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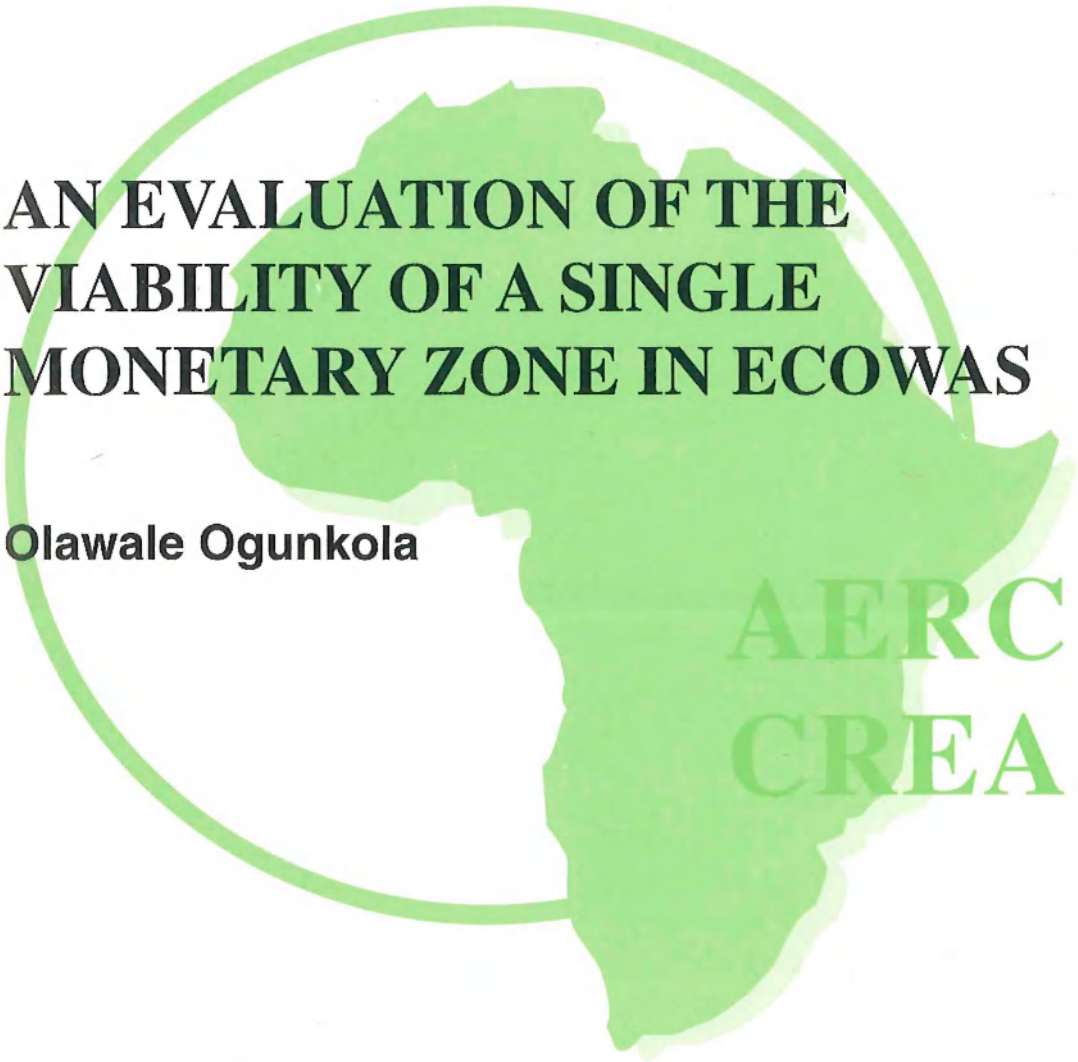

AN EVALUATION OF THE VIABILITY OF A SINGLE MONETARY ZONE IN ECOWAS

Olawale Ogunkola

AFRICAN ECONOMIC RESEARCH CONSORTIUM

CONSORTIUM POUR LA RECHERCHE ECONOMIQUE EN AFRIQUE

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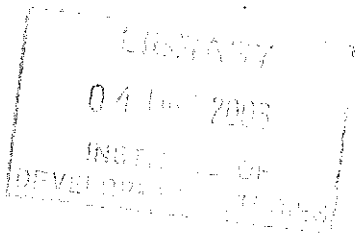

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Abstract

Currency convertibility and monetary integration activities of the Economic Community of West African States (ECOWAS) are directed at addressing the problems of multiple currencies and exchange rate changes that are perceived as stumbling blocks to regional integration. A real exchange rate (RER) variability model shows that ECOWAS is closer to a monetary union now than before. As expected, the implementation of structural adjustment programmes (SAPs) by various governments in the subregion has brought about a reasonable level of convergence. However, wide differences still exist between RER shocks facing CFA zone and non-CFA zone West African countries. Further convergence in economic policy and alternatives to dependence on revenues from taxes on international transactions are required for a stable region-wide monetary union in West Africa.

1. Introduction and the problem

Regional integration, perceived as one means for eradicating mass poverty among the peoples of 16 West African countries, has been the goal of the Economic Community of West African States (ECOWAS). They plan to achieve this goal through regional trade liberalization. To this end, various activities such as preferential treatment of intra-regional trade, transport and communication projects, and monetary integration, among others, are slated for implementation. These activities, spanning a quarter of a century, have recorded limited progress, as intra-regional trade is still very low. Various evaluations of the movement towards regional integration have identified conceptual as well as implementation problems.

