	(5.2)	37.1	(7.5)	5.0	(4.5)	13.0	(11.0)	0.1	(6.5)	3.2	(4.2)	29.6	(9.5)	6.8	(4.9)	59.9	(10.4)	0.5	(4.7)
5	44.8	(5.2)	37.0	(7.5)	5.1	(4.5)	13.0	(11.0)	0.1	(6.5)	3.6	(4.2)	29.4	(9.5)	6.8	(4.8)	59.6	(10.3)	0.5	(4.7)
10	44.8	(5.2)	36.9	(7.5)	5.1	(4.6)	13.0	(11.1)	0.1	(6.5)	3.8	(4.3)	29.4	(9.4)	6.8	(4.8)	59.5	(10.3)	0.5	(4.7)
	Percentage of the variance of domestic price inflation due to:																			
1	0.0	(7.9)	7.6	(3.4)	9.4	(12.4)	78.8	(11.4)	4.1	(14.5)	0.0	(5.9)	5.0	(4.6)	16.2	(14.3)	3.3	(8.1)	75.5	(15.5)
2	1.2	(8.2)	15.0	(5.7)	10.4	(10.8)	69.6	(8.9)	3.8	(12.4)	2.0	(6.7)	13.4	(6.7)	16.4	(12.7)	2.7	(6.8)	65.5	(13.8)
3	6.2	(8.4)	13.9	(5.2)	13.4	(11.1)	63.0	(8.6)	3.4	(12.3)	5.0	(7.2)	12.3	(6.1)	18.6	(12.9)	3.8	(6.9)	60.3	(13.5)
4	6.1	(8.5)	13.2	(5.3)	15.9	(11.2)	61.4	(8.5)	3.3	(12.3)	5.3	(7.4)	11.7	(6.2)	20.3	(13.0)	3.6	(6.8)	59.0	(13.6)
5	6.3	(8.5)	12.8	(5.3)	16.8	(11.3)	60.7	(8.5)	3.3	(12.3)	5.4	(7.4)	11.6	(6.3)	20.9	(13.0)	3.6	(6.8)	58.5	(13.6)
10	6.6	(8.6)	12.4	(5.4)	17.9	(11.4)	59.7	(8.4)	3.2	(12.4)	5.5	(7.4)	11.3	(6.4)	21.7	(13.2)	3.5	(6.7)	57.9	(13.7)

Source: Authors' estimates.

[1]Based on the estimated near VAR model with two lags, summarized in Table A2. The innovations ϵ^{1*}, ϵ^{tt}, ϵ^{s}, ϵ^{f}, and ϵ^{n} are respectively to world interest rates, terms of trade, domestic supply, fiscal and nominal policies. Approximate standard errors were computed by Monte Carlo Simulations, using 1,000 replications. The standard errors provide a measure of the precision of the estimated variance decomposition; the ratio of the estimated variance decomposition to the standard errors are not distributed Student's t.

Table 3. Non-CFA Franc Countries: Variance Decomposition of Domestic Variables[1]

(Standard errors in parenthesis)

	Model 1										Model 2									
	External				Domestic						External				Domestic					
	ϵ^{i*}		ϵ^{tt}		ϵ^{s}		ϵ^{f}		ϵ^{n}		ϵi^{i*}		ϵ^{tt}		ϵ^{s}		ϵ^{f}		ϵ^{n}	
Years	Percentage of the variance of domestic output due to:																			
1	0.0	(5.6)	0.1	(1.7)	78.4	(6.3)	0.1	(1.0)	21.5	(2.6)	0.0	(5.4)	0.1	(1.7)	84.9	(6.2)	0.0	(0.8)	14.9	(2.8)
2	0.5	(5.7)	0.2	(1.8)	78.6	(6.3)	0.1	(1.2)	20.5	(2.6)	0.4	(5.5)	0.2	(1.7)	85.2	(6.3)	0.0	(0.9)	14.3	(2.8)
3	2.6	(5.4)	0.5	(1.8)	77.8	(6.2)	0.2	(1.4)	19.0	(2.7)	2.6	(5.2)	0.4	(1.7)	84.0	(6.1)	0.0	(1.0)	13.1	(2.8)
4	3.2	(5.4)	0.5	(1.8)	77.2	(6.3)	0.2	(1.4)	18.8	(2.8)	3.1	(5.2)	0.4	(1.7)	83.4	(6.2)	0.0	(1.0)	13.1	(3.0)
5	3.2	(5.4)	0.6	(1.8)	77.0	(6.3)	0.2	(1.4)	19.7	(2.9)	3.1	(5.2)	0.4	(1.8)	83.3	(6.2)	0.0	(1.1)	13.2	(3.0)
10	3.2	(5.4)	0.6	(1.8)	76.2	(6.3)	0.2	(1.4)	19.7	(2.9)	3.1	(5.2)	0.4	(1.8)	82.7	(6.2)	0.0	(1.0)	13.7	(3.0)
	Percentage of the variance of the real exchange rate due to:										Percentage of the variance of the trade balance due to:									
1	0.0	(2.4)	0.1	(2.2)	0.2	(4.8)	91.1	(6.9)	8.7	(4.4)	0.1	(2.7)	15.0	(7.8)	0.5	(2.1)	83.5	(8.0)	1.0	(1.6)
2	0.5	(2.3)	0.1	(2.2)	0.2	(4.8)	90.5	(6.7)	8.7	(4.2)	3.1	(2.8)	14.9	(7.6)	0.5	(2.2)	81.2	(7.7)	0.9	(1.7)
3	1.4	(2.5)	1.5	(2.7)	0.3	(4.6)	87.4	(7.4)	9.3	(5.2)	3.5	(2.8)	14.3	(7.5)	1.1	(2.5)	80.6	(7.6)	0.9	(1.9)
4	1.4	(2.5)	1.5	(2.6)	0.4	(4.6)	86.9	(7.6)	9.8	(5.5)	3.5	(2.9)	14.3	(7.5)	1.1	(2.5)	80.2	(7.6)	0.9	(1.9)
5	1.7	(2.6)	1.5	(2.7)	0.4	(4.6)	86.5	(7.6)	9.8	(5.4)	3.6	(2.9)	14.3	(7.5)	1.1	(2.5)	80.2	(7.6)	0.9	(1.9)
10	1.7	(2.6)	1.5	(2.7)	0.5	(4.6)	86.2	(7.6)	10.0	(5.4)	3.6	(2.9)	14.2	(7.5)	1.1	(2.5)	80.1	(7.6)	1.0	(1.9)
	Percentage of the variance of domestic price inflation due to:																			
1	0.0	(2.2)	5.0	(3.7)	4.0	(5.8)	0.7	(3.8)	90.3	(7.8)	0.0	(2.2)	5.7	(3.8)	1.4	(5.7)	2.4	(3.6)	90.4	(7.8)
2	0.8	(2.7)	5.6	(4.0)	3.9	(6.4)	0.5	(3.3)	89.1	(8.0)	1.3	(2.9)	6.3	(4.1)	1.2	(6.4)	2.3	(3.5)	88.9	(8.3)
3	0.7	(2.8)	5.1	(3.8)	5.1	(6.6)	0.9	(3.5)	88.1	(8.2)	1.3	(3.0)	5.8	(3.9)	1.8	(6.6)	2.0	(3.3)	89.1	(8.2)
4	0.7	(2.8)	5.0	(3.7)	5.6	(6.8)	1.2	(3.6)	87.5	(8.2)	1.2	(3.0)	5.7	(3.8)	1.9	(6.7)	1.9	(3.2)	89.2	(8.2)
5	0.7	(2.8)	4.9	(3.7)	6.2	(6.8)	1.2	(3.6)	87.0	(8.3)	1.2	(3.0)	5.6	(3.8)	2.1	(6.8)	1.9	(3.2)	89.2	(8.2)
10	0.7	(2.8)	4.8	(3.8)	6.9	(6.8)	1.2	(3.6)	86.4	(8.3)	1.2	(3.0)	5.5	(3.8)	2.4	(6.8)	1.8	(3.2)	89.1	(8.3)

