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Macroeconomic Shocks and Trade Flows Within Sub-Saharan
Africa: Implications for Optimum Currency Arrangements ^{1/}

Prepared by Tamim Bayoumi and Jonathan D. Ostry

Authorized for distribution by Peter Isard and David Robinson

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Abstract

Africa has more countries than any other continent, and hence the largest number of potential monetary and exchange rate arrangements. This paper looks at whether the existing highly fractured monetary arrangements in Sub-Saharan Africa correspond to what might be expected from the theory of optimum currency areas. This is done by analyzing both the size and correlation of real disturbances across countries and the level of intra-regional trade. The results indicate little evidence that Sub-Saharan African countries would benefit in the near future from larger currency unions.

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^{1/} Useful comments on an earlier draft of this paper were provided by Jim Gordon and a number of colleagues in the African Department of the IMF.

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Summary

Africa has more countries than any other continent and hence the largest number of potential monetary and exchange rate arrangements. Current arrangements are notable for their diversity, ranging from the common currency union used by the members of the CFA franc zone to the freely floating exchange rates of such regional economic powers as South Africa. Moreover, these arrangements have evolved considerably over the past three decades as exchange rate arrangements have moved toward greater flexibility in Africa, as in developing countries more generally.

This paper looks at whether the existing highly fractured monetary arrangements in Africa correspond to what might be expected from the theory of optimum currency areas, which considers the economic factors that determine the gains and costs of adopting a single currency and seeks to measure these gains and losses. Gains from monetary union come from lower transaction costs and the elimination of exchange rate variability, while losses come from the inability to pursue independent monetary policies and to use the exchange rate as an instrument of macroeconomic adjustment. Both gains and losses are affected by structural features of the economies concerned, such as the size of asymmetric real disturbances, openness to trade, and labor mobility. Although the theory of optimum currency areas explores the advisability of forming a currency union, it is also relevant to the broader choice of regional exchange rate arrangements.

The paper presents empirical evidence on the size and correlation of underlying economic disturbances and intraregional trade across sub-Saharan Africa. Economic disturbances are calculated from a time-series model of real GDP per capita, while intraregional trade is calculated from the IMF's *Direction of Trade* database. The results indicate that in both dimensions most African countries have significantly smaller links than those across the three major industrial countries. As these countries show no signs of moving toward closer monetary cooperation, it appears unlikely that closer cooperation will occur within Africa in the near future as it has, for example, over the last two decades in Europe.

At the same time, the limitations of this exercise should be recognized. Only two criteria for determining the optimum range of a currency area are examined. Other potentially important issues, such as factor mobility, are not discussed. In addition, the results may reflect poor data on real output and underreporting of regional trade or country-specific factors that do not reflect the underlying economic structures of the countries involved. However, the uniformity of the results across groups of countries in the east, west, and south of the continent suggests that there is little likelihood of a significant move toward monetary cooperation over the next few years.

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I. Introduction

Africa has more countries than any other continent, and hence the largest number of potential monetary and exchange rate arrangements. Current arrangements are notable for their diversity, ranging from the common currency union used by the members of the CFA franc zone, to the freely floating exchange rates of such regional economic powers as South Africa. Moreover, these arrangements have evolved considerably over the past three decades as exchange rate arrangements have moved towards greater flexibility in Africa, as in developing countries more generally. Another significant break with the past was the devaluation of the CFA franc against the French franc in 1994, changing a parity which had been maintained at the same value for 45 years.

This paper looks at whether the existing highly fractured monetary arrangements in Sub-Saharan Africa correspond to what might be expected from the theory of optimum currency areas, which considers the economic factors which determine the benefits and costs of adopting a single currency. 1/ Gains from monetary union come from lower transaction costs and the elimination of exchange rate variability, while losses come from the inability to pursue independent monetary policies and to use the exchange rate as an instrument of macroeconomic adjustment. Both gains and losses are affected by structural features of the economies concerned. For example, if a group of countries is very open to intra-group trade, then the net gains associated with fixing exchange rates within the group will be greater than when the countries are relatively closed (McKinnon (1963)). This reflects larger gains from reducing transactions costs and uncertainty, and the fact that changes in the nominal exchange rate will have negligible effects on relative prices and quantities if the economy is very open, so that the costs of foregoing use of the exchange rate to promote adjustment would be relatively small. 2/ Diversification of the economy is also a factor that can influence the desirability of fixing the exchange rate (Kenen (1969)), with a more diversified production base implying greater net benefits to fixed rates. The reason is that more diversified economies are likely to face less frequent terms of trade shifts which, in turn, should require less frequent exchange rate adjustments.

A third issue relates to the similarity of underlying disturbances. If countries in a given region face similar disturbances then, assuming similar speeds of adjustment, the need for exchange rate policy autonomy is reduced relative to cases where disturbances are more dissimilar. Conversely, if countries face large asymmetric disturbances, then they are unlikely to be good candidates for forming a monetary union. Of course, structural

1/ The literature was started by Mundell (1961). Recent surveys include Masson and Taylor (1993) and Tavlas (1994). A recent theoretical treatment is contained in Bayoumi (1994).

2/ Openness also helps explain why very small countries, such as the Vatican or San Marino, use the currency of their large neighbor, Italy.

characteristics like diversification of the export base may influence the propensity to experience such disturbances, so the issues raised in the previous paragraph and here are related. 1/ The issue on which we will have little to say is the ease of adjustment to shocks (which is influenced by a number of factors including labor mobility across countries) which could influence the choice of exchange rate regime.

Formally, the theory of optimum currency areas looks at the advisability of forming a currency union. It is clearly also relevant, however, to the broader choice of regional exchange rate arrangements as it seeks to measure the gains and losses involved in eliminating exchange rate flexibility by adopting a common currency. This connection is probably best illustrated by events in the European Union, where the success of a regional arrangement to limit exchange rate fluctuations--the Exchange Rate Mechanism (ERM) of the European Monetary System--was an important factor in encouraging current moves towards a monetary union. This contrasts with the experience over the same period in Africa, which has seen a reduction in the number of countries with fixed exchange rate arrangements.

The example of the ERM also illustrates another reason for adopting a fixed exchange rate, namely using the exchange rate as an anchor for monetary policy. By limiting exchange rate variability against the deutsche mark, the ERM allowed other European countries to mimic the anti-inflationary monetary policies followed by the Bundesbank in Germany, thereby aiding their own anti-inflationary policies, particularly in the 1980s. As, with the possible exception of the South African rand, the obvious currencies for Sub-Saharan African countries to peg against for anti-inflationary reasons are all outside Africa, these considerations are unlikely to be important in determining intra-African monetary and exchange rate arrangements, which are the focus of this paper.

This paper begins (in the next section) by a brief review of existing exchange rate arrangements in Sub-Saharan Africa. This is followed by a discussion of a number of structural characteristics of Sub-Saharan African countries, including those relating to export diversification. We present some preliminary information on underlying disturbances by reporting summary data on the mean and variability of inflation and growth, and also on the correlation of growth and inflation across countries. The latter, however, is an imperfect measure of underlying shocks since observed inflation performance conflates the effects of disturbances and responses.

