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From: The Acting Secretary

Subject: Study on "Evaluating Participation in an African Monetary
           Union: A Statistical Analysis of the CFA Zone"

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        It should be noted that it is a departmental discussion paper
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DISCUSSION PAPER

EVALUATING PARTICIPATION IN AFRICAN MONETARY UNIONS:
A STATISTICAL ANALYSIS OF THE CFA ZONES

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ABSTRACT

Thirteen African nations are engaged in two monetary unions with France often referred to as the CFA Zone. Despite the acknowledged benefits of Zone membership -- a convertible currency, pooled resources and greater monetary and fiscal "discipline" -- several observers have questioned whether particular aspects of the Zone such as the lack of autonomy of the two Central Banks and the surrender of the exchange rate as a policy instrument have impeded its members' growth. This paper addresses that question by testing whether CFA Zone countries had different GNP growth rates from selected "comparator" countries during 1960-82. Results show that CFA countries grew significantly faster than comparator Sub-Saharan African countries but usually slower, and often significantly so, than the whole sample of developing countries. When the comparison is made by subperiod (before and after 1973), CFA countries' performance vis-a-vis that of their comparators improved during the 1973-82 period, casting further doubt on the claim that the monetary union is not functioning adequately.

1. INTRODUCTION

Macroeconomic instability is among the prime factors said to inhibit growth in developing countries. Its sources include terms of trade fluctuations and supply shortfalls on the one hand, and government policies on the other. In Latin America, this instability gets reflected in "stop-go" cycles with recurrent balance of payments crises, and with overvalued exchange rates sustained by increasingly opaque and distortionary restrictions to foreign trade. Moreover, these crises are often fueled by monetization of excessive public sector deficits. Elsewhere, including in African countries, the stop-go cycles are less pronounced and have a stronger exogenous component, but include many of the symptoms mentioned above. Here, too, distortionary forms of adjustment have been used to validate imprudent monetary and fiscal policies. The resulting macroeconomic instability has been said to raise uncertainty, which in turn deters domestic and foreign investment.

One way of overcoming this instability may be economic integration among countries in adjacent geographical areas. An example are the two monetary unions consisting of thirteen West African countries, all but one of whom was formerly a French colony. [1] Participation in the CFA Zone sets its members apart from most other developing countries in three ways: (i) monetary integration through the pooling of reserves which reduces the seignorage cost associated with holding foreign exchange reserves; (ii) currency convertibility because the CFA Franc (CFAF) is guaranteed by the French Franc (FF); (iii) a fixed exchange rate with the FF which has not been altered since 1948.

Though it is generally agreed that membership in the zone has been beneficial because it has reduced instability, encouraged resource accumulation, and led to fewer distortionary policies to correct macro imbalances, several criticisms have been raised of union membership. [2/] In the late sixties, there was a general feeling that France exerted too strong a control on monetary policy among zone members. This led to the 1973 reforms which increased the autonomy of the two Central Banks (BEAC and BCEAO) in credit and interest rate policy. [3/] More recently, concern has been raised that foresaking the exchange rate as an instrument to redress macro imbalances during the turbulent 1970s may have caused countries to resort to distortionary means of adjustment such as various instruments of protection which in turn would thwart attempts at establishing a customs union. [4/]

This paper examines whether the concerns mentioned above receive empirical support. The task is difficult and the information scant. For this reason we use a simple statistical model in which CFA Zone members' growth is weighed against that of "suitably" selected comparator countries. The pros and cons of monetary union participation, mostly from a long-run resource allocation perspective, are reviewed briefly in Section 2. Statistical considerations and country classifications are discussed in Section 3. Results of the comparisons follow in Section 4.

2. ZONE MEMBERSHIP: BENEFITS AND COSTS

Much of the discussion about the merits of participation in a monetary union has been concerned with short-term adjustments to internal and external disturbances and has dealt with developed countries (Tower and Willett, 1976). For developing countries there are also long-run implications

of monetary union participation (see Robson 1981, and 1983). Moreover, the alternatives to joining a monetary union open to developing countries are different from those for developed countries. Hence, it is useful to review the main arguments whereby monetary union membership confers benefits and costs.

Before examining the arguments, it is useful to recall two points. First, developing countries do not face the same choices as developed countries with if they choose against monetary union membership: whereas developed countries face a range of alternatives from independent floating to a fixed exchange rate, a developing country's choice is simply "what to peg to?" The alternative of independent floating is not open to developing countries because of thin foreign exchange markets, restrictions on capital flows and limited capital markets (McKinnon 1979). Second, since the advent of generalized floating among the major currencies starting in 1973, the issue of which currency to peg to -- a basket or a major trading partner -- has been the subject of debate for exchange rate policy in developing countries. However, this is somewhat apart from the costs and benefits of monetary union membership so we will review the arguments separately. [5]

2.1 Benefits of Monetary Union Membership

The major argument for participating in a monetary union can be found in the literature on optimum currency areas. In a seminal paper in which he was concerned about the short-run objectives of price stability and full employment, Mundell (1961) observed that boundaries of currency areas should be determined by factor mobility: within currency areas, factors should be mobile and, among currency areas, factors should be immobile. Though

subsequently criticized, [6/] this argument remains the major reason for countries joining in a monetary union. Although direct evidence on factor mobility is hard to come by for the CFA Zone, the common language and institutions inherited from the French and the lack of natural barriers between countries in the Zone would enhance factor mobility between countries.