Source: Authors' estimates.

[1]Based on the estimated near VAR model with two lags summarized in Table A3. The innovations ϵ^{i*}, ϵ^{tt}, ϵ^{s}, ϵ^{f}, and ϵ^{n} are respectively to world supply, world preferences, domestic supply, fiscal and nominal policies. Approximate standard errors were computed by Monte Carlo Simulations, using 1,000 replications. The standard errors provide a measure of the precision of the estimated variance decomposition; the ratio of the estimated variance decomposition to the standard errors are not distributed Student's t.

somewhat surprising. It could be argued, for example, that the non–CFA franc countries depend to a similar degree on exports of primary products and, to the extent that a number of countries in the subsample are heavily indebted, both types of shocks would be likely to impinge similarly on output fluctuations. However, much of the debt incurred may be on fixed terms (e.g., of a concessional nature) or it may be in arrears, thereby reducing the impact of interest rate shocks. Some additional evidence is presented below on the importance of external shocks as sources of macroeconomic fluctuations.

Among the domestic shocks, those from the supply side appear to predominate over demand-side shocks, particularly in the subsample of CFA franc countries. These results are consistent with recent evidence on the importance of supply shocks as a source of macroeconomic fluctuation for the U.S. economy (see, among others, Blanchard and Quah (1989), Shapiro and Watson (1988), and Gali (1992)) and for developing countries (see Hoffmaister and Roldós (1996, 1997)).

The dynamics of adjustment of output in the two subsamples are shown in Figures 2 and 3. The impulse responses have the expected sign and confirm the relative importance of the different shocks between and within the country groupings. Concentrating first on the CFA group (Figure 2), the adjustment of output to supply and terms of trade shocks appear to be consistent with the model. In the long run, a favorable supply shock leads to an output expansion of about 1¼ percent above the baseline, while a favorable terms of trade shock yields an expansion of output of about ½ percent above the baseline. The response of output on impact is roughly ¾ and ½ of the full adjustment to supply and terms of trade shocks respectively. The full adjustment is fairly rapid to both types of shocks and is mainly complete by the end of the second year.

The dynamics of output adjustment in the non–CFA franc countries are also as expected (Figure 3). A favorable supply shock leads to a fairly strong output response at about 1¾ percent above baseline, with 75 percent of the adjustment occurring within the first two years. A negative nominal shock leads to an output contraction of about ½ percent below baseline which demonstrates some persistence. This behavior of output suggests that the nominal shocks are picking up devaluations or depreciations, in which case the output responses are consistent with the literature on the contractionary effects of devaluation (see Lizondo and Montiel (1989)).

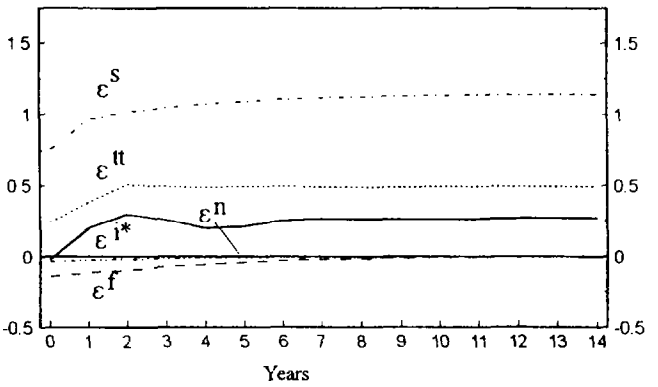
Turning to *real exchange rate movements*, those of the CFA franc countries are driven mostly by external shocks (see Table 2, Model 1). In the short run, however, domestic fiscal shocks are an important source of real exchange rate movements, explaining about 75 percent of the movements of the real exchange rate. However, in the long run, the importance of fiscal shocks declines markedly, and external shocks (to world interest rates and the terms of trade) play a much larger role. In the non–CFA franc countries (Table 3, Model 1), real exchange rate movements are driven mostly by domestic shocks; in particular, fiscal shocks predominate both in the short and long run, and nominal shocks explain a much smaller (but precisely) estimated share of such movements. These results imply that changes in fiscal policy stance

Figure 2. CFA Franc Countries: Impulse Responses of Domestic Variables[1]

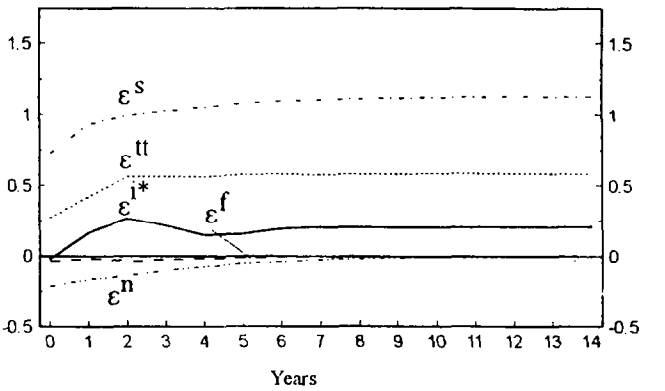
(Percent Deviations from Baseline)