In order to get around this latter issue, a simple time series model of growth is estimated and the residuals from such a model are analyzed to determine how correlated shocks are across countries. 2/ The results suggest that shocks--as well as being large and therefore economically

1/ Note however that highly specialized economies may find fixed rates desirable if the goal is to insure the purchasing power of incomes.

2/ We also look at the size of shocks themselves.

significant--are on average not highly correlated across country groupings. Section V contains a discussion of levels of intra-African trade. The conclusion, presented in Section VI, argues that, on the basis of the stylized facts on trade, diversification, and cross-country correlation of shocks, there are few grounds for believing that (sub-groupings of) Sub-Saharan African countries currently form optimum currency areas.

II. Existing Exchange Rate Arrangements

Sub-Saharan Africa contains a wide range of exchange rate arrangements. ^{1/} At one extreme, the members of the CFA franc zone maintain a monetary union between themselves and a fixed parity against the French franc. There are two main arrangements involved in the CFA franc zone. CFA francs issued by the Central Bank of West Africa (BCEAO) are legal tender in Benin, Burkina Faso, Cote d'Ivoire, Mali, Niger, Senegal, and Togo. CFA francs issued by the Bank of Central African States (BEAC) are legal tender in Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea, and Gabon. Both CFA francs were devalued against the French franc in early 1994, and appear likely to continue to remain at equal parities against each other. The 14 states ^{2/} involved in the CFA franc zone constitute the largest number of states involved in such a monetary union anywhere in the world.

A second group of countries with very close monetary arrangements are South Africa, Lesotho, Swaziland, and (since its independence from South Africa) Namibia, which collectively form the Common Monetary Area (CMA). The currencies of other members are pegged to the South African rand at par, the South African rand is legal tender in Lesotho and Namibia, and bank notes issued by other countries are freely convertible into South African rand. Movements of funds within the CMA are also unrestricted and unrecorded, except for statistical and customs purposes, and residents have access to each other's money and capital markets. Unlike the CFA franc zone, however, the CMA is dominated economically by a single member, South Africa, as the other members are economically small.

At the other end of the spectrum, several countries maintain freely floating exchange rates, most notably South Africa (other than with the other members of the CMA) and Nigeria, the two largest economies in Sub-

^{1/} Exchange rate arrangements are described in detail in Exchange Arrangements and Exchange Restrictions, an annual publication of the International Monetary Fund.

^{2/} Omitted from the above list of countries is the Comoros, whose currency is pegged independently of the other members of the CFA franc zone.

Saharan Africa. 1/ Numerous other countries maintain arrangements between these two extremes, and since 1980 there has been a significant shift towards more flexible arrangements. 2/ At the end of 1980, only two countries (South Africa and Ghana) had independently floating exchange rate arrangements, while by 1993 there were 10 such arrangements. Over the same period the number of countries maintaining fixed exchange rates against the U.S. dollar or pound sterling fell from nine in 1980 to only two in 1993. In addition, the parity of the CFA franc with respect to the French franc, which had been maintained at the same level for 45 years, was halved in 1994.

III. Stylized Facts

We begin the analysis by describing some stylized facts pertaining to behavior of growth and inflation, the two most important macroeconomic indicators, across African countries. 3/ The percentage change in real GDP and the implicit GDP deflator are used as our indicators of growth and inflation. 4/ The data come from the IMF's World Economic Outlook (WEO) database and span the period from 1964 to 1993.

Growth has averaged about 3 1/2 percent annually over the sample and annual inflation about 20 percent (Table 1). The inflation numbers, however, are distorted by the presence of two outliers, Zaire and Zambia, which experienced high inflations. Excluding these countries, average inflation falls to about 12 1/2 percent per year. When one considers Sub-Saharan Africa separately (excluding the two outlier countries), the picture for growth and inflation is similar. Interestingly, annual growth in the middle-income countries has averaged about 1 percentage point higher than in the low-income countries. Inflation, moreover, appears to have been more moderate and less volatile in the middle-income countries than in the low-income countries.

Table 2 focuses on the different performance of the CFA countries in the sample. As can be seen, the CFA countries experienced much lower (and less volatile) inflation than elsewhere on the continent, reflecting the fixity of the parity of the CFA franc vis-à-vis the French franc. The growth performance was slightly lower than the average for the non-CFA

1/ However, it may be noted that Nigeria has alternated between flexible and fixed exchange rates. South Africa has flexible rates but has maintained a differential rate for the financial rand. Other countries with flexible exchange rate arrangements would include Cape Verde and Guinea-Bissau.

2/ Dhonte and others (1993).

3/ See also Dhonte and others (1993, 1994).

4/ GDP deflators were used in the analysis rather than consumer prices because they provide a better indication of changes in underlying costs, and hence of differential (supply and demand) disturbances across countries.

Table 1. Growth and Inflation in Africa, 1964-93 1/

	<u>Growth</u>		<u>Inflation 2/</u>	
	Mean	Standard Deviation	Mean	Standard Deviation
All Africa	3.49	5.46	20.65	35.04
Africa excluding Zaire and Zambia	3.54	5.42	12.62	11.67
Sub-Saharan Africa <u>3/</u>	3.47	5.52	12.98	12.18
Sub-Saharan Africa excluding South Africa <u>3/</u>	3.48	5.58	13.03	12.34
Low-income countries <u>3/</u>	3.26	5.37	15.08	13.01
Middle-income countries <u>3/</u>	4.31	5.66	7.41	7.25

Source: International Monetary Fund, WEO database.

1/ Growth of real GDP and rate of change of implicit GDP deflator.

2/ Percentage change in the GDP deflator.

3/ Excluding Zaire and Zambia.

Table 2. Growth and Inflation in CFA-Member Countries, 1964-93

	<u>Growth</u>		<u>Inflation 1/</u>	
	Mean	Standard Deviation	Mean	Standard Deviation
Benin	3.08	3.45	4.24	8.34
Burkina Faso	2.36	5.87	4.65	7.43
Cameroon	3.68	6.86	6.27	6.75
Central African Republic	2.04	3.51	8.76	6.45
Chad	3.40	7.38	4.64	7.08
Comoros	3.74	2.86	8.11	6.04
Congo	4.78	6.72	4.73	10.00
Cote d'Ivoire	3.50	3.90	4.96	7.14
Equatorial Guinea	3.55	4.03	10.42	16.46
Gabon	2.83	10.77	5.95	11.60
Mali	2.36	6.00	6.60	7.51
Niger	3.13	8.08	4.66	8.06
Senegal	1.90	4.97	6.10	6.66
Togo	2.48	5.77	5.84	5.46
Average for CFA Countries	3.06	5.73	6.14	8.21
Average for Non-CFA Countries 2/	3.75	5.29	15.38	13.14

Source: International Monetary Fund, WEO database.

1/ Percentage change in the GDP deflator.