The periodic review of the activities of the regional body has culminated in the revision of the original treaty to address some of the problems that have arisen. Indeed, the revised treaty is an indication of the willingness of the regional body to forge ahead with the objective of achieving regional integration. The old provisions on cooperation in monetary and financial matters, that is, chapter four of the original treaty, were limited to the harmonization of economic and fiscal policies, the maintenance of balance of payments equilibrium, and the examination of developments in the economies of member states. The old treaty also proposed the establishment of bilateral and multilateral payments systems, a committee of West African central banks, and a Capital Issue Committee to oversee free flow of capital between member states.

The revised treaty strengthened and deepened the provision for monetary integration in the subregion. Indeed, it gave new impetus to the monetary integration efforts of the regional body and is a bold move towards monetary union. While the provisions in the original treaty can be regarded as mere statements of intention, as they lack definite steps towards implementation, the revised treaty states clearly the stages and steps towards the establishment of an ECOWAS monetary union.

A practical step in the establishment of a monetary union since 1975 was the establishment of the West African Clearing House (WACH), which subsequently became West African Monetary Agency (WAMA). Other efforts in the area of insurance, money and capital markets are clear steps towards monetary integration in the region.

This study contributes to the current efforts to establish a single monetary zone in the region by examining economic pre-conditions for a viable regional monetary union in West Africa. To what extent are these conditions being met by the member states? How can member states achieve the pre-conditions for the various stages of a single monetary zone in the subregion? These are some of the issues explored in this study.

Recently,[1] the Community was in search of consultants to draft the protocol on a single currency monetary zone. The belief seems to be that member states have taken

measures within the context of their national structural adjustment programmes (SAPs) to facilitate the establishment of a single monetary zone in the subregion. Even if this is true, there seems to be a lack of coordination and harmonization among the members' policies. It is indeed necessary to evaluate the individual countries' efforts not in terms of the impact of SAPs, but as they relate to the requirements for the establishment of a single monetary zone in the subregion.

The desirability of monetary integration in West Africa has been expressed not only by ECOWAS in the articles and protocols of the Community, but also by various researchers such as Soyibo (1998), Taylor (1994), and McLenaghan et al. (1982). Some outstanding conceptualization problems that impinge on the establishment of an effective monetary union in the subregion dominate the discussions in the literature. For example, there are divergent views about the timing and sequencing of activities leading to the establishment of a monetary union in the subregion. Taylor (1994) suggests that the transition from multiple currencies to a union currency should be very short so as to avoid possible confusion and the temptation to revert to independent action. McLenaghan et al. (1982) and Soyibo (1998), however, and on the basis of experiences of other regional bodies with monetary union and the fact that reforms do take time to implement, call for a more gradual approach. The balance of opinion is that for an enduring monetary union, a gradual approach is favoured. More importantly, effective monetary integration calls for some reforms, which usually take some time.

Objectives of the study

Various studies on the performance of ECOWAS have pointed to lack of monetary integration as one of the factors responsible for the low intra-regional trade in the subregion (Taylor, 1994; Ogunkola, 1998; Jebuni et al., 1999). Yet, studies on monetary integration in the subregion are scanty. This study focuses on the prospects of a viable monetary union in the subregion and the role of monetary integration in the facilitation and enhancement of payments for intra-regional trade.

Specifically, the main objective of this study is to determine the viability of an ECOWAS monetary union. Other objectives are to review the current levels of development (especially the implementation of reforms) in the economies of West African countries and their suitability for the establishment of a monetary union in the subregion, and to analyse the costs and benefits of monetary union in ECOWAS. The study also offers suggestions on necessary reforms for the establishment of an effective monetary union in the region.

Justification for the study

Payments for international transactions necessarily involve exchange of currencies, hence the different types of risks such as credit/payment risk and exchange rate risk.

The costs and ease with which international transactions are executed depend on the acceptability of the different currencies. Monetary integration becomes important in international economic relations especially in addressing the problems of the multiplicity of currencies and exchange rate regimes that often hinder trade flows between countries. It is obvious that importers will prefer goods and services from a country with less cumbersome payments systems devoid of exchange rate risk. This is more so with the current wave of globalization. While various instruments such as bills of exchange, letters of credit, etc., have been designed and are widely used to minimize both credit and payment risks, monetary integration is most suitable for addressing currency convertibility and exchange rate risk. Indeed, monetary integration, by promoting policy stability, promotes economic growth.

Lack of currency convertibility contributes to the high cost of transactions in the subregion as it costs money (and time and other resources) to exchange one currency for another. This is compounded by the international payments system in ECOWAS, which is unnecessarily cumbersome. Indeed, it has been reported that payments for intra-regional goods and services often pass through convertible currencies. Thus, payment for West African goods and services may pass through the European Union or the United States of America mainly because of the convertibility of their currencies. More importantly, traders pay multiple costs in terms of commissions and charges.

Exchange rate variability constitutes another set of risks to intra-regional trade. Even when currencies are convertible, the exchange rate policies of the countries in the region are neither stable nor predictable. Indeed, exchange rate control and other international payment restrictions implicitly promote unrecorded trans-border trade (UTT), which is rampant in the subregion. An over-valued exchange rate makes it possible for smugglers to earn more in local currency from a given amount of foreign exchange and to earn scarce foreign exchange, which further promotes UTT. Over-valued exchange rates reduce the price and income of domestic producers and hence discourage local production (Taylor, 1994). Put differently, over-valued exchange rates lead to misallocation of resources.