The other short-run argument for membership in a monetary union has to do with the observation that short-run adjustment to a disturbance is least costly, the smaller are the multiplier effects of that disturbance on output and the price level. Whether the disturbance is internal or external, the more open the economy -- in the sense of, say, the share of exports in GNP -- when the exchange rate is fixed the larger are export and import elasticities so the smaller are the induced changes in domestic spending because spending leaks to the external sector. But the superiority of fixed rates over the feasible alternative of a crawling peg is not per se an argument for a monetary union since adjustment to the disturbance could be achieved with unilateral pegging. Thus, the superiority of a monetary union in adjusting to a disturbance in the short run must be attributed to the lower probability of using the exchange rate than in fixed or crawling peg regimes where exchange rate changes only involve a unilateral decision.

While CFA Zone countries are relatively open economies -- their import share in GDP is between 35 percent and 41 percent -- the share of intraregional trade is only 7-8 percent of regional GNP. [7/] Therefore, the above short-run benefits of monetary integration, i.e. minimizing the short-run impact on prices and employment of a disturbance, are fairly small.

However there are long-run benefits conferred from Zone membership for CFA countries which are not discussed in the literature on optimum

currency areas. [8/] These benefits derive from full currency convertibility. As currency convertibility is rare among developing countries, this feature of the zone sets its members apart from their Third World peers. [9/] Speculative capital flows and capital flight have been much less among CFA Zone members. Such portfolio diversification across currencies as exists among zone residents has been related to political rather than to exchange rate risk. Though capital flight cannot unambiguously be said to reduce welfare it is likely to reduce growth insofar as the capital may not be repatriated. Also, often the income from the capital that has left the country is not spent in the country of origin. Moreover, more foreign direct investment is also likely to result from currency convertibility as potential investors perceive smaller risks of confiscation. Finally, by effectively relaxing restrictions on the portfolio decisions of private agents, currency convertibility is superior to the alternative of non-convertibility for the private sector.

2.2. Costs of Monetary Union Membership

The need to achieve a higher degree of policy coordination in a monetary union inhibits the freedom to pursue independent stabilization policies. For example, it has often been noted that belonging to a monetary union constrains countries in setting national targets for the inflation-unemployment mix. [10/] Effectively coordinated fiscal policy is also essential to ease regional adjustment because there is always some factor immobility. However, centralized fiscal policy is certainly not achieved by CFA Zone members as budget deficits are financed through borrowing in the community or internationally. However there are some constraints on fiscal policy insofar

as member states face limits on the amount of borrowing from their respective Central Banks. Insofar as economic integration is the goal of the monetary union, centralization is unavoidable.

Another factor to be considered is the tendency to postpone adjustment in all countries: the centralization of monetary policy and the (albeit loose) limits to borrowing from the operations account place bounds on the extent and duration of macroeconomic disequilibrium among CFA Zone members. As a result, their inflation rates are low compared with other developing countries. In turn, these lower inflation rates are attributable to the constraints imposed by membership in the monetary union. Mundell (1972) argues that the French tradition by stressing the passive nature of monetary policy and the rigidity of the exchange rate has bought stability at the expense of institutional development and monetary experience. The former British Colonies in Africa, by contrast, who opted for monetary independence, have sacrificed stability but gained experience and better developed monetary institutions. 11/ 12/ However, Mundell's observations are less applicable, now as the autonomy of the two Central Banks increased after the 1973 reforms (see Section 4.2 below).

Beyond the possible lack of institutional development caused by excessive foreign influence, rigid pegging to the franc during the period of generalized floating after 1973 may have weakened the insulation from external shocks. In his survey of the choice of peg for developing countries to mini- mize changes in relative prices of traded goods, Williamson (1982) shows that under fairly general specifications of the demand and production structures of developing countries (namely the dependent economy model), pegging to a trade weighted basket minimizes variation in the effective exchange rate (EER) and

is the best among the alternatives proposed. In turn, Macedo (1984) shows that, for UMOA countries, even though the monetary union achieved nominal EER stability, this was at the expense of real EER volatility which increased during the period of generalized floating. Thus, even if CFA Zone members had not adopted a basket peg, the possibility of devaluing periodically might have been a superior alternative to pegging to the French Franc insofar as it might have reduced EER volatility.

Another potentially important cost of rigid pegging to the French Franc has to do with relative price rigidities. Insofar as there are such rigidities among Zone members and if an effective real devaluation could be achieved by a nominal devaluation -- perhaps because of some nominal wage rigidity -- then, not having the option to devalue when in a position of external deficit may lead members to achieve redressement of their external deficit by means of distortionary taxes.

Finally, insofar as France is only concerned with the net position of the Zone in its operations account, adjustment may be postponed among several countries in deficit because one Zone member is experiencing a boom. This was the case in BEAC when Cameroon became a net exporter of oil starting in 1979.

3. GROWTH IN THE CFA ZONE: A COMPARISON WITH OTHER DEVELOPING COUNTRIES

The discussion in the previous section pointed out that members of the CFA zone have certain advantages over other countries. But these are in general hard to quantify, and they must be weighted against the potential costs, especially during the period of generalized floating after 1973. Indeed, to identify each effect separately, one would need a detailed structural macro model that could not be implemented with existing knowledge

and data. A less ambitious approach which we adopt here, is to compare, after trying to control for omitted factors, the growth rates of CFA zone members with those of other "comparable" countries. The analysis is for the period 1960-82 with a further breakdown for the subperiods 1960-73 and 1974-82. Results are reported for GNP growth only, because tests using GNP per capita yielded very similar results.