2/ Excluding Zaire and Zimbabwe.

countries, although this particular finding (unlike the previous one) is sensitive to the particular sample period.

Table 3 compares the performance of primary commodity exporters (i.e., countries with at least half their export base accounted for by commodity exports) versus countries with a diversified export base. Optimum currency area theory tells us that the desirability of flexible over fixed exchange rates (and hence the undesirability of a monetary union) increases with the degree of specialization in production. As is well known, the majority of African countries are highly specialized in the production and export of a few primary commodities--petroleum, coffee, cocoa, copper, and tea. This would imply--other things being equal--a greater propensity for asymmetric shocks in African countries relative to economies with a more diversified export base. There is some evidence of this among the African countries themselves. If one compares those countries which are classified by the WEO as being specialized in the export of primary commodities versus those with a diversified export base, the volatility of growth and inflation is higher on average in the commodity exporters than among the diversified exporters (Table 3).

Tables 4-7 report correlations of real GDP growth per capita among select groups of Sub-Saharan African countries: 1/ the CFA franc zone; the Economic Community of West African States (ECOWAS, a broader grouping of west African countries); the Southern African Development Coordination Conference (SADCC, a grouping of southern African countries); and the Cross-Border Initiative (CBI, a grouping of largely east African countries). 2/ The most striking feature of these Tables is the lack of coherence of economic growth across countries, illustrated by the large number of observed negative correlations. This is consistent with the highly specialized nature of most Sub-Saharan African economies and the prevalence of unsynchronized terms of trade shocks. 3/

Inflation correlations were also calculated on the same basis as the previous tables dealing with growth. Only the results for the ECOWAS are reported for the sake of brevity as they illustrate the more general patterns that were found (Table 8). Inflation correlations for countries within the CFA franc zone are relatively high, reflecting their fixed

1/ The calculations for per capita GDP correlations use data from the Penn World Tables, Version 5.5 (see Summers and Heston, 1991, for a description), as they were regarded as somewhat more reliable and were therefore used in the econometric analysis undertaken in the next section. The results using correlations based on IMF data were, however, very similar.

2/ The only significant Sub-Saharan African region missing from these groups is that comprising Ethiopia, Somalia, Sudan, and Djibouti, for which the data are largely unavailable.

3/ See Easterly and Levine (1995) on contagion effects affecting growth in African countries.

Table 3. Growth and Inflation in Africa By Type of Exporter, 1964-93

Countries	Growth		Inflation 1/	
	Mean	Standard Deviation	Mean	Standard Deviation
Exporters of primary commodities 2/				
Botswana	10.82	6.47	8.87	6.88
Burundi	3.88	5.81	6.60	7.64
Central African Republic	2.04	3.51	8.76	6.45
Chad	3.40	7.38	4.64	7.08
Comoros	3.74	2.86	8.11	6.04
Cote d'Ivoire	3.50	3.90	4.96	7.14
Djibouti	2.05	5.22	7.19	6.38
Equatorial Guinea	3.55	4.03	10.42	16.46
Gambia, The	5.26	7.03	9.45	9.83
Ghana	2.06	4.96	31.21	25.55
Guinea	3.34	2.36	14.15	13.33
Guinea-Bissau	5.18	7.47	28.96	32.83
Kenya	5.06	3.50	8.34	5.28
Liberia	1.67	5.93	6.42	6.09
Madagascar	1.96	5.73	10.88	7.66
Malawi	4.30	4.69	10.21	7.10
Mali	2.36	6.00	6.60	7.51
Mauritania	3.65	5.80	7.82	4.97
Mauritius	4.36	6.06	9.25	7.74
Niger	3.13	8.08	4.66	8.06
Rwanda	2.94	5.07	7.15	8.96
Sao Tomé and Príncipe	2.32	7.59	11.91	13.43
Somalia	2.79	6.11	34.40	43.88
Sudan	2.75	5.12	30.63	30.43
Togo	2.48	5.77	5.84	5.46
Uganda	2.79	4.05	75.11	33.56
Average	3.56	5.47	11.85	11.97
Diversified export base 3/				
Benin	3.08	3.45	4.24	8.34
Morocco	3.97	4.47	6.20	4.15
Senegal	1.90	4.97	6.10	6.66
Sierra Leone	2.74	4.03	30.98	31.63
South Africa	2.96	2.84	10.85	5.28
Zimbabwe	3.85	5.77	10.57	9.11
Average	3.08	4.25	11.49	10.86

Source: International Monetary Fund, WEO database.

1/ Percentage change in the GDP deflator.

2/ Countries whose exports of agricultural and mineral primary products account for at least half their total exports on average in 1984-86.

3/ Sub-Saharan African Countries that are not classified as (i) exporters of primary commodities (see footnote 1) or (ii) exporters of fuel or (iii) exporters of services and recipients of private transfers (see WEO for further details).

Table 4. Correlations of Growth Across CFA Countries, 1963-89

	Benin	Burkina Faso	Cameroon	CAR	Chad	Côte d'Ivoire	Comoros	Congo	Gabon	Mali	Niger	Senegal	Togo
Benin	1.00												
Burkina Faso	-0.57	1.00											
Cameroon	0.26	0.31	1.00										
CAR	-0.25	0.23	-0.11	1.00									
Chad	-0.17	0.20	-0.09	0.28	1.00								
Côte d'Ivoire	0.02	0.03	0.04	0.20	-0.14	1.00							
Comoros ^{1/}	0.17	-0.15	0.19	-0.09	0.00	0.06	1.00						
Congo	-0.20	0.05	0.11	0.23	-0.17	-0.08	-0.04	1.00					
Gabon	-0.17	-0.01	-0.13	0.21	0.08	0.30	-0.22	0.02	1.00				
Mali	-0.04	0.16	0.17	-0.01	0.07	-0.11	-0.32	0.03	-0.01	1.00			
Niger	0.14	-0.01	0.25	-0.03	0.04	0.11	0.16	0.06	-0.01	0.20	1.00		
Senegal	-0.03	0.14	-0.12	-0.06	-0.20	0.18	-0.26	0.01	0.04	0.34	0.50	1.00	
Togo	0.28	-0.17	0.00	0.52	0.09	0.02	-0.14	0.14	0.14	-0.25	0.15	-0.11	1.00

Notes. Source: Penn World Tables, Version 5.5.

^{1/} The data for Comoros end in 1987.