It can be argued that both convertibility and realistic exchange rates derivable from a monetary zone will not significantly affect the level of intra-regional trade, as other factors limit regional flows of goods and services in the region. However, a monetary zone is capable of fostering economic growth and of reducing the need for adjustment. Guaranteed convertibility and predictable exchange rates are indicators of a stable investment climate. The response of both foreign and domestic investors to such developments would definitely stimulate growth. A monetary zone also instils monetary and fiscal discipline in the participating members. On the basis of the experience of the CFA zone in West Africa, Devarajan and de Melo (1986) submit that it is generally agreed that membership of the zone has been beneficial because it has reduced instability, encouraged resource allocation and led to fewer distortionary policies to correct macro imbalances. This study examines the prospects of a monetary zone in the subregion from the basis of the effects of monetary integration on trade and economic development.

Organization of the study

The rest of this study is organized as follows: Section 2 examines some characteristics of the economies in West Africa and describes the current state of activities towards establishing a monetary union in the subregion. Issues in monetary integration such as the stages or types of monetary integration, and the costs and benefits of various forms of monetary integration are the preoccupation of Section 3. Also discussed in the section are the theoretical as well as empirical issues. Section 4 is on the RER model. Monthly and quarterly models were estimated and the results analysed in this section. Section 5 briefly examines the costs and benefits of an ECOWAS monetary union. Section 6 concludes.

2. ECOWAS and a single monetary zone in West Africa

Table 1 presents some of the characteristics of the economies in the region. First, the multiplicity of currencies and the levels of economic activity suggest that harmonization of policies is capable of promoting recorded intra-regional trade flows. There are ten different currencies circulating in the West Africa subregion (see Table 1). The CFA franc, which circulates among the seven Union Economique et Monetaire Ouest Africaine (UEMOA) members in the region, bears a fixed exchange rate with the euro to which it was pegged at the rate of CFAF655.957 per euro. The CFA franc is fully convertible within the French franc zone. The United States dollar is legal tender in Liberia, while other currencies in the region are managed by different exchange rate policies.

Some characteristics of West African economies

Two groups of countries are distinguishable in the region: the CFA zone countries and those outside the CFA zone. These groups differ in many respects; the CFA zone countries are more integrated culturally (French language and culture) and in terms of policy. More importantly, they operate within a monetary union. Evidence suggests superior performance of this group of countries over other West African countries, which has been attributed to the effectiveness of their monetary union (Guillaumont et al., 1988; Medhora, 1990; Devarajan and de Melo, 1986). Currently available data reveal that CFA zone countries recorded an average real GDP growth rate of about 5% between 1994 and 1998, a rate higher than that of the non-CFA zone countries.

The production structure of the economies of ECOWAS provides a rough indicator of product diversification and suggests that the economies of the West African states are not highly diversified. These countries produce similar tropical agricultural products and there are only minor differences in their structures of production (Table 1). The share of agricultural production varied from 13% (Cape Verde) to 46% (Ghana) in 1980, while in 1995, the corresponding range was between 12% (Cape Verde) and 50% (Mali). The share of industrial production in total production remains low, averaging 21% and 19% in 1980 and 1995, respectively. The share of manufacturing production was about 47% (i.e., less than 10% of total production) of the industrial production.

Services exert significant influence in the production structure of these economies. The share of services in total production for the two periods, 1980 and 1995, was 47%.

Table 1: Some characteristics of economies of West Africa

Country Services	Currency US$)	Deficit-GDP ratio US$)		Debt—GDP ratio		Inflation rate		Gross domestic Products (1985 constant prices)			Average growth rates		Exports (million	Imports (million	Degree of openness	Seigniorage (Mg)		(Mstg)	Agriculture	Industry	Services	Agriculture	Industry
		1980	1995	1980	1995	1980	1995	1980	1985	1995	1980-85	1985-95	1985	1985	1985	1981-86	1990-91		1980			1985	
Benin	CFAF	-4.2	-3.2	0.267	0.807	*na*	na	*805*	*1046*	1364	5.99	3.04	*150*	331	0.46	-2.4	2.7	0.27	0.14(0.85	0.059	0.37	0.17(0.60)	0.46
Burkina F.	CFAF	-7.6	-1.9	0.153	0.511	na	6.9	1246	1476	1895	3.69	2.84	71	332	0.27	1	-0.1	0.35	0.27(0.63)	0.38	0.35	0.18(0.59)	0.47
Cape Verde	Escudo	-8	12.9	0	0.389	na	8	76	107	164	8.16	5.33	6	84	0.84	na	na	0.13	0.17(0.31)	0.69	0.12	0.14(0.26)	0.74
Escudo		-8	12.9	0	0.389	na	8	76	107	164	8.16	5.33	6	84	0.84	na	na	0.13	0.17(0.31)	0.69	0.12	0.14(0.26)	0.74
Côte d'Iv.	CFAF	-12.8	-3.7	0.686	1.941	14.18	12.5	6705	6978	7993	0.81	1.45	3198	1749	0.71	1.1	0.4	0.35	0.15(0.56)	0.5	0.31	0.17(0.59)	0.52
Gambia	Dalasi	-10.7	-3.3	0.856	1.053	6.12	6.5	163	218	266	6.75	2.2	43	93	0.62	1.8	1.8	0.31	0.10(0.59)	0.58	0.19	0.11(0.61)	0.71
Ghana	Cedi	-11.7	-6.4	0.33	0.95	33.33	37.5	4602	4504	7094	-0.43	5.75	617	731	0.3	3.3	0.4	0.46	0.21(0.68)	0.33	0.36	0.19(0.60)	0.45
Guinea	Franc	-0.5	-2.8	0.385	0.826	na	na	2654	2529	3850	-0.94	5.22	493	420	0.36	na	na	0.24	0.35(0.14)	0.4	0.23	0.34(0.11)	0.43
Guinea B.	Peso	12.2	-1.4	2.997	3.371	na	31.2	223	247	380	2.15	5.38	12	60	0.29	na	na	0.32	0.11(0.96)	0.57	0.48	0.07(0.64)	0.45
Liberia	Dollar	-14.5	-15.1	0.429	16.076	12.79	na	1147	1055	1126	-1.60	0.67	436	287	0.69	na	na	0.38	0.30(0.22)	0.31	0.4	0.18(0.48)	0.42
Mali	CFAF	-14.3	-3.3	0.352	0.962	na	11.8	1287	1242	1738	-0.70	3.99	124	299	0.34	1.7	-0.6	0.44	0.10(0.47)	0.47	0.5	0.14(0.47)	0.36
Mauritania																							
Ouguy		-13.7	1.1	na	na	na	na	686	683	972	-0.09	4.23	374	234	0.89	1.7	1.1	0.24	0.25(0.30)	0.52	0.24	0.31(0.27)	0.45
Niger	CFAF	-1	-0.7	0.232	0.846	9.35	9.6	1479	1440	1645	-0.53	1.42	259	369	0.44	0.6	-0.7	0.38	0.21(0.31)	0.41	0.46	0.18(0.40)	0.36
Nigeria	Naira	-3.4	3.5	0.289	1.136	10	42.1	84000	80955	119903	-0.73	4.81	12548	8877	0.26	1.1	2.9	0.33	0.38(0.24)	0.29	0.36	0.25(0.28)	0.4
Senegal	CFAF	-8.2	-0.2	0.4	0.769	14.74	2.5	2223	2579	3215	3.2	2.47	562	826	0.54	1	-0.8	0.2	0.17(0.70)	0.64	0.19	0.20(0.71)	0.61
Sierra Leo.	Leone	-12.1	-6.3	0.516	1.249	0	20.6	1035	1199	969	3.17	-1.92	130	151	0.23	6.2	6.2	0.45	0.18(0.27)	0.37	0.53	0.17(0.33)	0.3
Togo	CFAF	-5.7	-6.4	0.831	1.107	11.01	14.1	776	753	831	-0.59	1.04	190	288	0.63	1.9	1.4	0.26	0.24(0.30)	0.5	0.37	0.17(0.33)	0.4
Total	n/a							109107	107011	153405	n/a	n/a	19213	15131	n/a	n/a	n/a						
Average	*n/a*							6819.19	6688.19	9587.81	1.77	3	1200.81	945.69	0.49	n/a	n/a	0.32	0.21(0.47)	0.47	0.34	0.19(0.46)	0.47