3.1 The Statistical Model and Country Classification

After classifying countries into groupings, we will compare the growth rates of the 11 CFA zone members with those of 63 other developing countries for the period 1960-82. In this cross-section time-series framework, we are interested in analyzing the GNP growth rate of country i in the t-th year, say Y_{it}, which belongs to group classification S. (Group classification is described below.) One common method for pooling cross-section and time series data is to use the least-squares-with-dummy-variables (LSDV) method. In this method the slope coefficient is the same for all cross-section units and only the intercepts are different. Since we are interested in testing whether the slope coefficients which are trend estimates of GNP growth are the same across different groups of cross-section units, we would have to modify the LSDV technique. The extended model would then be

$$(1) \qquad Y_{it} = \sum_{j=1}^{N} \alpha_{oj} \, D_{it}^{j} + \beta_{o} T + \beta_{1} \, D_{it}^{*} \, T + v_{it}$$

where, as before, i refers to a country, t to time, D_{it}^{j} is a dummy variable which takes a value of zero unless the observation belongs to the i-th country, D_{it}^{*} is a dummy variable taking the value one if the country belongs

to the CFA zone, zero otherwise, T is a time index, and v_{it} is the error term with the usual properties. Note that the use of the D^j_{it} dummies severely reduces the degrees of freedom for hypothesis testing. This would present a problem in some of the group classifications adopted below. In this regression, tests of a different growth rate in CFA zone countries, is a test on the significance of β_1.

An alternative, that results in a gain in degrees of freedom, is to use the error-components framework which handles the problem of cross-period correlation by treating the intercept terms α_i as random variables rather than fixed. Since α_i are random, the residuals are now $u_{it} = \alpha_i + v_{it}$ and the presence of α_i produces a correlation among residuals of the same cross-section unit, even if, as below, we assume that the residuals from different cross-section units are independent. Correlated residuals requires use of a generalized least squares (GLS) estimator to get efficient estimates. [13/] The model to be estimated is:

$$(2) \qquad Y_{it} = \sum_{S=1}^{2} \alpha^S_i D^S_{it} + \sum_{s=1}^{2} \beta_s D^{*s}_{it} T + u_{it}$$

where D^S_{it} and D^{*j}_{it} are dummies that determine if the i-th country belongs to the CFA zone. We assume that the residuals have zero mean and common variance σ^2_u and that they are both serially independent and independent across units. The assumptions are:

$$E(\alpha^S_i) = 0; \quad E(u_{it}) = 0$$

$$cov(\alpha^S_i, \alpha^S_j) = \sigma^2_\alpha \quad \text{for } i = j$$
$$= 0 \quad \text{otherwise}$$

$$\text{cov } (u_{it}, u_{js}) = \sigma_u^2 \quad \text{if } i = j; \ t = s$$

$$= 0 \text{ otherwise}$$

$$\text{cov } (a_i^S, u_{jt}) = 0 \text{ for all } i, j, t$$

Besides resulting in more degrees of freedom than with the LSDV method, the variance components (VC) model does not eliminate the covariance between groups. More importantly for our purposes, treating the intercept terms as a random variable is a way of accounting for other missing variables not included in the model. The costs of this approach are the conditions imposed on the error structure. Whereas the country-specific effects are captured by the dummy variables in the LSDV approach, in the VC model they are captured in the intercept term which must be uncorrelated with the explanatory variables in the model, including the CFA zone dummy. [14]/

It should be clear that with our crude way of dealing with omitted factors, the classification of countries is of great importance since it is also a way accounting for some of the omitted variables. Table 1 below gives the sample of 74 countries for which we have constant series GNP for the period 1960-82. The selection is the result of choosing all countries with income per capita below $US3,000 in 1980 and a population over 1 million in 1965. [15]/ Note also that for one of the regressions, we consider the CFA as a single country to reflect the fact that the countries are engaged in a monetary union. Hence the inclusion of the CFA zone as a country in Table 1. [16]/

The countries in table 1 are classified along nine dimensions which will be the focus of pairwise growth comparisons between CFA zone members and non-zone members. The nine dimensions inspired from Chenery and Syrquin

Table 1: CFA Zone vs. Comparator and Sub-Saharan Countries (1960-1982).
Country Classifications.

#	Country	Code	CFA (12)	Size Lge (19) II	Size Sml (56) III	Oil Exp. (13) IV	Oil Imp. (61) V	Income Low (55) VI	Income High (20) VII	Semi-Indust. (28) VIII	Sub-Saharan All (31) IX	Sub-Saharan Rich (7) X	Population 1965 (Mill.)	Percapita GNP 1980 (US $)
1	AFGHANISTAN	1			X		X	X					11.12	223.8
2	ALGERIA	3			X	X			X	X			11.92	2,111.6
3	ANGOLA	6			X	X		X			X		5.35	831.9
4	ARGENTINA	8		X			X		X	X			22.28	1,982.7
5	BURKINA FASO	194	X		X		X	X			X		4.60	218.2
6	BANGLADESH	13		X			X	X					60.48	130.2
7	BENIN	17	X		X		X	X			X		2.33	335.1
8	BOLIVIA	20			X		X	X					3.84	758.7
9	BRAZIL	24		X			X		X	X			84.29	2,001.0
10	BURMA	27		X			X	X					24.25	172.8
11	BURUNDI	28			X		X	X			X		3.13	239.6
12	CENTRAL AFR.REP	32	X		X		X	X			X		1.74	349.7
13	CFA	1000	X	X			X	X			X		32.84	627.4
14	CHAD	33	X		X		X	X			X		3.31	112.7
15	CHILE	34			X		X		X	X			8.51	2,399.2
16	CHINA	35		X			X	X		X			746.80	289.6
17	COLOMBIA	38		X			X	X		X			18.49	1,282.0
18	CONGO	40	X		X	X		X			X	X	1.07	987.3
19	COSTA RICA	42			X		X		X	X			1.49	2,048.8
20	DOMINICAN REP.	49			X		X		X	X			3.72	1,158.5
21	ECUADOR	51			X	X		X		X			5.13	1,476.2
22	EGYPT	52		X		X		X		X			29.39	581.6
23	EL SALVADOR	53			X		X	X					3.01	735.1
24	ETHIOPIA	55		X			X	X					22.55	132.4
25	GABON	64	X		X	X		X			X	X	0.69	5,032.2
26	GHANA	68			X		X	X			X		7.77	374.0
27	GUATEMALA	75			X		X	X		X			4.62	1,077.3
28	GUINEA	76			X		X	X			X	X	4.14	299.1
29	HAITI	79			X		X	X					3.95	274.2
30	HONDURAS	80			X		X	X					2.30	636.8
31	HUNGARY	82			X		X		X				10.15	2,033.0
32	INDIA	84		X			X	X		X			487.32	235.6
33	INDONESIA	85		X		X		X					104.76	473.4
34	IVORY COAST	91	X		X		X	X		X	X		4.16	1,212.6
35	JAMAICA	92			X		X	X					1.75	1,097.3
36	KENYA	96			X		X	X		X	X		9.52	412.8
37	KOREA, REPUBLIC	99		X			X		X	X			28.71	1,606.6
38	LIBERIA	103			X		X	X			X		1.14	521.7
39	MADAGASCAR	106			X		X	X			X		6.08	366.5
40	MALAWI	107			X		X	X			X		3.92	197.6