Table 5. Correlations of Growth Across ECOWAS Countries, 1963-89

	Benin	Burkina Faso	Cape Verde	Côte d'Ivoire	Gambia	Ghana	Guinea	Guinea- Bissau	Liberia	Mali	Mauritania	Niger	Nigeria	Senegal	Sierra Leone	Togo
Benin	1.00															
Burkina Faso	-0.57	1.00														
Cape Verde	0.09	0.23	1.00													
Côte d'Ivoire	0.02	0.03	-0.34	1.00												
Gambia	0.06	-0.23	-0.23	0.27	1.00											
Ghana	0.34	-0.29	0.03	-0.03	0.25	1.00										
Guinea	-0.20	0.25	-0.04	0.02	0.49	0.08	1.00									
Guinea-Bissau	-0.15	0.04	-0.48	0.31	0.09	0.00	-0.21	1.00								
Liberia ^{1/}	-0.02	-0.27	-0.31	0.22	0.40	0.30	0.16	0.17	1.00							
Mali	-0.04	0.16	-0.06	-0.11	0.19	-0.11	0.32	-0.15	-0.17	1.00						
Mauritania	-0.16	0.11	-0.11	0.10	0.05	0.00	0.08	-0.01	0.19	-0.21	1.00					
Niger	0.14	-0.01	0.23	0.11	0.24	0.25	0.20	-0.29	0.34	0.20	0.23	1.00				
Nigeria	0.12	-0.18	-0.24	0.17	0.34	0.31	0.08	-0.06	0.17	-0.05	0.25	0.17	1.00			
Senegal	-0.03	0.14	-0.00	0.18	-0.08	-0.31	0.08	-0.25	-0.10	0.34	0.25	0.50	-0.10	1.00		
Sierra Leone	-0.05	-0.24	-0.33	0.01	-0.17	0.01	-0.18	0.06	0.25	-0.09	0.19	0.06	0.31	0.29	1.00	
Togo	0.28	-0.17	0.29	0.02	0.31	0.31	-0.11	-0.15	-0.09	-0.25	0.33	0.15	0.30	-0.11	0.06	1.00

Source: Penn World Tables, Version 5.5.

^{1/} The Liberian data end in 1986.

Table 6. Correlations of Growth Across SADCC Countries, 1963-88

	Angola	Botswana	Lesotho	Malawi	Mozambique	Namibia	South Africa	Swaziland	Tanzania	Zambia	Zimbabwe
Angola	1.00										
Botswana	0.31	1.00									
Lesotho	-0.17	0.21	1.00								
Malawi	-0.08	0.05	0.22	1.00							
Mozambique	0.51	0.01	0.03	-0.07	1.00						
Namibia	0.07	-0.09	0.21	-0.04	0.45	1.00					
South Africa	0.17	0.23	-0.01	0.01	0.20	0.10	1.00				
Swaziland	-0.15	-0.03	0.04	0.03	0.34	0.32	0.33	1.00			
Tanzania	0.10	0.13	0.10	0.15	0.21	0.46	0.27	0.17	1.00		
Zambia	-0.06	0.11	-0.19	0.22	-0.01	0.03	0.48	0.02	0.23	1.00	
Zimbabwe	0.17	0.20	-0.07	0.12	0.08	0.08	0.12	-0.12	0.06	0.32	1.00

Source: Penn World Tables, Version 5.5.

Table 7. Correlations of Growth Across CBI Countries, 1963-87

	Burundi	Kenya	Malawi	Namibia	Rwanda	Tanzania	Uganda	Zambia	Zimbabwe
Burundi	1.00								
Kenya	0.62	1.00							
Malawi	0.31	0.54	1.00						
Namibia	-0.09	0.09	-0.04	1.00					
Rwanda	0.15	-0.03	0.12	-0.05	1.00				
Tanzania	-0.09	0.23	0.15	0.46	-0.25	1.00			
Uganda	0.13	0.10	-0.27	0.13	0.14	-0.09	1.00		
Zambia	-0.32	-0.11	0.22	0.03	-0.17	0.23	0.12	1.00	
Zimbabwe	-0.06	0.18	0.12	0.08	0.15	0.06	0.19	0.32	1.00

Source: Penn World Tables, Version 5.5.

Table 8. Inflation Correlations Across the ECOWAS Countries ^{1/}

	Benin	Burkina Faso	Cape Verde	Cote d'Ivoire	The Gambia	Ghana	Guinea	Guinea Bissau	Liberia	Mali	Mauritania	Niger	Nigeria	Senegal	Sierra	Togo
Benin	1.00															
Burkina Faso	-0.09	1.00														
Cape Verde	-0.11	0.28	1.00													
Cote d'Ivoire	0.17	0.57	-0.03	1.00												
The Gambia	-0.34	0.01	0.33	-0.14	1.00											
Ghana	0.26	0.35	0.37	0.17	0.19	1.00										
Guinea	-0.07	-0.15	-0.02	-0.27	0.48	0.24	1.00									
Guinea-Bissau	-0.07	-0.20	-0.12	-0.36	0.46	-0.04	0.40	1.00								
Liberia	-0.12	0.26	0.04	0.11	0.07	-0.04	-0.24	0.09	1.00							
Mali	0.24	0.40	-0.01	0.47	-0.26	0.02	-0.48	-0.34	0.14	1.00						
Mauritania	-0.20	0.04	-0.03	-0.12	-0.04	-0.23	-0.26	-0.25	0.13	-0.01	1.00					
Niger	0.08	0.30	0.20	0.31	-0.10	0.26	-0.43	-0.61	0.22	0.34	0.51	1.00				
Nigeria	-0.16	0.07	0.11	-0.08	0.30	0.09	-0.05	0.50	0.31	-0.01	-0.16	-0.03	1.00			
Senegal	-0.39	0.60	0.34	0.55	0.30	0.27	-0.05	-0.11	0.26	0.23	-0.11	0.18	0.03	1.00		
Sierra Leone	-0.13	-0.16	-0.05	-0.37	0.60	0.15	0.79	0.72	-0.01	-0.45	-0.34	-0.55	0.28	-0.07	1.00	
Togo	-0.06	0.71	0.38	0.69	0.22	0.46	-0.16	-0.34	0.14	0.43	0.03	0.51	0.04	0.71	-0.21	1.00

Source: International Monetary Fund, WEO database.

^{1/} Inflation is measured as the percentage change in the GDP deflator.

exchange rate arrangement. For ECOWAS countries not in the CFA franc zone, however, correlations are generally small, and in many cases negative. Thus, as with the growth correlations, the degree of cross-country coherence in inflation performance does not provide a strong argument in favor of currency union for the majority of Sub-Saharan African countries.

The generally low correlations of real growth and inflation could reflect the poor quality of the underlying data. Summers and Heston (1991) provide an assessment of data quality across a wide range of countries. They rate the data of many Sub-Saharan African countries as being unreliable, and such errors in measurement could lower observed correlations. However, this does not appear to be the whole story. Even in cases where the data are considered somewhat more accurate, such as Namibia, South Africa and Zimbabwe, bilateral correlations of real GDP growth remain low. The high correlations of inflation across members of the CFA franc zone are also hard to reconcile with the idea that the results are due exclusively to data mismeasurement.