Notes: na means not available and n/a means not applicable. Seigniorage is defined as government revenue obtained through the exclusive privilege of printing money expressed as percentage of GDP. Seigniorage of more than 2% of GDP is not desirable as it is a precursor of inflation. Seigniorage of more than 3% for several years indicates large macroeconomic imbalances.

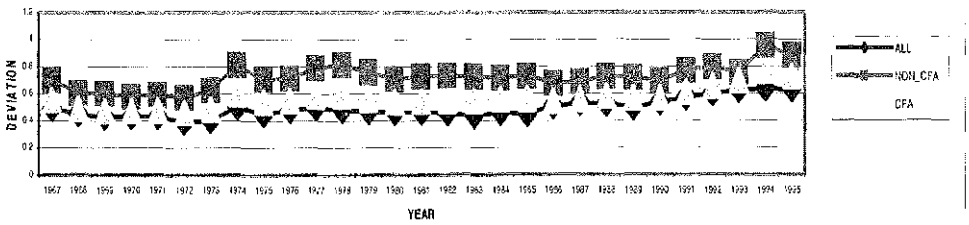
Sources: African Development Bank (1997); World Bank (1994) (for seigniorage); (3) *Tella and Adesoye (1998).*

More importantly, recent trends in the production structure point to the emerging importance of the service sector especially tourism. Major tourist destinations are Ghana, Senegal and Côte d'Ivoire.

The poor performance of CFA zone countries after 1981 was attributed to changes in the world economy, persistent current account deficits and the inability of these economies to adjust. Indeed, the growth performance of the CFA zone West African economies did not improve until after the 1994 devaluation of the CFAF. This slow or negative growth in per capita GDP of the CFA zone countries was attributed to worsening balance of payments, debt crises, declining competitiveness and, more importantly, an apparent failure to adjust to the changes in their environment (Devarajan and de Melo, 1990).

Over the years, the structure of the West African economies has not changed significantly. A few countries in the region dominate: Nigeria, Côte d'Ivoire, Ghana, Senegal and Guinea. These countries accounted for about 90% of the total GDP of the region in 1995 (see Table 1). The growth rates of the economies in West Africa have not shown any significant convergence over the years. Figure 1, based on the concept of F-convergence, reveals non-convergence in both the CFA and non-CFA zones of West Africa. This is not far from a priori expectations, as developments in these economies (both CFA and non-CFA countries) were influenced by different factors. It is noted that some countries in this region depend on raw agricultural output for foreign exchange and some on mineral (especially petroleum products) exports.

Figure 1: STANDARD DEVIATION OF LOG PER CAPITA INCOME OF ECOWAS, 1967 TO 1995



The recorded intra-regional trade of the subregion, though increasing, is still negligible and does not fully reflect the over 25 years of efforts directed at regional integration(Ogunkola, 1998). Given that the estimated potential trade in the subregion is a multiple of the currently observed intra-regional trade, and coupled with considerable unrecorded regional trans-border trade, monetary integration in the subregion has the potential to increase recorded intra-regional trade. The current attraction of the subregion's exports to the developed countries may be due to convertibility of developed countries' currencies as well as to the complementarity of commodities of the region.