Table 1 (continued)

#	Country	Code	CFA (12)	Size Lge (19) II	Size Sml (55) III	Oil Exp. (13) IV	Oil Imp. (61) V	Income Low (55) VI	Income High (19) VII	Semi-Indust. (27) VIII	Sub-Saharan All (31) IX	Sub-Saharan Rich (7) X	Population 1965 (Mill.)	Percapita GNP 1980 (US $)
41	MALAYSIA	108			X	X			X	X			9.53	1,653.3
42	MALI	110			X		X	X			X		4.56	199.4
43	MAURITANIA	113			X		X	X			X		1.09	433.1
44	MEXICO	115	X			X			X	X			43.50	2,615.4
45	MOROCCO	119			X		X	X		X			13.32	948.2
46	MOZAMBIQUE	120			X		X	X			X		7.26	322.7
47	NEPAL	122			X		X	X					10.34	133.8
48	NICARAGUA	127			X		X	X					1.61	784.5
49	NIGER	128	X		X		X	X			X		3.51	326.6
50	PAKISTAN	136		X			X	X					52.41	311.8
51	PANAMA	137			X		X		X				1.27	1,861.7
52	PAPUA NEW GUINEA	149			X		X	X					2.14	815.1
53	PARAGUAY	140			X		X		X				2.02	1,359.2
54	PERU	142			X	X		X		X			11.23	1,117.7
55	PHILIPPINES	143	X				X	X		X			31.77	730.6
56	PORTUGAL	146			X		X		X	X			9.20	2,462.9
57	RWANDA	150			X		X	X			X		3.25	222.9
58	SENEGAL	157	X		X		X	X			X		3.92	501.6
59	SOMALIA	163			X		X	X			X		2.82	274.8
60	SOUTH AFRICA	152		X			X		X	X			19.47	2,666.4
61	SRI LANKA	167			X		X	X					11.13	271.2
62	SUDAN	173			X		X	X			X		12.36	367.3
63	SYRIAN ARAB REP	177			X	X			X	X			5.33	1,512.3
64	TAIWAN, PROVINC	179			X			X	X	X			13.44	2,268.8
65	THAILAND	180	X				X	X		X			31.24	706.9
66	TOGO	181	X		X		X	X			X		1.70	430.4
67	TURKEY	186		X			X		X	X			31.15	1,312.6
68	UGANDA	190			X		X	X			X		8.43	235.3
69	UN.REP.CAMEROON	189	X		X	X		X			X	X	5.83	737.4
70	UN.REP.TANZANIA	193			X		X	X			X		11.60	264.2
71	URUGUAY	195			X		X		X	X			2.69	3,450.2
72	VENEZUELA	200			X	X			X	X			9.17	1,805.9
73	ZAIRE	210	X				X	X			X	X	18.52	203.1
74	ZAMBIA	211			X		X	X			X	X	3.64	619.4
75	ZIMBABWE	164			X		X	X			X	X	4.27	762.3

Sources: (1) Chenery, H. and M. Syrquin, "Patterns of Development: 1950-1970"
(London: Oxford University Press, 1975)
(2) Berg, Eliot "Accelerated Development in Sub-Saharan Africa" (Washington, D.C., World Bank, 1981)

Notes:
II= Defined as POP(1965) > 15 Million.
III= Defined as POP(1965) < 15 Million.
VII= Low Income defined as GNP/capita(1980) < $1,300.00
VI= High Income defined as GNP/capita(1980) > $1,300.00

(1975) are: large, small, oil exporter, oil importer, low income, high income, semi-industrial, sub-Saharan mineral rich and other sub-Saharan Africa. The allocation of countries in the sample to each classification is given in table 1. In the results reported below a typical comparison would be the GNP growth rate of small CFA zone countries with the GNP growth of non-CFA zone small countries.