IV. Estimation and Empirical Results

One limitation of looking at correlations of output growth and inflation across countries is that no distinction is made between the underlying disturbances themselves and the response to these disturbance. To get around this problem, Bayoumi and Eichengreen (1994) used vector autoregression techniques in which output growth and inflation were regressed upon their own lagged values to decompose output and inflation into underlying aggregate demand and supply disturbances and responses across Europe, the Americas, and east Asia. 1/

Ideally, one would use the same techniques to look at underlying disturbances across Sub-Saharan African countries. Unfortunately, when we tried to do this the results from the vector autoregressions did not satisfy the expected "over-identifying restrictions" on price responses used by Bayoumi and Eichengreen (1994) to confirm the validity of their decomposition, a problem which can probably be attributed to the poor nature of the underlying data. 2/ Accordingly, a somewhat simpler estimation strategy focusing on the behavior of real output was adopted. More precisely, the growth of real output per capita (measured as the change in the logarithm of real GDP per capita) was regressed upon its own first and second lags. The residuals from this regression were taken to represent the underlying real output disturbances. Reflecting the inclusion of two lags in the estimation procedure, the correlations were generally calculated over the period 1963-88 or 1963-89. Given the size of the cross-country data

1/ Bayoumi (1994) provides theoretical justification for this approach.

2/ Essentially, these over-identifying restrictions require that prices rise in response to a positive aggregate demand disturbance, but fall in response to a positive aggregate supply disturbance.

set, no attempt was made to identify the source of these disturbances, which could reflect various factors including domestic economic policies, external shocks, political instability, civil unrest, and droughts.

The size of the underlying disturbances were calculated using the standard deviation of the residuals. These were calculated for the four regional groupings discussed earlier, the CFA franc zone, ECOWAS, SADC, and the CBI. The overall results were similar across all of these groupings, with the standard deviations varying from 3 1/2 - 4 percent per annum for countries such as Senegal, Guinea, South Africa, and Zimbabwe, to around 10 percent per annum for countries such as Gabon, Guinea-Bissau, Swaziland, and Uganda. By way of comparison, the same calculations produced values of 2 - 2 1/2 percent for the three largest industrial countries, Germany, Japan, and the United States.

Next, we looked at the correlations of these disturbances. In interpreting the correlation coefficients it is useful to find out which correlations are significantly different from zero. The statistic $\ln[(1+r)/(1-r)]/2$, where r is the sample correlation coefficient, has an asymptotically normal distribution with a variance of $(T-3)$, where T is the number of observations. ^{1/} With 27 observations this implies that positive correlation coefficients of 0.32 or larger are significantly different from zero at the 10 percent level, and of 0.48 or greater are significant at the 1 percent level. Correlations which are significant at the 10 percent level are shaded in the Tables that follow.

Table 9 shows the correlation of underlying disturbances across members of the CFA franc zone. ^{2/} Six out of 66 correlations are significantly different from zero at the 10 percent level and one at the 1 percent level, almost exactly the results which would be expected to occur through chance. Four of the six significant correlations are positive, the other two negative. Of the positive correlations, those between Senegal and both Mali and Niger represent a contiguous land mass, as does the correlation between the Central African Republic and Chad. However, none of these correlations are particularly strong (none are significant at the 1 percent level). All in all, there seems to be little evidence that real disturbances across members of the CFA franc zone show any pattern at all. ^{3/}

The next Table shows the same results for the members of ECOWAS, which represent all of the countries in west Africa between Mauritania in the north and west and Nigeria in the south and east. Of the 120 correlations, 15 are significantly different from zero at the 10 percent level, slightly

^{1/} Kendall and Stuart, 1967, pp. 292-93.

^{2/} The Table only reports correlations of disturbances within Africa. The close economic ties between the CFA franc zone and France are therefore not considered.

^{3/} See Boughton (1991) on other "political economy" reasons for the existence of the CFA franc zone.

Table 9. Correlations of Underlying Disturbances Across the CFA Countries, 1963-89

	Benin	Burkina Faso	Cameroon	CAR	Chad	Côte d'Ivoire	Comoros	Congo	Gabon	Mali	Niger	Senegal	Togo
Benin	1.00												
Burkina Faso	-0.54	1.00											
Cameroon	0.25	0.28	1.00										
CAR	-0.29	0.29	-0.02	1.00									
Chad	-0.13	0.19	-0.01	0.36	1.00								
Côte d'Ivoire	-0.13	0.24	-0.06	0.15	-0.06	1.00							
Comoros ^{1/}	0.19	-0.12	0.16	-0.13	-0.02	-0.14	1.00						
Congo	-0.23	0.07	-0.03	0.21	-0.13	-0.20	-0.06	1.00					
Gabon	-0.27	0.10	-0.08	0.03	0.08	0.05	-0.30	-0.02	1.00				
Mali	-0.04	0.18	0.18	0.09	0.03	0.12	-0.27	0.01	0.09	1.00			
Niger	0.09	0.08	0.23	-0.08	0.08	-0.12	0.15	0.01	-0.15	0.31	1.00		
Senegal	-0.15	0.19	-0.22	-0.15	-0.20	0.18	0.34	-0.15	0.08	0.34	0.45	1.00	
Togo	0.25	-0.12	0.12	0.46	0.21	-0.23	-0.23	0.15	-0.13	-0.22	0.10	-0.25	1.00

Source: Based on data from the Penn World Tables, Version 5.5.

^{1/} The data for Comoros end in 1987.

Table 10. Correlations in Underlying Disturbances Across the ECOWAS Countries, 1963-89

	Benin	Burkina Faso	Cape Verde	Côte d'Ivoire	Gambia	Ghana	Guinea	Guinea- Bissau	Liberia	Mali	Mauritania	Niger	Nigeria	Senegal	Sierra Leone	Togo
Benin	1.00															
Burkina Faso	-0.54	1.00														
Cape Verde	0.07	0.19	1.00													
Côte d'Ivoire	-0.13	0.24	-0.44	1.00												
Gambia	0.02	-0.12	-0.19	0.12	1.00											
Ghana	-0.34	-0.30	-0.01	-0.16	0.26	1.00										
Guinea	-0.17	0.24	-0.02	0.08	-0.50	0.09	1.00									
Guinea-Bissau	-0.18	0.07	-0.54	0.26	-0.07	-0.02	-0.23	1.00								
Liberia ^{1/}	-0.15	0.02	-0.25	-0.01	0.30	-0.41	0.22	-0.04	1.00							
Mali	-0.04	0.18	-0.02	0.12	0.30	-0.14	-0.34	-0.22	0.07	1.00						
Mauritania	-0.20	0.09	-0.07	0.02	0.15	-0.00	0.10	-0.12	0.16	-0.14	1.00					
Niger	0.09	0.08	0.26	-0.12	0.27	0.23	0.22	-0.34	0.12	0.31	0.17	1.00				
Nigeria	0.07	-0.11	-0.15	-0.14	0.16	-0.32	0.05	-0.07	0.16	-0.12	0.17	-0.09	1.00			
Senegal	-0.15	0.19	0.03	0.18	0.05	-0.47	0.19	-0.30	-0.02	-0.34	0.30	-0.45	-0.25	1.00		
Sierra Leone	-0.10	-0.20	-0.25	-0.11	-0.19	0.01	-0.17	0.07	-0.09	-0.07	0.16	-0.04	0.27	0.10	1.00	
Togo	0.25	-0.12	-0.35	-0.23	0.27	-0.37	-0.03	-0.26	-0.23	-0.22	-0.33	0.10	0.24	-0.25	-0.01	1.00

Source: Based on data from the Penn World Tables, Version 5.5.