The share of intra-ECOWAS trade in total trade has remained below 10% over the years, with great disparity along subregional groupings. Table 1 suggests that most UEMOA members trade more with West African countries than did other ECOWAS members. Indeed, the shares of these members of UEMOA have generally increased. For example, Benin's share increased from 15.01% in 1988 to 33.86% in 1993; Côte

d'Ivoire's from 18.83% in 1988 to 26.88% in 1993, Senegal's from 12.02% to 21.25%, and Togo's from 12.39% to 24.5%. Can this pattern be attributed to the existence of a single currency among these countries? At present, intra-regional traders in the subregion convert local currencies for internationally convertible currencies before changing them to the local currency of the trading partner. In this case, the traders pay commissions at least twice on each transaction.

Benefits derivable from monetary union in the West Africa subregion include the reduction in transaction costs, a stable and predictable macroeconomic environment, and increased intra-regional trade. On the cost side, the loss of the use of monetary policy is not likely to be a major constraint as these countries use this policy sparingly (Taylor, 1994). Of course, the use of the policy varies across the countries in the subregion; hence a detailed analysis is required to ascertain the effect of losing this instrument to the regional body. The ability of government to obtain revenue from its exclusive right of printing money, seigniorage, is also to be given up to the regional body. The last column in Table 1, based on the World Bank (1994) calculations and assumptions, suggests that seigniorage has reduced in most countries. While this is a good omen for the establishment of a monetary union, its distribution among members is an important factor in ensuring a viable monetary union.

The concentration of these economies in the production of tropical agricultural products has implications for the formation of a monetary union in the subregion. When the degree of product diversification is high, changes in the terms of trade and in the national exchange rates will be minimized. As the degree of product diversification of these economies may not be high, the stability of a monetary union in the subregion is likely to be affected.

Finally, the degree of openness of these economies, defined as the share of exports plus imports in GDP, averaged 49% and varied between 23% in Sierra Leone and 84% in Cape Verde in 1995. The more open an economy is, the less effective an arrangement of flexible exchange rates becomes as a control and mechanism for external balance.

ECOWAS efforts in monetary integration

The main focus of the examination in this section is on provisions relating to monetary integration and the activities of the institutions responsible for promoting monetary union in the region. Other complementary efforts are also mentioned.

The revised Treaty expanded and broadened the scope of cooperation in monetary and financial matters to include the establishment of a monetary union. The following main steps are identified:

- Harmonization of monetary, financial and payment policies.
- Introduction of limited convertibility of currencies towards facilitating the liberalization of intra-regional payments transactions.
- Promotion of the role of commercial banks in the intra-community trade financing.
- Introduction of a credit and guarantee fund mechanism to improve the multilateral system of clearing payments transactions between member states.

- Promotion of activities of the West African Monetary Agency towards ensuring convertibility of currencies and creation of a single monetary zone.
- Establishment of a Community Central Bank and a common currency zone.

Apart from a detailed listing of the process of a monetary union, an ECOWAS monetary cooperation programme (EMCP) was established to coordinate the activities leading to the establishment of a single monetary zone in West Africa. Theoriginal timetable for the union put the completion date at 2005. The first ten years (from 1990 to 1999) would witness the establishment of a custom union. Thereafter, the next five years (from 2000 to 2004) would be devoted to the establishment of an economic and monetary union. Thus, the Community was expected to achieve the status of economic and monetary union by 2005.

The EMCP was designed in three phases, with the first phase geared towards clearing arrears in the WACH and introducing new payment instruments such as ECOWAS travellers cheques and bills of exchange. A credit guarantee mechanism was to be established in this phase. Other activities in the first phase are the transformation of WACH into a specialized monetary agency of ECOWAS and the removal of non-tariff barriers (NTBs) to payments, trade and investments.

Similarly, the last two phases were designed to achieve medium- to long-term measures such as exchange rate realignment and harmonization, adoption of an ECOWAS exchange rate system with a central parity and margin of fluctuation, maintenance of fiscal discipline, and adoption of a market-oriented approach to monetary policy.

The examination of these measures reveals that almost all the members of ECOWAS have implemented exchange rate adjustment policies and realized reduction in the gaps between the official and parallel market exchange rates. This rather high level of achievement was due to the implementation of structural adjustment programmes (SAPs) rather than compliance with the agreed implementation schedules of EMCP measures. Other EMCP measures such as a credit ceiling to government by the respective central banks, current and capital account liberalization, and interest rate deregulation are also integral parts of country-specific SAPs that have also witnessed a relatively high level of implementation. It is noted that measures relating exclusively to the regional body's integration scheme have not reached a similar level of implementation, if they have been implemented at all. Measures in this category are removal of NTBs, which has been implemented by only two members, and ratification of the WAMA protocol, which was also done by only two members (or by 12.5% of members).

The West African Monetary Agency was established to promote the use of national currencies in intra-regional trade and to promote savings in the use of member states' foreign exchange reserves. The agency was also meant to promote trade liberalization and monetary cooperation among members. The intensification in the use of national currencies of members, as well as saving foreign exchange reserves of members, was to be achieved through a clearing and settlement mechanism.

The level of transactions passing through the agency has fluctuated over the years. In value terms, the level rose gradually from about 18.28 million WAUA in 1976 to a peak of about 233.64 million WAUA in 1983. By 1984 the level of transactions was half that

of the preceding year; the decline continued, and by 1990 it was about 14 million WAUA. Except for 1994 and 1995, when the transactions rose to about 78.23 million WAUA and 93.73 million WAUA, respectively, the level of transactions passing through the agency remained very low. Indeed, since 1995 it has remained under 5 million WAUA. The fluctuation in the value of transactions passing through WAMA indirectly reflects the exchange rate regimes in the subregion. It can be noted that when transactions through WAMA were high, high foreign exchange restrictions were in place. The liberalized era of foreign exchange is reflected in the low volume of transaction. Is the Agency relevant in a liberalized foreign exchange regime?