4. STATISTICAL RESULTS

4.1. Entire Period: 1960-82

Results from estimation of equation 2 are given in Tables 2 (1960-82) and 3 (by subperiod). In Table 2, we report non-CFA and CFA intercepts which are 1960 mean GNP in million $US 1980. They appear in columns 1 and 2 and a check on their values serves to see how different initial country sizes are between CFA and non-CFA within each classification. These are followed by estimated trend GNP growth rates for non-CFA and CFA countries in columns 3 and 4. [17/] The t-test is on the significance of the difference in GNP growth between CFA and non-CFA countries is reported in column 5 which also gives the difference between CFA and non-CFA trend GNP growth. The last two columns are the estimated component of GNP growth variance due to country-specific effects $(\hat{\sigma}_\alpha^2)$ and the estimated component of total unexplained growth variance that is due to purely random effects $(\hat{\sigma}^2)$. Because the variance component for time-series $(\hat{\sigma}_u^2)$ was always small, it is not reported in the table.

Starting with the entire sample (model I), we cannot reject (at the 1 percent significance level) the hypothesis that CFA-zone countries' GNP growth over the 1960-82 period was less than that of the other developing countries in the sample. Over the period, their growth rate was on average 0.8 percent

lower.   Treating all CFA countries as a single country (model II) and comparing its mean growth rate to that of other large countries, the difference is no longer statistically significant. The CFA zone does better vis-a-vis its comparator when it is treated as a single country than when countries are considered individually. In part this is due to the fact that countries, when treated individually, are given equal weight in the regression. But when the CFA zone is viewed as an aggregate, the weight of fast-growing Ivory Coast is greater which improves the performance of the CFA zone. However, it is legitimate to treat the CFA zone as a single economic zone since this is the purpose of creating the monetary union in the first place. Though 0.6 percentage points lower than that of other large countries, growth of the CFA is not statistically significant and, in the comparative sense established by the model, is average for our sample of countries.

Moving down the table, we see that among small countries (model III), CFA zone members' growth is also less, though the difference is statistically less significant. When the comparison is made among oil importing countries (model V), CFA zone members grow by 1.4 percentage point less than their comparators. The difference in growth is quite large and retains some (though weaker) statistical significance when the comparison is restricted to the 1973-82 period (see below). Finally, when the comparison is made among low income countries (model VI), the growth rate of low income CFA zone members is only 0.6 percent less than that of other low income countries and retains statistical significance. Thus, when given equal weight and when considered individually as small or low income countries, CFA zone countries have had relatively slower growth than their comparators. Unfortunately, we cannot question further the reasons for this difference in growth performance be they

Table 2.   Variance Component Model of GNP Growth for CFA and Non-CFA Countries

Model: ln(GNP) = bo + b1*D + go*TIME + g1*D*TIME

Classification	Non-CFA bo	CFA 1/ bo+b1*D	Non-CFA go	CFA go+g1*D	Differ.	$(\hat{\sigma}^2_\alpha)$	$(\hat{\sigma}^2)$
I. Entire Sample							
Coefficient	3,454 *	904 *	4.51 *	3.69	-0.83 *	1.7690	0.0241
t-ratio	(48.5)	(-3.1)	(59.1)		(-5.2)		
II. Large Countries							
Coefficient	13,426 *	11,852	5.25 *	4.66	-0.59	1.4014	0.0168
t-ratio	(34.6)	(-0.1)	(55.7)		(-1.4)		
III. Small Countries							
Coefficient	2,006 *	904 **	4.22 *	3.69	-0.53 **	0.9429	0.0254
t-ratio	(52.4)	(-2.4)	(48.2)		(-3.2)		
IV. Oil Exporting							
Coefficient	8,248 *	1,046 *	5.43 *	5.73	0.31	0.6860	0.0322
t-ratio	(35.2)	(-3.9)	(30.4)		(0.8)		
V. Oil Importing							
Coefficient	2,931 *	856 **	4.34 *	2.92	-1.42 *	1.8272	0.0203
t-ratio	(42.9)	(-2.4)	(51.5)		(-8.4)		
VI. Low Income							
Coefficient	2,477 *	900 **	3.95 *	3.35	-0.60 *	1.4929	0.0206
t-ratio	(42.4)	(-2.4)	(52.7)		(-3.8)		
VII. High Income							
Coefficient	7,456 *	858	5.82 *	6.98	1.16 *	1.4578	0.0204
t-ratio	(32.1)	(-1.7)	(49.5)		(2.7)		
VIII. Semi-Industrial							
Coefficient	9,282 *	2,512	5.69 *	6.58	0.89 **	1.2002	0.0155
t-ratio	(43.3)	(-1.2)	(68.4)		(2.2)		
IX. Sub-Saharan							
Coefficient	1,337 *	904	3.29 *	3.69	0.40 **	0.6663	0.0268
t-ratio	(38.3)	(-1.3)	(27.9)		(2.0)		
X. Sub-Saharan Rich							
Coefficient	1,925 *	1,046	3.31 *	5.73	2.43 *	0.4039	0.0192
t-ratio	(24.1)	(-1.3)	(15.5)		(7.4)		
XI. Sub-Saharan Poor							
Coefficient	1,213 *	856	3.29 *	2.92	-0.37	0.7298	0.0260
t-ratio	(32.1)	(-0.9)	(25.1)		(-1.7)		

Notes: - Dummy (D) is 0 for Non-CFA and 1 for CFA membership; Intercepts: 10**6 1980 US $.
           - Levels of Significance: * = 1% and ** = 5% .
           - Growth estimates in percentage.
           1/ t-ratio in parenthesis is for the difference b1.

Estimator: W.A. Fuller and G.E. Battese.   "Estimation of Linear Modelswith Cross -error Structure".
                                              Journal of Econometrics, V.2, No.1, May 1974, p.67-78.

endowments, less flexible economic structures, or more adverse shocks such as droughts.