Output

Model 1

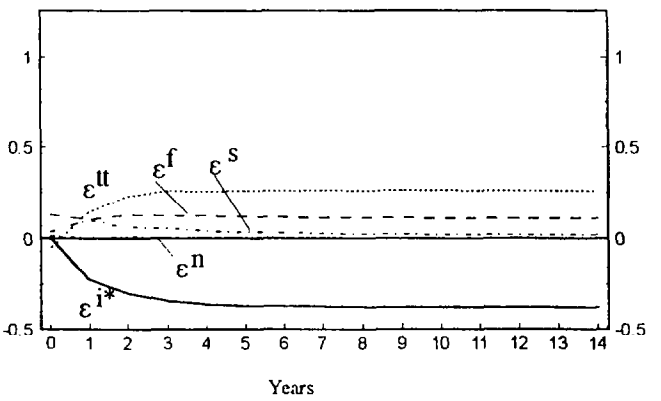


Model 2



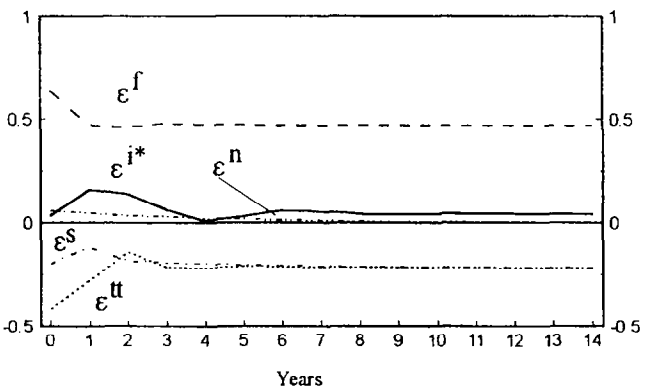
Real Exchange Rate

Model 1



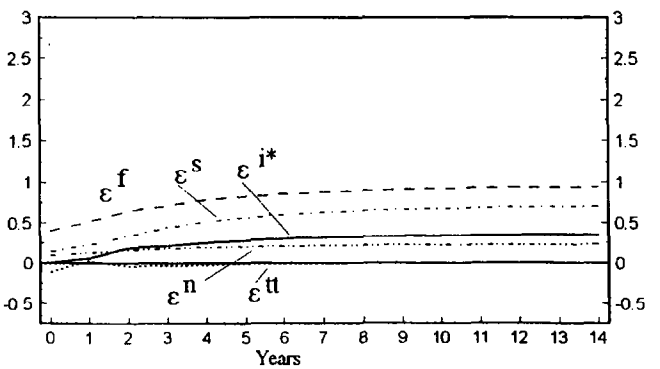
Trade Balance

Model 2

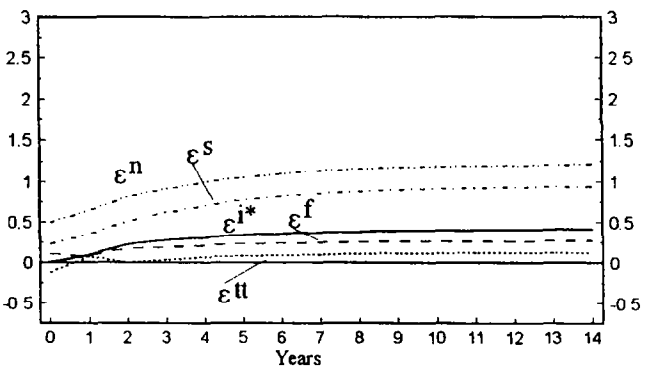


Prices

Model 1



Model 2



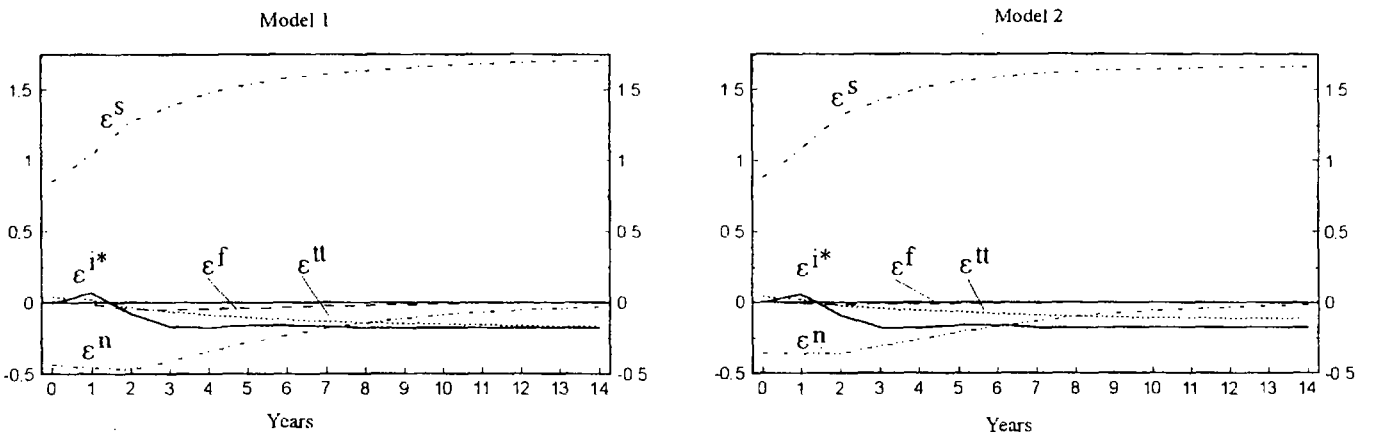
Source: Authors' calculations.

[1] The innovations ε^{i*}, ε^{tt}, ε^s, ε^f, and ε^n are respectively to world interest rates, terms of trade, domestic supply, fiscal and nominal policies. The responses correspond to a one standard error shocks to each of these innovations.