The volume of intra-regional transactions passing through WAMA bears an indirect relationship to exchange control measures and fixed exchange rate regimes of the member countries. Hence, the general decline in the volume of intra-regional transactions passing through WAMA is largely a reflection of the liberalization of foreign exchange markets in these countries. The slight recovery in the transactions in 1994 and 1995 was due mainly to the introduction of controls in Nigeria in 1994 and the devaluation of the CFA Franc in 1994, which resulted in the increase in transactions between Nigeria and CFA zone countries (WAMA, 1999).

Even when intra-regional trade is routed through the Agency, settlement of transactions in hard currencies rather than clearing of net balances dominates. The share of the amount that was cleared out of the total transactions passing through the Agency remained very low, between 2.83% and 38.95% during 1976–1998 (see Table 2). Settlement generally required the use of foreign exchange, hence the Agency was not effective in promoting the use of national currencies as well as saving foreign exchange of member states.

The volume of the transactions passing through the Agency is not an indication of the level of intra-regional trade in the subregion. Such trade (exports and imports) has been increasing except for minor fluctuations (see Table 2). It rose from about $0.378 million in 1976 to about $5.3 million in 1997. The share of transactions passing through the Agency was never up to 25%. In fact, apart from 1980, 1983 and 1984 when the share was more than 20%, the share of intra-regional trade passing through the Agency was below 20%. This suggests that the Agency was not attractive to intra-regional traders.

No doubt the performance of the Agency has been below expectation and this has necessitated a review of its operations to make it more relevant for regional integration of the region. The Committee of Governors of member central banks in 1998 set up a committee for this purpose. The committee's findings pointed to known factors such as lack of complementarity in production and low rate of industrialization, just to mention a few. The effect of structural adjustment programmes implemented by members, which has led to the deregulation of the external sector, the devaluation of most currencies and the increase in access to foreign exchange, makes the use of the clearing system very unattractive (WAMA, 1999: 10).

Various efforts to improve the payment system in ECOWAS are under way. First, WAMA is to be revamped to cope with the changing economic environment and to be more effective in achieving its goals.

Table 2: Transactions through West African Monetary Agency, 1976–1998

	Transactions	Clearing	Clearing as % of transaction	Intra-ECOWAS trade	Clearing	Clearing as % of trade
	Million WAUA	Million WAUA	%	000 US $	000 US $	%
1976	18.28	4.30	23.52	884.00	47.60	5.40
1977	45.45	13.40	29.48	1291.00	117.60	9.10
1978	52.40	14.22	27.14	1355.00	135.60	10.00
1979	71.96	17.79	24.72	1494.00	186.00	12.40
1980	141.22	23.79	16.85	1649.00	368.00	22.30
1981	162.42	32.14	19.79	2371.00	384.00	16.20
1982	133.85	19.90	14.87	2311.00	296.00	12.80
1983	205.51	15.68	7.63	1974.00	440.00	22.30
1984	233.46	17.51	7.50	1957.00	480.00	24.50
1985	128.38	16.79	13.08	2064.00	260.00	12.60
1986	89.78	11.97	13.33	1828.00	210.00	11.50
1987	56.69	3.11	5.49	2297.00	146.00	6.40
1988	24.52	9.55	38.95	2307.00	66.00	2.90
1989	20.24	5.44	26.88	2308.00	52.00	2.30
1990	14.04	2.96	21.08	3438.00	38.00	1.10
1991	16.07	2.92	18.17	3255.00	44.00	1.40
1992	16.97	2.83	16.68	3566.00	48.00	1.30
1993	22.92	2.15	9.38	4142.00	64.00	1.50
1994	78.23	2.21	2.83	3940.00	224.00	5.70
1995	93.73	19.11	20.39	3995.00	284.00	7.10
1996	4.51	0.56	12.42	4718.00	12.20	0.30
1997	2.97	0.39	13.13	5305.00	8.20	0.20

Source: WAMA (1999).

Second, there is a proposal on the establishment of a West African inter-bank payment system (WAIPS) by commercial and merchant banks in the region. WAIPS, according to WABA (1999), is to focus on trade, payments and transfers across the subregion. WAIPS is to improve the efficiency in fund transmission at the lowest cost. Apart from settling the net debit position of participating banks in hard currency (which is expected to be very low) through the various central banks, WAIPS will be owned by West African banks, and will not need central banks' financial intervention.

Other complementary efforts include the ECOWAS trade liberalization scheme and the free movement of persons. Recently, a regional development plan aiming at ensuring complementarity between economic policies of the regional body and individual member states is being developed. It is meant to address harmonization of economic policies, trade and investment policies, and infrastructural development, among others. The lack of coordination and harmonization of SAP-induced policies adopted by different members was the main reason for the proposed plan.

3. Issues in monetary integration

There are various phases of monetary integration, ranging from limited currency convertibility to single common currency (monetary union). While a permanently fixed exchange rate is the core of a monetary union, higher forms of monetary integration involve integration of economic policies, a common pool of reserves and a single central bank. The lowest form of economic union is an arrangement of limited currency convertibility, while the highest form of monetary integration is the establishment of a full monetary union.

Types of monetary union

The following types of monetary integration arrangements can be identified from the literature: limited and full currency convertibility; partial monetary union; parallel currency union; single common currency; and full monetary union.