Not surprisingly, when Ivory Coast is compared with other semi-industrial countries (model VIII), its growth (5.7 percent) is 0.9 percentage point higher than that of other semi-industrial countries though its statistical significance is marginal. Comparing Gabon and Cameroon with other oil exporters (model IV) reveals that they grew faster than other oil exporters but the comparison may be quite misleading since the two countries are much smaller in size than their comparators (see the intercepts). Pooling Gabon and Ivory Coast (model VII), we get again statistically significant higher growth for the Zone members.

When we turn to a comparison with other sub-Saharan countries, the picture changes dramatically. No longer are the CFA zone members worse performers. Within the group of all sub-Saharan countries their growth rate is 0.4 percent higher than the average (model IX) and the difference is statistically significant. Among the sub-Saharan rich countries their higher growth is also statistically significant (model X). Finally, among sub-Saharan poor countries, CFA zone growth is slightly less than that of other sub-Saharan poor countries, but the difference is not statistically significant.

If we take the comparison among sub-Saharan countries as the most appropriate one because we can better control for other factors (such as droughts and natural and physical endowments), we find that CFA zone members have grown somewhat more rapidly than their comparators and that the difference is statistically significant for the model considered. While not conclusive, the evidence tends to support the view that CFA zone members have,

on the whole, performed well in terms of GNP growth when compared with other sub-Saharan countries. Furthermore, when considered as a single country, thé CFA zone appears not to have grown less rapidly than other large countries.

4.2. Comparison by Sub-Periods: 1960-73 vs. 1974-82

A further comparison by sub-periods is useful because of the combination of the advent of generalized floating among major currencies starting in 1973 at which time BEAC and BCEAO also acquired greater autonomy from France following a series of institutional reforms which started in 1972. The reforms included more decentralization of powers so that credit policy was less controlled by the Bank of France (money supply growth which had been around 10 percent annually for BEAC and BCEAO until 1973, rose to 45 percent in 1974); Africanization of the Central Banks' staff; and a greater degree of diversification of the Central Banks' foreign reserves (now African members must deposit 65 percent of their foreign currency reserves in an operations account with the French Treasury). [18/] Thus, under the new statutes and rules of intervention, in case of imbalances, the Central Banks have a strengthened role in monetary policy and an enhanced range of monetary instruments for meeting their objectives.

Controlling as best possible for other factors such as the oil shocks, one may suspect that the comparative performance of CFA and non-CFA countries might have been affected by these events. On the one hand, if properly used, greater autonomy in the setting of money supply targets would be expected to raise growth if earlier there was indeed insufficient credit availability. [19/] On the other hand, pegging to the Franc rather than to a basket of currencies or even allowing for periodic exchange rate realignments

might have been more costly during the post-1973 turbulent year when floating led to great exchange rate volatility.

Growth rates by subperiods and statistical significance tests are reported in Table 3. [20] A glance at columns 3 and 6 shows that during the first subperiod CFA Zone countries grew slower for all but two classifications. In the second subperiod, CFA Zone countries grew faster than non-CFA countries for four classifications. This suggests an improvement over the first subperiod especially if one notes that the difference in growth between non-CFA and CFA countries diminished for nine out of the eleven classifications. The newly acquired independent status for CFA Zone countries at the beginning of the period covered in the analysis may be a reason for their relatively poorer performance during the first subperiod. In any case, the improvement in the second subperiod is dramatic.

The results from comparing CFA and non-CFA growth by sub-periods are further summarized in Table 4. It is apparent that only the high income and semi-industrial classifications (VII and VIII) that include the Ivory Coast -- which had severe macroeconomic imbalances in the late seventies -- show a worse performance in the second period. The oil importing-classification (V) remains unchanged and the remaining nine classifications show an improvement for the second subperiod. The comparison among sub-Saharan countries is striking, suggesting a relatively better performance for CFA Zone members during the turbulent 1970s.

It is noteworthy that, with the exception of Ivory Coast's deterioration among the semi-industrial country group during the second subperiod, CFA Zone members have either maintained or improved their position relative to comparators during the period of external shocks. Of course, our crude tests do not allow us to attribute this apparent improvement to reform in the

Table 3: A Comparison of GNP Growth for CFA and Non-CFA Countries.

Model: ln(GNP) = bo + b1*D + go*TIME + g1*D*TIME

Classification	First Sub-Period: 1960-73			Second Sub-Period: 1973-82		
	Non-CFA go	CFA go+g1*D	Differ. g1	Non-CFA go	CFA go+g1*D	Differ. g1
I. Entire Sample						
Coefficient	4.88 *	3.61	-1.27 *	3.61 *	3.00	-0.61
t-ratio	(64.9)		(-6.5)	(17.9)		(-1.5)
II. Large Countries						
Coefficient	5.44 *	4.28	-1.16 **	4.74 *	4.14	-0.60
t-ratio	(41.7)		(-2.0)	(23.6)		(-0.7)
III. Small Countries						
Coefficient	4.66 *	3.61	-1.04 *	3.15 *	3.00	-0.16
t-ratio	(52.3)		(-5.2)	(14.0)		(-0.4)
IV. Oil Exporting						
Coefficient	5.47 *	4.52	-0.95 *	4.84 *	4.22	-0.62
t-ratio	(5.5)		(-3.2)	(9.3)		(-0.6)
V. Oil Importing						
Coefficient	4.77 *	3.28	-1.50 *	3.37 *	2.54	-0.84 **
t-ratio	(56.4)		(-6.4)	(15.2)		(-2.0)
VI. Low Income						
Coefficient	4.43 *	3.47	-0.96 *	3.05 *	3.35	0.30
t-ratio	(51.8)		(-4.8)	(16.3)		(0.7)
VII. High Income						
Coefficient	5.93 *	4.94	-0.99	4.90 *	-0.01	-4.89 *
t-ratio	(43.4)		(-1.5)	(12.8)		(-5.1)
VIII. Semi-Industrial						
Coefficient	5.83 *	7.31	1.48 *	4.80 *	5.38	0.58
t-ratio	(55.6)		(2.7)	(17.3)		(0.7)
IX. Sub-Saharan						
Coefficient	4.20 *	3.61	-0.58 *	2.00 *	3.00	1.00
t-ratio	(30.9)		(-2.6)	(6.0)		(1.8)
X. Sub-Saharan Rich						
Coefficient	4.39 *	4.52	0.13	1.38	4.22	2.84 **
t-ratio	(20.8)		(0.4)	(1.8)		(2.4)
XI. Sub-Saharan Poor						
Coefficient	4.15 *	3.28	-0.87 *	2.16 *	2.54	0.37
t-ratio	(25.6)		(-3.2)	(5.9)		(0.6)