^{1/} The Liberian data end in 1986.

more than would be expected by chance. Within this total there are twice as many positive correlations as negative ones. These positive correlations also show some geographic pattern. Ghana has significant positive correlations with Togo, Benin, and Nigeria, the three countries to its immediate east, while the correlations among these other three countries are positive, although not significant. Similarly, there are significant positive correlations between Mali and both Senegal and Guinea, and between Guinea and the Gambia, with the remaining correlations between these four countries being positive though not significant (although Guinea-Bissau, which is between Senegal and Guinea does not fit this pattern). Two features of these country groupings are worth noting. The first is that they both include a mixture of countries that use CFA francs (Benin, Togo, Mali, and Senegal) and those which do not. Second, the strength of these correlations should not be overestimated. The correlations found within parts of western Europe, east Asia, and between regions of the United States reported in Bayoumi and Eichengreen (1994) are significantly higher than those across these countries.

Correlations across members of the SADCC, which include the countries in the Southern part of the continent, are reported in Table 11. Five of the 55 correlations are significant, and all are positive. However, they make little geographic sense. Only one of the correlations involves contiguous countries (Angola and Botswana), while some of the others represent countries at a considerable distance from one another, such as Tanzania and Namibia, and South Africa and Zambia. Indeed, the most striking feature of the Table is probably a negative result, namely the lack of significant correlations between the regional economic power, South Africa, and neighboring countries such as Namibia (which was part of the South African customs and currency union for much of the estimation period), Lesotho, and Swaziland, all of which have currencies pegged to the South African Rand as part of the Common Monetary Area. Finally, Table 12 reports results for the largely east African membership of the Cross-Border Initiative. ^{1/} Of the three significant correlations, the only one between contiguous states is that between tiny Burundi and Kenya. At 0.67, this is also the highest correlation between underlying disturbances within any of the Tables.

When assessing the magnitude of the correlations, it is desirable to exclude that part accounted for by the international business cycle, for only deviations from common movements are relevant for assessing the suitability of a group of countries for a currency union. Following Bayoumi and Eichengreen (1994), correlations within the Group of Three (G-3) industrial countries--Germany, Japan, and the United States--were used as the benchmark for the underlying correlation. The correlation coefficients between these three countries varies between 0.34 and 0.57. On this basis,

^{1/} The CBI represents an attempt to improve economic cooperation in the areas of trade, cross-border payments and exchange systems, investment, and institutional development among member countries.

Table 11. Correlations in Underlying Disturbances Across the SADCC Countries, 1963-89

	Angola	Botswana	Lesotho	Malawi	Mozambique	Namibia	South Africa	Swaziland	Tanzania	Zambia	Zimbabwe
Angola	1.00										
Botswana	0.33	1.00									
Lesotho	-0.04	0.18	1.00								
Malawi	-0.11	0.15	0.26	1.00							
Mozambique	0.42	-0.07	0.05	-0.16	1.00						
Namibia	0.10	-0.05	0.11	-0.06	0.33	1.00					
South Africa	0.09	0.21	-0.14	-0.16	0.01	-0.12	1.00				
Swaziland	-0.17	-0.02	0.01	-0.03	0.30	0.24	0.23	1.00			
Tanzania	-0.01	0.10	0.01	0.13	0.09	0.50	0.15	0.09	1.00		
Zambia	-0.19	0.06	-0.25	0.17	-0.12	-0.12	0.37	-0.09	0.18	1.00	
Zimbabwe	0.03	0.17	-0.11	0.08	-0.05	0.11	0.02	-0.17	0.08	0.25	1.00

Source: Based on data from the Penn World Tables, Version 5.5.

Table 12. Correlations of Disturbances Across CBI Countries, 1963-87

	Burundi	Kenya	Malawi	Namibia	Rwanda	Tanzania	Uganda	Zambia	Zimbabwe
Burundi	1.00								
Kenya	0.47	1.00							
Malawi	0.30	0.47	1.00						
Namibia	0.01	0.12	-0.06	1.00					
Rwanda	0.05	-0.08	0.15	-0.10	1.00				
Tanzania	-0.01	0.23	0.13	0.50	-0.30	1.00			
Uganda	0.10	0.09	-0.25	0.03	0.18	-0.08	1.00		
Zambia	-0.24	-0.12	0.17	-0.12	-0.18	0.18	0.19	1.00	
Zimbabwe	0.06	0.17	0.08	0.11	0.10	0.08	0.22	0.25	1.00

Source: Based on data from the Penn World Tables, Version 5.5.

it is clear that the vast majority of the observed correlations among the various country groupings reported in Tables 9-12 are smaller than the benchmark, and are in many cases negative. Clearly, Sub-Saharan African countries generally exhibit less coherent output fluctuations even than the G-3 countries, and it is difficult to make the case therefore that similarity of output shocks would be a driving force leading these countries to form close regional monetary ties or a currency union.

Why might the size of the disturbances across Sub-Saharan African countries be larger and the correlations across countries be lower than those even across the three major industrial countries? One explanation is undoubtedly that these countries are highly specialized in production of a limited number of primary goods. Their economic fortunes, therefore, tend to follow the vagaries of markets for the particular products which they produce, as their possibilities for insuring themselves against these uncertainties are limited. To the extent that neighboring countries produce different goods, there is little reason to expect the underlying disturbances to be closely correlated. Other factors, however, may also be at work. The poor quality of the underlying data, by generating random errors across series, could raise the estimated size of disturbances and lower correlations compared to their true value. ^{1/} Finally, the identified disturbances may reflect the economic impact of domestic factors such as the impact of government policies or civil strife. To the extent that these domestic political conditions differ across countries, this may also tend to reduce the observed correlations below those that might be expected given the underlying structure of the existing economies.

V. Optimum Currency Areas: The Role of Trade

An important consideration in any assessment of the net benefits associated with monetary union relates to the extent of intra-union trade. A high ratio of intra-group trade to total trade implies that the exchange rate is a relatively ineffective means of securing macroeconomic adjustment, so that foregoing its use (as in a monetary union) is relatively less costly. To get some perspective on this issue, trade within the member countries of the European Union accounted for approximately 60 percent of total trade on average in the period since 1970, and has grown markedly as intra-European trade barriers have come down. Trade within the Group of Three countries, by contrast, is relatively small, ranging from about 10 percent for Germany, to 20 percent for the United States and 30 percent for Japan.