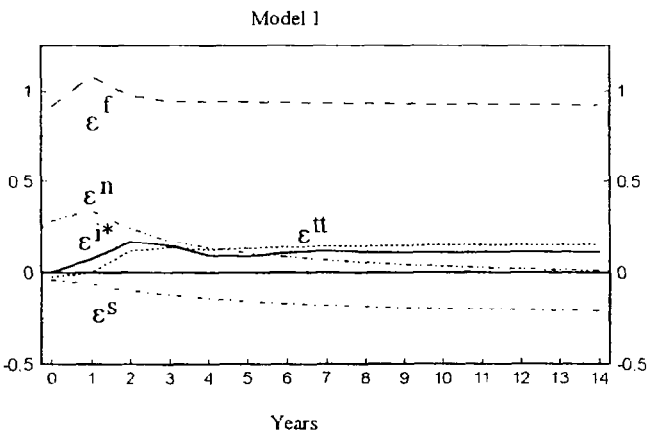
Figure 3. Non-CFA Franc Countries: Impulse Responses of Domestic Variables[1]

(Percent Deviations from Baseline)

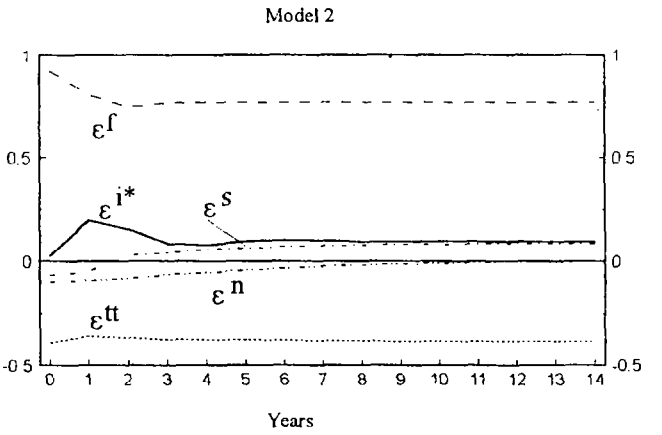
Output



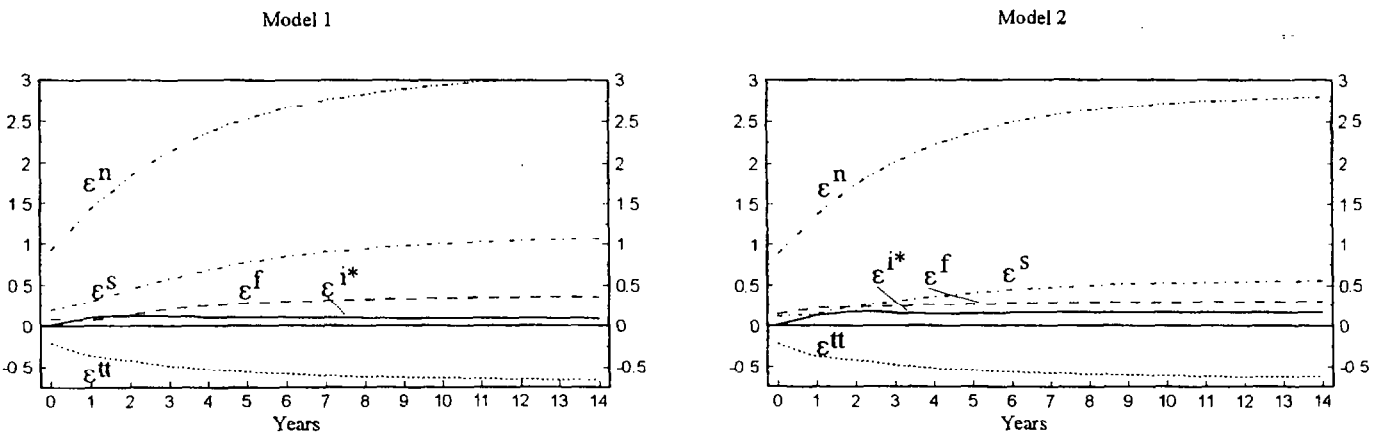
Real Exchange Rate



Trade Balance



Prices



Source: Authors' calculations.

[1] The innovations ε^{i*}, ε^{tt}, ε^{s}, ε^{f}, and ε^{n} are respectively to world interest rates, terms of trade, domestic supply, fiscal and nominal policies. The responses correspond to a one standard error shocks to each of these innovations.

are the most important determinant of real exchange rates for this group of countries (i.e., the non–CFA franc countries). Although the absence of a role for external shocks in explaining real exchange rate movements in the non–CFA franc countries may appear somewhat surprising, this is consistent with findings for other developing countries (see Devereux and Connolly (1996), and Hoffmaister and Roldós (1997)).

In terms of the *dynamic adjustment of real exchange rates*, the following points can be highlighted (Figures 2 and 3). First, an expansionary fiscal shock in the CFA franc zone sample leads to a real appreciation of about 1/8 percent above baseline and occurs upon impact. Second, a favorable terms of trade shock leads to a real appreciation of 1/8 percent above baseline on impact *but* a 1/4 percent above baseline appreciation over time; i.e., the real exchange rate adjustment occurs gradually. A positive world interest rate shock leads to a gradual real depreciation, which amounts to about 1/4 percent below baseline in the long run. In contrast, the adjustment of real exchange rates in the non–CFA franc countries appears to be larger, particularly the adjustment to fiscal shocks. An expansionary fiscal shock leads to an appreciation of about 1 percent above baseline, which also occurs upon impact.

Trade balance movements in the CFA franc countries are largely due to domestic shocks, but there is a role for external shocks. While domestic shocks account for about 60 percent of trade balance movements, the terms of trade account for about 30 percent. Fiscal shocks dominate the former, and a fiscal expansion has a substantial negative impact on the trade balance (slightly less than ¾ percent above baseline), which subsequently is partially reversed. A favorable terms of trade shock improves the trade deficit on impact, although half of this improvement subsequently dissipates within two years. Both of these results appear to be consistent with corresponding movements in the real exchange rate. For the non–CFA franc countries, domestic factors predominate, but in contrast to the real exchange rate, external shocks *do* matter (Table 3, Model 2). These latter shocks account for about 15 percent of trade balance movements. With respect to dynamics–expansionary fiscal shocks, a key factor for both real exchange rate and trade deficit behavior–lead to a real appreciation and to a worsening of the trade balance (Figure 3). While, the expansion of domestic absorption is partially reversed within two years, the real appreciation is more persistent. However, nominal (monetary) shocks that are important for the real exchange rate movements in the non–CFA franc countries, lead to a real appreciation on impact but appear to be reversed within four years. Favorable terms of trade shocks do influence the trade balance and lead to an improvement on impact of about ½ percent that persists in the long run.