Notes: - Dummy (D) is 0 for Non-CFA and 1 for CFA membership.
- Levels of Significance: * = 1% and ** = 5% .
- Growth estimates in percentage.

Estimator: - W.A. Fuller and G.E. Battese. "Estimation of Linear Models with Cross-error Structure".
Journal of Econometrics, V.2, No.1, May 1974, p.67-78.

Table 4: Growth Comparisons by Subperiod: Summary Results

Classification [a] 1960-73	GNP Growth Rates [b] 1960-73	1973-82
I Entire Sample	L	NS -
II Large Countries	L	NS -
III Small Countries	L	NS -
IV Oil Exporter	L	NS -
V Oil Importer	L	L
VI Low Income	L	NS +
VII High Income	NS -	L
VIII Semi-Industrial	H	NS +
IX All Sub-Saharan	L	NS +
X Sub-Saharan Rich	NS +	H
XI Sub-Saharan Poor	L	NS +

[a]   Classification from Table 1; estimates from Table 3.

[b]   NS = Difference in growth rates between CFA and non-CFA not statistically significant; H (L) = Higher (Lower) growth of CFA Zone countries (significance level: 5 percent or more). Signs next to NS are: + if CFA Zone growth is higher; and - if CFA Zone growth is lower.

monetary union or to the greater superiority of a fixed exchange rate when the intensity and frequency of external shocks increased. But it does appear that the fear that a fixed exchange rate was detrimental to adjustment is not supported empirically, at least within our simple classificatory scheme.

5. CONCLUSIONS

After reviewing the potential benefits and costs for developing countries' participation in a monetary union, this paper has provided a simple assessment of the performance of the CFA Franc Zone during the period 1960-82. The largest available sample of developing countries was used to construct a Chenery-Syrquin type of country classification for comparing, within a variance component statistical model, GNP growth of CFA Zone members with that of comparator countries.

When comparisons are made for the entire period 1960-82, results are sensitive to which of the eleven classification schemes is used. However, when the comparison of CFA Zone countries is extended only to other sub-Saharan countries, it is found that their growth is higher.

Results are stronger when the sample is analyzed for two subperiods: 1960-73 and 1973-82, the latter subperiod corresponding to floating exchange rates, supply shocks, and greater autonomy in setting monetary policy within the CFA Zone. For all but two classification schemes, CFA Zone countries improved their performance vis-a-vis comparator countries during the 1973-82 period. The improved performance is particularly strong for comparison with other sub-Saharan countries. Even though the comparisons are based on a very crude statistical analysis, the results cast doubt on the preoccupation that the CFA monetary union is not functioning adequately. One the contrary, the

results lend support to the view that the discipline imposed by monetary union participation was helpful for adjustment during the period of generalized floating and supply shocks.

FOOTNOTES

[1]/ The two monetary unions are the Union Monetaire Ouest Africaine (UMOA) with Central Bank BCEAO and the membership of the Banque des Etats de L'Afrique Centrale, BEAC.

[2]/ The case for beneficial participation in the Zone is made in P. and S. Guillaumont (1984). A radical critique is found in Amin (1973).

[3]/ Mundell (1972) and P. and S. Guillaumont (1984) have noted that stability in the CFA Zone may have been bought at the expense of financial and overall development.

[4]/ Macedo (1984) discusses the issue in the West African context and Nascimiento (1983) provides an analysis for WAMU countries.

[5]/ P. and S. Guillaumont (1984, chapter 10) point out the potential conflict for establishing a customs union of belonging to a monetary union. BEAC countries, Chad excepted, belong, with other countries, to a customs union (UDEAC is the French acronym) since 1964 and WAMU countries belong to a looser arrangement known as ECOWAS which is to establish a common external tariff by 1986.

[6]/ Bhatia (1985) reviews the criticims.

[7]/ Controlling for income per capita levels, P. and S. Guillaumont (1983, p. 223) show that CFA Zone members' openness is high compared with other African countries, but low on a world-wide comparison. Mundell (1972) argues that low levels of intraregional trade in Africa are due to artificial barriers as well as to natural barriers (lack of transportation and communication policy). In the CFA zone there are no artificial barriers. Natural barriers and the lack of effective demand would then account for low levels of intraregional trade.

[8]/ We do not mention the microeconomic benefits deriving from the use of a common money. The allocative benefits from a common money are well known and are reviewed in Tower and Willett (1976, pp. 6-15)

[9]/ Convertibility of the CFA Zone is of course linked to convertibility of the FF. With few exceptions, FF convertibility has been maintained since 1967.

[10]/ De Grauwe (1975) shows that in a Phillips-curve world joining a monetary union forces countries to abstain from setting national targets for the inflation cost, but that there is no welfare cost of joining a monetary union in a Friedman-Phelps world where unemployment is determined by real factors.