According to this classification, convertibility at market clearing rates is referred to as limited currency convertibility. In this case, all the exchange restrictions with respect to the existing currencies in the subregion are eliminated. Members maintain their currencies, which are convertible at a market clearing rate or fixed exchange rate. The basic aim of the limited currency convertibility is to minimize the disadvantages of multiple currencies that may exist in the region. This is a weak form of monetary union, as members are not obliged to make firm commitment to this policy. Furthermore, there is no common policy towards third countries, so that individual members can still formulate different policies towards third countries. Since this creates unrestricted exchange and use of the member countries' currencies, it is not only a modest attempt at monetary integration of a region, but also a way of promoting intra-regional trade.

Unlike under a limited currency convertibility arrangement where countries can still use exchange rate policy, full convertibility of members' currencies involves irrevocable commitments to a fixed exchange rate. Indeed, a full convertible currency arrangement calls for certain preconditions to be met. Such conditions include approximate external balance and readiness to eliminate all exchange and other restrictions on external transactions without undue pressure on the foreign exchange reserves (McLenaghan et al., 1982).

The partial monetary union approach has been referred to as the European monetary system (EMS) model. This approach involves the harmonization of exchange rates through cooperative intervention in foreign exchange markets to eliminate or minimize exchange

risks in trade and other economic relations. The approach is based on (a) an exchange rate and intervention mechanism, (b) an accounting and settlement mechanism, and (c) a credit mechanism. It also features the establishment of a unit of account. Chipeta and Mkandawire (1994) described it as a loosely integrated monetary zone. This is characterized by (a) a close alignment of the participating members' exchange rates; (b) some harmonization of monetary policy through cooperative intervention in their exchanges; (c) some cooperation in fiscal policy; and (d) retention of substantial national autonomy in most areas of economic and financial policies.

The parallel currency union model is described as a system in which a common union currency is issued to circulate side by side with national currencies to which it has a defined and fixed relationship. For the system to work there must be an irrevocable commitment to a permanently fixed exchange rate and full and less costly convertibility. In this system, national central banks are retained but their existing autonomy in monetary and credit management is reduced in favour of the union monetary authority, which is jointly exercised by the member states. It is a more advanced stage than the limited and full currency convertibility arrangement and the partial monetary union approach.

The single common currency model entails the establishment of a single currency. It also involves a common monetary authority that is responsible for issuing a common currency, holding and managing the external assets of the member countries in a common pool, and managing the monetary and some aspects of the fiscal policies of the member countries. The activities of the common monetary authority are to facilitate monetary stability and the full and unlimited convertibility of their currency against the external reference currency to which it is immutably pegged.

Complete economic and monetary union (EMU) is the ultimate goal of any monetary integration process. An EMU involves a single currency for the area, a complete displacement of all existing autonomous national banks with a regional bank (federal reserve type such as operates in the USA), a common external exchange rate, and common monetary and credit policies. The creation of money for the purpose of deficit financing is severely constrained. Some aspects of fiscal autonomy are also given up.

For a sustainable monetary union, similarities in the economic structure of member states are not only necessary but are also important for a relatively equitable distribution of net benefits from integration. The process of making these economies similar has been termed convergence. Indeed, it is viewed that large differences in economic growth, inflation rates, or budget deficits among members would make monetary integration difficult. It can be argued that a country suffering from rising inflation would be under pressure to devalue. This would make a fixed exchange arrangement difficult for such a country. Similarly, as budget deficits hinder stable exchange rates, which thus become a stumbling block on the path to an irreversible fixed exchange arrangement, there is need to keep budget deficits at minimum levels.

Cobham and Robson (1992) traced similar stages/processes/types of monetary integration. These authors also discussed the costs and benefits of different types of monetary integration. Elements of cost are: the loss of exchange rate as a policy tool, possible initial disinflation, loss of seigniorage and loss of inflation tax revenue from lower inflation. These costs are common to all forms of monetary integration, albeit at

varying degrees. Improved price stability, reduced exchange rate variability, reduced transaction costs, improved price transparency, interest on saving from pooling of foreign exchange reserves, resource savings from centralization of monetary policy and dynamic gains are some of the benefits of full monetary integration. These benefits are partially available to all other forms of monetary integration.

The authors conclude that while the costs appear to be similar for all forms of identified monetary integration, the benefits seem to increase with the stages of monetary integration, with full benefits attainable when a monetary and economic union model is adopted. While this may be true for some groups of countries, the West African subregion needs to be thoroughly examined. Both factors that are quantifiable and those that are not should be included in the analysis. Also, short-term versus long-term cost-benefit analyses should be conducted.

Theoretical issues in monetary union

Since the seminal paper of Mundell (1961), the theory of optimum currency areas (OCAs) has been used in the analysis of monetary union issues. The traditional theory of OCAs stems from the recognition that foreign trade imposes special trading costs (such as transport and monetary trade costs) that are not encountered in domestic trading. The monetary trade costs arise because of the existence of multiple currencies and multiple units of account. In a modern economy, unlike the barter system, multiple currencies raise problems of currency conversion. The theory compares and balances the costs and benefits of forming a monetary union. The net benefit is usually viewed as accruing to the union as a whole rather than to the individual cooperating countries. Indeed, the net benefit is a crucial factor in the formation of a monetary union on economic grounds.

The main benefit of a monetary union is the reduction in transaction costs derivable from the elimination of separate national currencies. The point here is that the cost of exchanging different currencies is a stumbling block to intra-regional trade. These costs are regarded as a net dead-weight loss for the union as a whole. Another benefit is the elimination of the degree of uncertainty associated with exchange rate movements. If a single currency as opposed to multiple national currencies is in circulation in a union, there will be no exchange rate variability, hence the risk premium usually built into real interest rates will be reduced. Other things being equal, the implication is that a project that was hitherto (prior to monetary union) not viable will become viable. Thus, in a sense, a monetary union promotes investments. The promotion of market integration and the strengthening of price stability within the monetary union are other benefits. Intra-regional trade that was suppressed because of the swings in exchange rates and the maintenance of different units of accounts will be promoted in a monetary union setting.