With respect to *inflation*, changes in the inflation rate of the archetypal CFA franc country during the sample period are explained mostly by domestic factors, although external shocks also have a role. The results suggest that domestic demand shocks explain about 60 percent of price movements and supply shocks about 20 percent. The decomposition of demand shocks between fiscal and nominal shocks, however, differs across models; Model 1 suggests that fiscal shocks are the main source of price movements with a marginal role assigned to nominal shocks, but Model 2 suggests the opposite. The results also suggest that external shocks, particularly terms of trade shocks, have an important effect, accounting for

about 10-15 percent of price movements. For the non–CFA franc countries, changes in the rate of inflation were predominantly associated with domestic factors, namely with nominal shocks. These account for more than 85 percent of all price movements; the evidence for other shocks suggests they play a marginal role in explaining price movements.

The adjustment of prices in CFA franc countries are consistent with the model and appear to reflect the fact that the nominal exchange rates of these countries have been pegged to the French franc. We note in particular that: (1) expansionary demand policies have an immediate impact on price increases that are roughly ½ of the full long-run effect, which is drawn out over time; (2) a favorable supply shock leads to a gradual increase in prices suggesting that the real appreciation that follows the shock results not from nominal exchange rate appreciation but from domestic price movements; and, (3) a favorable terms of trade shock appears to lead on impact to a temporary decline in prices that quickly reverts to its original level. More importantly, note that nominal shocks lead to smaller price increases in the CFA franc countries than in the non–CFA franc countries

D. Additional Evidence on External Shocks

It is possible that the world interest rate, along with the terms of trade, may not accurately capture the importance of external shocks to our sample of sub–Saharan Africa countries. Most countries in the sample have longer-term debt which bears a fixed rate, and the external debt which does not, is typically in arrears. Apart from trade credits, access to international capital markets has been limited, especially in comparison to developing countries in other geographical regions. Some evidence on the issue is provided here by introducing world output shocks in the VAR models in place of world interest rate shocks. The near-VAR models were reestimated by replacing the world interest rate with world output.[14]

The substitution of world output shocks for world interest rate shocks does not appear to modify substantially the results on sources of macroeconomic fluctuations in the CFA franc countries (Table 4). Domestic supply shocks continue to explain the bulk of movements in output, with external shocks playing a secondary role. Fiscal shocks continue to dominate the behavior of real exchange rates in the short run, with external shocks taking over this role in the long run. Fiscal and external shocks are important sources of trade balance movements, while domestic demand shocks explain a good part of price movements, with external shocks playing a subsidiary role. The only real difference between these results and those presented earlier is that the importance of terms of trade shocks declines as a source of macroeconomic fluctuation. This is most noticeable for the real exchange rate, but also occurs in the trade

[14]This section uses U.S. output as the proxy for world output to maintain consistency with existing work. The results, however, do not change qualitatively if either (aggregate) European or French output is used instead.

Table 4. CFA Franc Countries: Variance Decomposition of Domestic Variables[1]

(Standard errors in parenthesis)

	Model 1										Model 2									
	External				Domestic						External				Domestic					
	ϵ^{y^w}		ϵ^{tt}		ϵ^{s}		ϵ^{f}		ϵ^{n}		ϵ^{yi^w}		ϵ^{tt}		ϵ^{s}		ϵ^{f}		ϵ^{n}	
Years	Percentage of the variance of domestic output due to:																			
1	0.0	(3.5)	6.9	(8.8)	88.4	(13.5)	4.4	(2.0)	0.3	(10.5)	0.0	(4.9)	9.1	(9.0)	80.5	(13.7)	1.0	(3.3)	9.3	(9.6)
2	1.4	(3.3)	7.4	(8.9)	86.8	(12.0)	4.2	(1.8)	0.2	(8.5)	0.9	(4.3)	10.0	(9.0)	79.5	(12.1)	0.9	(3.0)	8.6	(8.0)
3	6.9	(4.0)	8.2	(8.8)	80.7	(11.3)	3.9	(1.8)	0.2	(8.0)	5.6	(4.8)	10.9	(8.9)	74.3	(11.2)	0.9	(2.8)	8.2	(7.6)
4	6.9	(3.9)	8.1	(8.8)	80.6	(11.2)	4.0	(1.8)	0.2	(8.0)	5.9	(4.8)	10.8	(8.8)	73.9	(11.1)	0.9	(2.8)	8.4	(7.6)
5	8.2	(4.0)	8.2	(8.7)	79.4	(11.1)	4.0	(1.8)	0.2	(8.0)	6.6	(5.0)	10.8	(8.7)	73.3	(11.0)	0.9	(2.8)	8.4	(7.4)
10	8.3	(4.0)	8.2	(8.6)	79.1	(11.0)	4.1	(1.7)	0.2	(7.9)	6.7	(5.0)	10.8	(8.7)	73.0	(10.9)	1.0	(2.8)	8.5	(7.3)
	Percentage of the variance of the real exchange rate due to:										Percentage of the variance of the trade balance due to:									
1	0.2	(10.7)	19.3	(8.1)	8.6	(3.0)	70.8	(11.9)	1.0	(7.6)	0.3	(5.2)	26.4	(10.1)	4.6	(4.4)	68.6	(11.0)	0.1	(3.9)
2	13.0	(9.8)	44.0	(7.9)	5.8	(3.0)	36.4	(11.3)	0.8	(8.2)	0.3	(5.3)	26.8	(10.1)	5.0	(4.5)	67.8	(11.0)	0.1	(4.2)
3	74.5	(9.1)	12.8	(7.1)	2.0	(2.7)	10.6	(10.1)	0.2	(7.3)	4.1	(5.9)	27.1	(9.5)	5.2	(4.3)	63.6	(10.0)	0.1	(4.0)
4	75.0	(9.1)	12.5	(7.0)	2.0	(2.7)	10.3	(10.1)	0.2	(7.3)	4.0	(5.8)	27.5	(9.4)	5.2	(4.3)	63.2	(10.0)	0.1	(3.9)
5	76.3	(9.0)	12.4	(7.0)	1.8	(2.6)	9.3	(9.9)	0.2	(7.2)	5.3	(6.0)	27.2	(9.3)	5.1	(4.2)	62.2	(9.9)	0.1	(3.9)
10	76.6	(9.0)	12.5	(7.0)	1.7	(2.7)	9.0	(9.8)	0.2	(7.2)	5.5	(6.0)	27.2	(9.3)	5.0	(4.2)	62.1	(9.8)	0.1	(3.9)
	Percentage of the variance of domestic price inflation due to:																			
1	0.2	(2.8)	13.1	(3.5)	10.2	(15.4)	72.9	(11.1)	3.7	(16.6)	0.1	(6.9)	7.3	(4.2)	20.1	(15.9)	6.4	(8.7)	66.1	(16.3)
2	1.3	(2.9)	17.2	(6.0)	12.1	(13.9)	66.0	(8.5)	3.4	(14.4)	0.3	(5.9)	14.5	(6.4)	21.5	(14.6)	5.1	(7.6)	58.5	(14.7)
3	1.5	(2.9)	16.4	(5.5)	16.6	(14.2)	62.3	(8.6)	3.2	(14.5)	0.4	(5.9)	13.6	(5.9)	24.3	(14.8)	6.7	(7.9)	55.0	(14.5)
4	4.8	(3.3)	15.2	(5.7)	17.9	(14.2)	59.0	(8.3)	3.0	(14.4)	0.5	(6.0)	13.1	(6.1)	26.2	(14.8)	6.4	(7.7)	53.8	(14.5)
5	4.6	(3.3)	14.8	(5.8)	19.2	(14.3)	58.3	(8.3)	3.0	(14.4)	0.6	(6.0)	12.7	(6.3)	26.9	(14.8)	6.4	(7.7)	53.3	(14.5)
10	5.1	(3.3)	14.3	(5.8)	20.3	(14.5)	57.3	(8.2)	3.0	(14.5)	0.8	(6.0)	12.2	(6.4)	28.0	(15.0)	6.4	(7.7)	52.6	(14.6)