A major problem with any assessment of the extent of intra-African trade relates to the coverage of the data. As is well known, for many countries in the sample, frontiers are highly permeable and informal trade

^{1/} Summers and Heston (1991) discuss the quality of the data across different countries.

is of great significance, being equivalent according to some estimates to as much as total recorded trade (see, for example, Faroutan and Prichett (1993)). ^{1/} Nevertheless, even allowing for such effects, the consensus appears to be that intra-African trade accounts for only a small fraction of the total trade of African countries. Moreover, if one focuses more narrowly on selected country groupings within Africa--some of which have been established specifically to enhance trade--intra-group trade has remained relatively low.

Table 13 uses Direction of Trade data to evaluate the extent of intra-African trade. ^{2/} For each country in the sample, the ratio of imports plus exports in intra-African trade to total imports plus exports (the "intra-African trade share") is provided. As can be seen, the simple average of the intra-African trade shares is just under 12 percent, equivalent to about half the average intra-G-3 trade share. The intra-African trade shares range from about 1 percent for Liberia--most of whose trade is with the United States--to about 30 percent for Burkina Faso, Mali, Malawi, and Zimbabwe. (Interestingly, most of the countries with relatively high intra-African trade shares are landlocked). By way of comparison, the average intra-African trade share--at 12 percent--is quite close to the low-end of the intra-G-3 trade share (10 percent), and only about one fifth of the average intra-EU trade share (60 percent).

While evidence of low intra-African trade shares is convincing, it is possible that sub-groupings of African countries exhibit a greater propensity to engage in international trade with other African countries. Table 14 looks at the CFA franc zone and its Western African and Central African components. While intra-CFA trade is relatively high among some of the landlocked countries, on average the intra-CFA trade share is only about 9 percent (excluding the Comoros--which trades hardly at all with the other CFA countries--the average trade share rises to about 10 percent, close to the average for Africa as a whole). ^{3/} Like the rest of Africa, the member countries of the CFA zone trade mostly with industrial countries, and in this case especially with France. ^{4/} A similar picture emerges for the Western and Central African parts of the CFA zone. Moreover, there is little evidence (see the paper by Kitchen (1990)) that trade within the

^{1/} In addition, over much of the sample period, most African countries were under-reporting their trade with South Africa, which was doing likewise with them. On the quality of the data see Yeats (1990).

^{2/} These data include only merchandise trade.

^{3/} Intra-regional trade for members of the CMA other than South Africa are not available through the Direction of Trade Statistics. Other sources, however, indicate that the smaller CMA countries may have significant trade ties with South Africa. Over 80 percent of Lesothos' trade in goods and services is estimated to be with South Africa, while for Botswana, Namibia, and Swaziland the proportion ranges from 50 to 80 percent.

^{4/} The high level of trade with France presumably reflects, in part, the convertibility of CFA francs into French francs.

Table 13. Intra-African Trade as a Percentage of Total Trade

(In percent)

Country	Intra-African Trade Share
Algeria	2.02
Benin	12.81
Burkina Faso	28.19
Burundi	11.43
Cameroon	9.99
Cape Verde	7.66
Central African Republic	13.35
Chad	17.77
Comoros	11.55
Congo	4.27
Cote d'Ivoire	16.80
Djibouti	17.96
Equatorial Guinea	17.58
Ethiopia	4.49
Gabon	5.16
Gambia The	7.32
Ghana	9.22
Guinea	8.66
Guinea-Bissau	8.13
Kenya	11.26
Liberia	1.30
Madagascar	6.12
Malawi	33.31
Mali	34.98
Mauritania	7.81
Mauritius	9.37
Morocco	3.43
Mozambique	12.62
Niger	16.56
Nigeria	2.58
Rwanda	17.50
Sao Tome & Principe	3.02
Senegal	16.83
Seychelles	13.68
Sierra Leone	10.05
Somalia	7.73
South Africa	4.74
Sudan	1.73
Tanzania	7.14
Togo	14.11
Tunisia	3.55
Uganda	15.53
Zaire	8.40
Zambia	14.65
Zimbabwe	31.68
Average	11.65
<u>Memorandum Items:</u>	
Average Intra-EU trade share	58.03
Average Intra-G3 trade share	20.37

Source: International Monetary Fund, Direction of Trade Statistics. Sample is 1970-93 for all countries except for Zimbabwe where the sample is 1981-93.

Table 14. Intra-CFA Zone Trade Shares

(In percent)

	Intra-CFA Trade Share
<u>CFA Countries</u>	
Benin	5.13
Burkina Faso	22.07
Cameroon	6.12
CAR	3.56
Chad	14.56
Comoros	0.01
Congo	1.56
Côte d'Ivoire	7.66
Equatorial Guinea	16.61
Gabon	2.65
Mali	23.32
Niger	6.35
Senegal	9.07
Togo	6.53
Average for CFA countries	8.94
<u>West African CFA Countries</u>	
Benin	4.91
Burkina Faso	21.90
Côte d'Ivoire	6.51
Mali	23.28
Niger	6.22
Senegal	6.01
Togo	5.82
Average for West African CFA countries	10.66
<u>Central African CFA Countries</u>	
Cameroon	4.38
CAR	3.24
Chad	13.39
Congo	0.79
Equatorial Guinea	16.26
Gabon	0.80
Average for Central African CFA countries	6.48

Source: International Monetary Fund, Direction of Trade Statistics. Sample is 1970-93.

Central African monetary union has grown significantly since the early 1960s, in contrast to what may be observed in other trading blocks in Europe and Asia.

Data for the Economic Community of West African States (ECOWAS) also show relatively low intra-ECOWAS trade shares (Table 15). The shares are lowest for Liberia and Nigeria, and highest for some of the landlocked countries in Western Africa, e.g., Burkina Faso and Mali. A similar picture emerges (see Table 15) for the countries in the Cross-Border Initiative (CBI) which was specifically aimed at strengthening economic integration among the participating countries (for a discussion, see Bakoup et al. (1995)). Finally, the intra-group trade share for the seven largest African economies (excluding South Africa) shows that only about 4 percent of total trade of these countries involves flows within the group. This is an extremely low number and, even allowing for the possibility that unrecorded trade is significant, suggests that intra-group trade does not approach levels observed in other trading blocks in different parts of the industrial and developing world.

There are a number of possible factors that may help to account for the extremely low level of intra-African trade. One relates to the noncomplementary production structures of these economies, with exports consisting of raw materials and primary products heavily in demand by the industrial countries, while imports consist mainly of finished investment and consumer goods that are not produced domestically. Relatively poor local and intra-regional transportation and communications networks, that are in any case mainly geared to maintaining links with the industrial countries rather than within the region, may also help to explain the low level of intra-African trade (see Ojo (1987)). Other factors of an economic rather than a structural nature would include specific commercial and pricing policies, as well as nonconvertibility of currencies outside the CFA franc zone.