11/ We do not mention the evidence suggesting that inflation leads to lower growth and consequently that, by lowering inflation the CFA Zone has been beneficial to it members. Controlling for other factors, Kormendi, Lavy and McGuire (1985) find for a sample of 63 developing countries that average growth rates over the period 1968-82 are inversely related to average inflation rates over the same period.

12/ Two theoretical explanations have been advanced recently in support of the negative correlation between growth and inflation. The first is that relative price variability increases with inflation which implies that producers will be more prone to making errors in their input and output decisions because of their inability to predict changing relative prices. The second proposition comes from the new neoclassical macroeconomics. It states that monetary variability adds noise to the ex-ante real returns resulting in increased uncertainty about the real returns and hence may lead to a decline in the marginal propensity to invest.

13/ The difference between the GLS estimates and the OLS and LSDV estimators depends on the extent of cross-section correlation among residuals and the length of the time-series. See Maddala (1977, pp. 327-8).

14/ The above models are estimated using the GLS estimator proposed by Fuller and Battese (1974). An alternative is to use the estimator proposed by Parks (1967) where the residuals follow a first-order autoregression with contemporaneous correlation between cross-sections. If indeed the model exhibits autocorrelation of the first order, the Parks estimator results in higher efficiency and correctly estimated variances. Tests with this estimator however, often resulted in estimated values of $\rho > 1$ which in turn resulted in near-singularity of the GLS covariance matrix since ρ was set close to 1. Hence our selection of the Fuller-Battese estimator.

15/ For the CFA zone, one country, Gabon was both above the income per capita cut-off point and below the population cut-off point. It was included in the sample because it belongs to the CFA zone.

16/ Of course, when the Zone is included as one country in a regression, the 11 member countries of the CFA zone are excluded, and vice versa.

17/ Results using GNP per capita were similar and are available from the authors upon request.

18/ Credit and debit balances in the operations account are subject to interest rates equal to the rediscuount rate set by the Bank of France. In principle, the debt balance of any member is not to exceed a predetermined ceiling (BCEAO) or is subject to a discount rate penalty (BEAC) so that the Central Banks have to address excessive debit positions through a squeeze on the money supply. In practice, controls have been loose and France has been concerned with the net position of each Central Bank rather than with the net position of each member.

19/ But, if there was excess money creation -- as might have been the case in 1974 -- this might lead to distortionary forms of adjustment to external shocks in the presence of price rigidities, and hence to lower growth.

20/ For the two classifications that include Gabon (IV and VII), CFA growth for the entire period does not lie between period averages. This is so because of an extreme growth rate for Gabon near the cut-off point.

BIBLIOGRAPHY

Amin, S., Le Developpement Inegal, (Paris, 1973), Editions de Minuit, Paris.

Bhatia, R., The West African Monetary Union: an Analytical Survey. Occasional Paper No. 35, (Washington, D.C.: IMF, 1985)

Berg, E., Accelerated Development in Sub-Saharan Africa, Washington, D. C., World Bank, 1981.

Chenery, Hollis and M. Syrquin, Patterns of Development, (Oxford: Oxford University Press, 1975.

De Grauwe, P., "Conditions for Monetary Integration: A Geometric Interpretation", Review of World Economics, Vol. 111, No. 2 (1975), pp. 635-46.

Fuller, W. and G. Battese, "Estimation of Linear Models with Crossed-error Structure," Journal of Econometrics, Vol. 2 (1974), pp. 67-78.

Guillaumont, P., and S., Zone Franc et Developpement Africain, (Paris: Economica, 1984).

Guillaumont, S., "La Situation Monetaire et Financiere des Etats Africains de la Zone Franc," Revue d'Economie Politique, Vol. 94, No. 5 (1984), pp. 592-601.

Kormendi, C., V. Lavy, P. Meguire, "Aid, Exports, Investment, and Economic Growth in Developing Countries: Some Empirical Results", mimeo, (Washington, D. C.: The World Bank, 1985).

Macedo, J. de, "Collective Pegging to a Single Currency: The West African Monetary Union", mimeo, (Princeton: Princeton University, 1984).

Maddala, G.S., Econometrics, (New York: McGraw-Hill, 1977).

McKinnon, R., Money in International Exchange, (Oxford: Oxford University Press, 1979).

Mundell, R., "A Theory of Optimum Currency Areas" American Economic Review, Vol. 51 (1961), pp. 227-257.

Mundell, R., "African Trade, Politics and Money" in R. Tremblay (ed.) Africa and Monetary Integration, (Montreal: Editions HRW, 1972).

Nascimiento, J., "The Choice of an Optimum Exchange Currency Regime for a Small Economy: An Econometric Analysis", mimeo, (Dakar: ESGE, 1983).

Parks, R. W., "Efficient Estimation of a System of Regression Equations when Disturbances are both Serially and Comtemporaneously Correlated," <u>Journal of the American Statistical Association</u>, Vol. 62 (1967), pp. 500-509.

Robson, P., <u>Integration, Development and Equity: Economic Integration in West Africa</u>, (London: Allen & Unwin, 1983)

Robson, P., <u>The Economics of International Integration</u>, (London: Allen & Unwin, 1981).

Tower, E. and T. Willett, <u>The Theory of Optimum Currency Areas and Exchange Rate Flexibility</u>, (Princeton, N.J., Princeton Special Papers in International Economics, 1976).

Williamson, J., "A Survey of the Literature on the Optimal Peg", <u>Journal of Development Economics</u>, Vol. 11 (1982), pp. 39-61.

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