Source: Authors' estimates.

[1]Based on the estimated near VAR model with two lags, analogous to those summarized in Table A2 where the world interest rate has been replaced with world output. The innovations ϵ^{y^w}, ϵ^{tt}, ϵ^{s}, ϵ^{f}, and ϵ^{n} are respectively to world output, terms of trade, domestic supply, fiscal and nominal policies. *Approximate standard errors were computed by Monte Carlo Simulations, using 1,000 replications. The standard errors provide a measure of the precision* of the estimated variance decomposition; the ratio of the estimated variance decomposition to the standard errors are not distributed Student's t.

balance results. It is possible that shocks to the terms of trade may be capturing partially the effects of shocks to world demand and in the determination of commodity prices.[15]

Introducing world output shocks into the models for the non–CFA franc countries also has no noticeable effect on the results (Table 5). Domestic supply shocks explain most of the fluctuations to output, while fiscal shocks predominate in explaining real exchange rate movements, with a secondary role for nominal shocks. Fiscal shocks also predominate in explaining trade balance movements with a considerably smaller role played by external shocks, while inflation movements are predominantly driven by nominal shocks.

In contrast to the results for the CFA franc countries, the influence of terms of trade shocks on the non–CFA franc countries is not diminished by the substitution of world output shocks for world interest rate shocks. This may suggest that these results could be reflecting differences in the structure of output e.g., the share of agriculture in GDP, the share of primary products in total exports, and so on. Differences in the structure of output could make the CFA franc countries more susceptible to external shocks notwithstanding their inability to use the exchange rate in response to shocks. We consider this question further in the following section.

IV. Economic Structure versus Exchange Rate Regimes

The differences in the sources of macroeconomic fluctuations for the CFA franc and the non–CFA franc sub–Saharan Africa countries, namely the greater importance of external shocks in the former group, raises the question of whether these differences arise from differences in economic structure or whether they may be due to differences in exchange regimes. The CFA franc countries in this study maintained a fixed peg to the French franc throughout the sample period (1971-93), until they collectively devalued by 50 percent in foreign currency terms in January 1994. The non–CFA franc countries, on the other hand, followed more diverse exchange regimes during the period; they adjusted their exchange rates more frequently (adjustable pegs) or moved towards more flexible exchange arrangements. However, there is the possibility that the countries in the two subsamples differed significantly in other economically important respects.

To shed some light on the issue, we examined several indicators that might be expected to reveal the whether countries in the two subsamples differ in terms of economic structure. Data assembled for these countries were: (1) the share of primary commodities in total merchandise exports; (2) the share of primary commodity exports in GDP; (3) openness as measured by exports plus imports as a percent of GDP; (4) the share of agriculture in GDP; and (5) the share of government consumption in GDP. We hypothesize that if observations for the first four indicators are *higher* for the CFA franc countries than for the non–CFA franc

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[15]See Reinhart and Wickham (1994), and Borensztein and Reinhart (1994).

Table 5. Non-CFA Franc Countries: Variance Decomposition of Domestic Variables[1]

(Standard errors in parenthesis)