However, it must be noted that while the level of intra-African trade is undoubtedly lower than in other parts of the world where trade and monetary integration have been seriously pursued, it does not follow that from a normative standpoint, the level of intra-African trade is somehow too low. Clearly, to make such a judgement requires an assessment of the optimal level of intra-African trade, based on the relevant structural and economic characteristics of the countries involved. While the results of any such model are likely to be open to debate, it is possible to make the case (using fairly standard trade models) that in fact the level of intra-African trade is no lower than would be predicted given the structural characteristics of these economies. For example, according to the standard "gravity" trade model estimated by Faroutan and Prichett (1993) to explain regional trade flows, the very low level of intra-African trade is fully accounted for by the low trade potential of these countries, which in turn is a reflection of their very small economic size.

Table 15. Intra-African Trade Shares: Selected Country Groupings

(In percent)

	Trade Share
<u>Intra-ECOWAS Trade Shares</u>	
Benin	9.36
Burkina Faso	23.42
Cape Verde	3.08
Côte d'Ivoire	13.10
Gambia The	6.87
Ghana	10.03
Guinea	7.94
Guinea-Bissau	6.26
Liberia	0.98
Mali	24.37
Mauritania	5.29
Niger	14.45
Nigeria	2.22
Senegal	11.44
Sierra Leone	12.77
Togo	10.35
Average for ECOWAS countries	10.12
<u>Intra-Cross-Border-Initiative (CBI) Trade Shares</u>	
Burundi	8.91
Comoros	8.49
Kenya	8.47
Madagascar	1.45
Malawi	7.97
Mauritius	1.80
Rwanda	15.73
Seychelles	4.21
Tanzania	5.50
Uganda	16.42
Zambia	4.38
Zimbabwe	4.82
Average for CBI countries	7.35
<u>Intra-Big Seven Trade Shares 1/</u>	
Cameroon	2.69
Ghana	8.44
Côte d'Ivoire	7.23
Kenya	0.40
Nigeria	2.03
Zimbabwe	0.63
Senegal	8.61
Average for big-seven countries	4.29

Source: International Monetary Fund, Direction of Trade Statistics.

1/ Seven largest economies in Africa excluding South Africa.

VI. Conclusions

This paper has looked at empirical evidence on the size and correlation of underlying economic disturbances and intra-regional trade across Sub-Saharan African countries to investigate the possibilities for closer regional monetary arrangements in this region in the future. Subject to the caveats discussed previously with respect to the quality of the underlying data, the results indicate that in both dimensions most Sub-Saharan African countries have significantly smaller links than those across the three major industrial countries. As the major industrial countries show no signs of moving towards closer monetary cooperation, it appears highly unlikely that closer cooperation will occur within Sub-Saharan Africa in the near future as it has, for example, over the last two decades in Europe. Indeed, the results here indicate that the main benefit from the existing common currency arrangements of the CFA franc zone may well come from the monetary stability generated by the peg with the French franc rather than the regional integration of members with each other. Similarly, many of the benefits of the Common Monetary Area for Lesotho, Namibia, and Swaziland may well be due to the monetary stability the arrangement provides.

At the same time, the limitations of this exercise should be recognized. We only looked at two criteria for determining the optimum range of a currency area. Other potentially important issues, such as factor mobility, were not discussed. In addition, the results may well reflect poor data on real output and under-reporting of regional trade, or domestic factors which do not reflect the underlying economic structures of the countries involved. On the other hand, the uniform nature of our results across groups of countries in the east, west, and south of the continent lead us to believe that there is little likelihood of a significant move toward monetary cooperation over the next few years.

These results for Sub-Saharan Africa can be compared with earlier ones reported on the correlation of underlying disturbances across western Europe, east Asia, and the Americas by Bayoumi and Eichengreen (1994). They found that a large group of European countries and two rather smaller groups of Asian countries faced relatively similar disturbances. However, there was little evidence of such patterns in the Americas. The results reported here for Sub-Saharan Africa parallel these earlier results for the Americas. In both cases, existing monetary arrangements appear likely to continue for a while.

References

- Bakoup, F., A. Bessaha, and L. Errico, "Regional Integration in Eastern and Southern Africa: The Cross-Border Initiative and Its Fiscal Implications," IMF Working Paper WP/95/23 (Washington: International Monetary Fund, April 1995).
- Bayoumi, Tamim, "A Formal Model of Optimum Currency Areas," IMF Staff Papers, No. 41 (1994), pp. 537-54.
- Bayoumi, Tamim, and Barry Eichengreen, One Money or Many? Analyzing the Prospects for Monetary Unification in Various Parts of the World, Princeton Study in International Finance No. 76 (September 1994).
- Boughton, James M., "The CFA Franc Zone: Currency Union and Monetary Standard," IMF Working Paper WP/91/133 (1991).
- Dhonte, Pierre, J. Clement, M. Matungulu, and D. Rehm, "Economic Trends in Africa," IMF Working Paper WP/93/71 (1993).
- , D. Ballali, G. Terrier, and S. Cosse, "Economic Trends in Africa: The Economic Performance of Sub-Saharan African Countries," IMF Working Paper WP/94/109 (1994).
- Easterly, William, and R. Levine, "Africa's Growth Tragedy: A Retrospective 1960-89" (mimeo, World Bank, June 1995).
- Faroutan, F., and L. Prichett, "Intra-sub-Saharan African Trade: Is There Too Little?" Journal of African Economies, Vol. 2 (May 1993), pp. 74-105.
- Kendal, M., and A. Stuart, The Advanced Theory of Statistics, Vol. 2 (New York: Hafner Publishing Company (1967)).
- Kenen, P.B., "The Theory of Optimum Currency Areas: An Eclectic View," in Monetary Problems of the International Economy, ed. by Mundell and Swoboda (Chicago and London: University of Chicago Press, 1969) pp. 41-60.
- Kitchen, R., "Problems of Regional Integration in Africa," University of Bradford Development and Project Planning Centre, New Series Discussion Paper No. 15 (June 1990).
- Masson, Paul R., and Mark P. Taylor, "Currency Unions: A Survey of the Issues," in Policy Issues in the Operation of Currency Unions, ed. by Paul R. Masson and Mark P. Taylor (Cambridge: Cambridge University Press, 1993).
- McKinnon, R.I., "Optimum Currency Areas," American Economic Review, Vol. 53 (September 1963), pp. 717-24.

- Mundell, Robert, "A Theory of Optimum Currency Areas," American Economic Review (1961), pp. 657-65.
- Ojo, O., "Monetary and Other Financial Obstacles to intra-African Trade," African Development Bank, Economic Research Paper No. 6 (May 1987).
- Robson, P., "New Regionalism and Developing Countries," Journal of Common Market Studies, Vol. 31 (September 1993), pp. 329-48.
- Summers, Robert, and Alan Heston, "The Penn World Tables (Mark 5): An Expanded Set of International Comparisons, 1950-88," Quarterly Journal of Economic, Vol 106 (May 1991), pp. 327-68.
- Tavlas, George, "The Theory of Monetary Integration," Open Economies Review Vol. 5, (1994), pp. 211-30.
- Yeats, Alexander J., "On the Accuracy f Economic Observations: Do Sub-Saharan Trade Statistics Mean Anything?" World Bank Economic Review, Vol. 4 (1990), pp. 135-56.