	Model 1										Model 2									
	External				Domestic						External				Domestic					
	ϵ^{y*}		ϵ^{tt}		ϵ^{s}		ϵ^{f}		ϵ^{n}		ϵ^{y*}		ϵ^{tt}		ϵ^{s}		ϵ^{f}		ϵ^{n}	
Years	Percentage of the variance of domestic output due to:																			
1	0.0	(4.6)	0.3	(2.0)	77.3	(5.8)	0.0	(0.9)	22.4	(2.9)	0.0	(4.9)	0.2	(2.1)	84.5	(6.0)	0.0	(0.8)	15.3	(3.0)
2	2.5	(4.8)	0.4	(2.1)	75.9	(6.0)	0.1	(1.1)	21.1	(2.8)	2.5	(5.1)	0.3	(2.2)	82.8	(6.2)	0.0	(1.0)	14.4	(3.0)
3	4.0	(5.0)	0.5	(2.2)	75.5	(6.1)	0.2	(1.2)	19.8	(3.0)	3.8	(5.2)	0.4	(2.3)	82.4	(6.3)	0.0	(1.1)	13.4	(3.1)
4	4.1	(4.9)	0.5	(2.2)	75.4	(6.1)	0.2	(1.2)	19.8	(3.0)	3.9	(5.2)	0.4	(2.3)	82.1	(6.4)	0.1	(1.1)	13.5	(3.2)
5	4.1	(5.0)	0.5	(2.2)	75.2	(6.2)	0.2	(1.2)	20.0	(3.1)	3.9	(5.2)	0.4	(2.3)	82.0	(6.4)	0.1	(1.1)	13.7	(3.3)
10	4.1	(4.9)	0.6	(2.2)	74.4	(6.2)	0.2	(1.2)	20.7	(3.1)	3.9	(5.2)	0.4	(2.3)	81.4	(6.4)	0.1	(1.1)	14.2	(3.3)
	Percentage of the variance of the real exchange rate due to:										Percentage of the variance of the trade balance due to:									
1	0.0	(2.1)	0.1	(1.6)	0.0	(5.2)	92.5	(6.8)	7.3	(4.1)	0.9	(6.7)	10.5	(7.0)	0.8	(1.9)	86.6	(8.2)	1.1	(1.6)
2	0.1	(2.3)	0.1	(1.7)	0.0	(5.2)	92.4	(6.8)	7.3	(3.9)	1.5	(6.7)	10.3	(6.8)	0.9	(2.0)	86.2	(8.2)	1.1	(1.7)
3	3.1	(3.0)	0.3	(1.7)	0.2	(5.0)	88.7	(7.2)	7.6	(4.7)	2.6	(6.6)	10.1	(6.6)	1.4	(2.2)	84.8	(8.0)	1.1	(1.9)
4	3.6	(3.2)	0.3	(1.7)	0.3	(5.0)	87.9	(7.4)	7.9	(4.9)	2.6	(6.6)	10.1	(6.6)	1.4	(2.2)	84.8	(8.0)	1.2	(1.9)
5	4.3	(3.3)	0.5	(1.7)	0.3	(4.9)	87.0	(7.4)	8.0	(4.9)	2.6	(6.6)	10.2	(6.6)	1.4	(2.2)	84.7	(8.0)	1.2	(1.9)
10	4.7	(3.4)	0.5	(1.7)	0.4	(4.9)	86.3	(7.5)	8.1	(4.8)	2.7	(6.6)	10.2	(6.6)	1.4	(2.2)	84.6	(8.0)	1.2	(1 9)
	Percentage of the variance of domestic price inflation due to:																			
1	0.2	(4.3)	3.0	(2.3)	5.0	(5.6)	0.6	(3.5)	91.3	(8.0)	0.2	(5.1)	3.9	(2.4)	2.0	(5 3)	2.3	(3.4)	91.6	(8.2)
2	0.4	(4.3)	3.9	(2.8)	4.7	(6.3)	0.5	(3.1)	90.6	(8.2)	0.4	(5.1)	5.0	(2.9)	1.7	(6.1)	2.3	(3.3)	90.6	(8.6)
3	2.3	(3.8)	3.7	(2.8)	5.6	(6.6)	1.0	(3.4)	87.3	(8.3)	2.3	(4.6)	4.8	(2.8)	2.1	(6.3)	2.0	(3.1)	88.8	(8.4)
4	2.9	(3.8)	3.6	(2.8)	6.0	(6.7)	1.3	(3.5)	86.1	(8.4)	3.0	(4.5)	4.7	(2.8)	2.2	(6.4)	1.9	(3.1)	88.3	(8.4)
5	3.0	(3.8)	3.5	(2.7)	6.4	(6.8)	1.4	(3.5)	85.7	(8.4)	2.9	(4.5)	4.5	(2.8)	2.3	(6.5)	1.9	(3.1)	88.3	(8.5)
10	3.1	(3.8)	3.3	(2.7)	7.0	(6.8)	1.5	(3.5)	85.1	(8.4)	3.0	(4.5)	4.4	(2.8)	2.5	(6.5)	1.8	(3.1)	88.3	(8.5)

Source: Authors' estimates.

[1]Based on the estimated near VAR model with two lags, analogous to those summarized in Table A3 where the world interest rate has been replaced with world output. The innovations ϵ^{y*}, ϵ^{tt}, ϵ^{s}, ϵ^{f}, and ϵ^{n} are respectively to world output, terms of trade, domestic supply, fiscal and nominal policies. Approximate standard errors were computed by Monte Carlo Simulations, using 1,000 replications. The standard errors provide a measure of the precision of the estimated variance decomposition; the ratio of the estimated variance decomposition to the standard errors are not distributed Student's t.

countries in our sample, this would help explain the greater importance of external shocks for the CFA franc group. Regarding the last indicator, the reverse is hypothesized because larger government consumption would reflect a larger nontraded and a smaller traded good sector. The data for the (albeit imperfect) structural indicators are given in Table 6 together with "t" tests for differences in the means (details are given in the footnote to the table), the null hypothesis being that the means are equal. For indicators (1), (4), and (5), the raw data show little difference between the subsample country group, and with the exception of (5), this is confirmed by the "t" tests. Despite the fact that the t-test for the latter indicator rejects the null hypothesis, it is unlikely that a difference of 0.3 percent of GDP in the share of government spending is economically meaningful.[16] For indicators (2) and (3), respectively the share of primary product exports in GDP and the degree of openness, the figures are both *higher* for the non–CFA franc countries and the "t" tests reject the null hypothesis of equal means at the 5 percent level. Other things being equal, this result would argue for less vulnerability of the CFA franc countries to external shocks rather than more vulnerability as our earlier results suggest. We conclude, therefore, that our earlier results on differences between the between the CFA franc and non–CFA franc sub–Saharan Africa countries do not appear to arise from different structural characteristics, but are more likely the result of differing exchange rate regimes together with the attendant constraints on the conduct of economic policies.

V. Main Differences and Concluding Remarks

This paper seeks to further our understanding of the macroeconomic fluctuations of sub-Saharan African countries. Using structural VAR analysis this study looks at the importance of external versus domestic shocks in explaining macroeconomic fluctuations in two subsample country groups of sub–Saharan Africa countries: CFA franc and non–CFA franc sub–Saharan Africa. While there does not appear to be an a priori reason to think that macroeconomic fluctuations in this region are different from those in other developing countries, the weak economic performance of sub–Saharan Africa countries combined with the recent emphasis on common factors affecting trends and cycles, may suggest otherwise. Moreover, the fact that CFA franc countries maintained a fixed peg to the French franc throughout the sample period (1971-93) and averaged significantly lower per capita growth than the rest of sub–Saharan Africa during the 1980s and early 1990s suggests that it may be important to analyze CFA franc countries separately from the rest of sub–Saharan Africa. Also, these two subsamples provide a interesting experiment for a study on the effect of different exchange rate regimes in developing countries.

The evidence provided in this paper suggests that the sources of macroeconomic fluctuations in the CFA franc countries differ from the rest of sub–Saharan Africa. In general, external shocks have had a greater impact on output, the real exchange rate, and inflation in

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[16]The rejection is associated with the very low variability in the share of government consumption in GDP for the CFA franc countries.

Table 6. Sub-Saharan Africa: Economic Structure

(In percent, unless otherwise noted)

Indicator	CFA	Non-CFA	t-statistic
(1) Share of primary commodities in merchandise exports	77.4	75.5	1.8
(2) Share of primary commodity exports in GDP	12.9	17.0*	-7.9
(3) Openness (exports plus imports as percent of GDP)	63.0	66.9	-12.0*
(4) Share of agriculture in GDP	36.1	36.2	-0.1
(5) Share of government consumption in GDP	14.6	14.3	8.4*

Source: International Monetary Fund, *IFS*, World Bank, *World Developments Indicators*, and UNCTAD, *Commodity Yearbook*.

Note: Primary commodities as shares of merchandise exports and of GDP are the average share for three annual observations for 1970, 1980 and 1990 (Tables 1.19 and 1.22 of the *Commodity Yearbook*). Exports plus imports as percent of GDP are the average for 24 annual observations from 1970 through 1993 for 5 CFA franc zone countries and 10 non-CFA countries (*IFS*, the sum of line 90c and line 98c divided by line 99b). The share of agriculture in GDP is the average of two annual observations for 1970 and 1993 for the available countries (8 CFA and 11 non-CFA) in *World Development Indicators* (Table 3, Structure of Production). The share of governments spending is the average for 24 annual observations from 1970 through 1993 for 5 CFA franc zone countries and 10 non-CFA countries (*IFS*, line 91f divided by line 99b).

The t-test statistic is for the null hypothesis of equal means of CFA and non- CFA countries conditional on equal variances. The degrees of freedom for each test equals the total number observations for the available countries listed in Table A1 minus 2 observations. Specifically, the degrees of freedom are respectively 67, 67, 358, 36, and 358 for the five indicators shown. Rejection of null hypothesis at the 5 percent significance level is denoted with an asterisk (*).

the CFA franc countries than in the rest of sub–Saharan Africa. This study has examined the possibility that the higher vulnerability to external shocks may reflect differences in the structure of the CFA franc countries–for instance, in the concentration of primary exports from the CFA franc countries–and finds that structural differences are probably insufficient to explain the differences observed in macroeconomic fluctuations. This result suggests that the implementation of exchange rate arrangement of the CFA franc countries prevented the exchange rate playing any substantive role as a partial buffer for external shocks. This finding is consistent with the evidence in Ghosh, et al. (1997) which find that countries with fixed exchange rate regimes face higher real volatility.

The real exchange rate behavior in the CFA franc countries, not surprisingly, differs markedly from non–CFA franc sub–Saharan African countries. In the CFA franc countries domestic demand policies primarily affect real exchange movements in the short run, i.e., the first year, and external factors dominate its movements thereafter. This may help to explain why the adjustment strategy followed by the CFA franc countries that relied heavily on fiscal policy to achieve a real depreciation during the 1980s was largely ineffective in restoring long-run external competitiveness and led mostly to deep economic recession in the late 1980s (see Bouton, Jones, and Kiguel (1994)). In non–CFA sub–Saharan Africa fiscal policy has had a larger and more persistent influence on the real exchange rate, while external shocks have played a small role. This is consistent with the evidence for industrial countries in Froot and Rogoff (1991) and Debelle and Faruqee (1996) and with the evidence for developing countries in Asia and Latin America in Hoffmaister and Roldós (1997).

Despite the differences discussed above, the main source of output fluctuations in both the CFA franc countries and non–CFA franc sub–Saharan Africa countries are supply shocks even in the relatively short-run. It is particularly interesting to note that output responses to supply shocks in the region, especially in the non–CFA franc sub–Saharan Africa countries, are in line with those supply responses observed for other developing countries (see Hoffmaister and Roldós (1997)).

This paper has shown that output shocks for the CFA franc countries and for non–CFA franc countries are similar despite the fact that terms of trade shocks appear to be larger in non–CFA franc countries. At the same time, the real exchange rate in non–CFA franc countries appears to have been more volatile. Our empirical evidence suggests that despite the larger terms of trade shocks, non–CFA franc countries were better able to withstand these, in part due to the greater flexibility of their exchange rate regimes. However, the worse inflation performance of this group of countries appears to have been the cost paid for somewhat greater "resilience" to external shocks.

DESCRIPTION OF THE ESTIMATED VAR MODELS

The VAR models were estimated with panel data for a subsample of eight CFA franc and 15 non–CFA franc countries. The lag selection for the VAR models with panel data is somewhat more involved than for single-country data (see Holtz-Earkin, Newey and Rosen (1988)). This study uses two lags in all models and checks the robustness of our results to the number of lags, as discussed below. Initial testing for each panel VAR suggested that a common variance for the individual countries in the panel is rejected by the data. Thus, further tests and estimates are based on weighted least squares (feasible GLS).

The deterministic part of the model consists only of a common intercept in each equation because we find no evidence of country-specific intercepts, and adding them to the model does not appreciably change the results. Regarding time-specific intercepts, note that these are not separately identifiable because the model contains a time-specific series, namely the real world interest rate, which has a common value for all countries each year.

As noted before, the estimated model contains five variables–the world real interest rate, terms of trade, output, the real exchange rate, and prices. To impose the small open economy assumption both in the short-run and in the long-run, the VAR model is estimated as a near-VAR, where the real world interest rate and the terms of trade equations are specified as block exogenous. To ensure that this specification does not unduly restrict the data, the near-VAR specification was tested against the "full" VAR specification using a likelihood ratio test; the resulting test statistic does not reject the near-VAR specification at conventional levels of statistical significance.

The conclusions drawn in this study do not appear to be overly sensitive to the number of lags used to estimate the model. We reestimated the near VAR models using one and four lags and found that the main qualitative results did not change. It should be noted that using four lags increases the complexity of the dynamic responses observed in the two subsamples. As OLS estimates are in principle not efficient because of the near VAR specification, the model was reestimated using seemingly unrelated regression techniques. These results confirm the main qualitative results presented in this paper.

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