The main cost of a monetary union, on the other hand, is the member country's loss of the ability to manipulate the value of its currency and to conduct an independent monetary policy such as devaluing its currency and adjusting its interest rate as a tool for macroeconomic adjustment. Inasmuch as a nominal exchange rate has real effects, the elimination of national currencies in a monetary union has a cost. Exchange rate as a

policy instrument can affect relative prices such as the real wage and the relative price of traded to non-traded goods.

When economies surrender their national currencies, the management of shocks is left to other policy instruments such as fiscal policy. However, since macroeconomic disturbances affect different economies differently, the analysis of costs of forming a monetary union has been understandably concentrated on asymmetric shocks and alternative adjustment mechanisms. If the costs facing the countries are asymmetric, then the formation of a monetary union among them may not be beneficial as it can lead to deeper recession and more a pronounced business cycle (Bayoumi et al., 1997). There are efforts at distinguishing between supply and demand shocks. The issues in alternative adjustment mechanisms have focused on labour mobility within the union, wages and prices, and fiscal policy, among others.

The traditional theory of OCAs can be appreciated from the perspective of the costs of forming a monetary union. The first criterion is the high degree of factor mobility, especially labour. This is an essential element in the formation of an enduring monetary union(Mundell , 1961). Mundell postulates that if there is a high degree of labour mobility within a region, the cost of forming a monetary union in the region will be minimized. The view is that high mobility of factors of production allows an economy within a monetary union to deal with asymmetric shocks through migration, lessening the need for adjustment through exchange rate changes. Thus, it can be averred that this proposition is based on an alternative adjustment mechanism.

The second criterion, postulated by McKinnon (1963), is based on a similar argument. If there is a high degree of openness among nations prior to the establishment of a monetary union, the formation of such a union is likely to be beneficial as most prices are already being determined in the market. Indeed, the deviations from the law of purchasing power parity of individual countries are a reflection of country risks. Formation of a monetary union among countries with a high degree of openness eliminates the divergences of different national currencies in the union. Since this is likely to have been minimal prior to the formation of the union, the benefits of eliminating transaction costs, relative to the overall costs of monetary union, will ultimately be beneficial to the region.

Kenen (1969) proposes the third criterion, which is the degree of product diversification among the countries intending to form a monetary union. The assumption is that a more diversified economy is less likely to suffer from a country-specific shock and the country's exchange rate is therefore less useful in macroeconomic adjustment. Thus, surrendering (to the union) the exchange rate policy is less painful to such an economy.

Vaubel (1978) provided the linkage between these three criteria and changes in real exchange rate as follows. First, if labour is highly mobile, unemployment in an area within the monetary union will be eliminated through labour migration to other areas in the union. Thus, fewer attempts would be made to change the real wage through exchange rate depreciation. Second, if trade between members of a monetary union is highly diversified, according to Vaubel (1978), the law of large numbers reduces the probability and the size of changes in each country's terms of trade. Hence countries whose external transactions are highly diversified will experience only small real exchange rate changes. Third, the openness criterion concerns macroeconomic efficiency of nominal exchange

rate changes, for the openness of an economy is, if at all, negatively correlated with stock of exchange rate illusion available for real adjustment through nominal exchange rate changes. Observed real exchange rate changes tend to be smaller, the more open the potential member economies are vis-à-vis each other.

From these linkages it can be understood why most studies on the evaluation of viability of a monetary union have concentrated on exchange rate variability. This is also because the three criteria (high labour mobility, trade diversification and degree of openness) are difficult to measure.

Empirical issues in measuring the potential effects of monetary union

The literature on monetary zones is biased towards the experience of the developed countries. Among the few studies relating to developing countries are Devarajan and de Melo (1987, 1990) and Guillaumont et al. (1988). These studies relate to the CFA franc zone. The aim of Devarajan and de Melo (1987, 1990) was to test for differences between the GNP growth rates of CFA zone countries and that of the group of "comparator" countries. The finding of Devarajan and de Melo (1987) that CFA countries grew significantly faster than the "comparator" countries in the 1970s was attributed to the effective functioning of the CFA monetary union. According to them the results cast doubt on the concern that the CFA monetary union was not functioning adequately.

Devarajan and de Melo (1990) were motivated by developments in other SSA countries, especially real exchange rate depreciation. Other concerns included the slow or negative growth in per capita GDP, worsening balance of payments, debt crises, financial crises, declining competitiveness, and apparent failure of CFA franc countries to adjust to the changed environment they inherited from the 1970s. The inability of the CFA zone to adjust to external developments was responsible for the observed unwholesome economic performance of this group of countries. Thus, the benefits of convertible currency and a fixed exchange rate resulted in monetary and fiscal discipline, which in turn was beneficial to CFA members in the 1970s. However, the rigidity of exchange rate policy hurt these countries in the 1980s, as necessary external adjustment was not practicable under the type of monetary zone that was adopted.

Apart from the short-run costs and benefits of monetary zone membership, Devarajan and de Melo (1987) identified the long-run benefits of participation. The benefits derived from currency convertibility include (a) minimum speculative capital flows and exchange rate risk induced capital flight and (b) possible increase in foreign direct investment. Other related studies are Guillaumont et al. (1988) and Chipeta and Mkandawire (1994). These studies evaluated existing monetary unions using either comparative analysis (using groups of "comparators") or trend analysis (of some variables that are germane to effective monetary union). Jenkins and Thomas (1996), however, concentrated on the readiness of Southern African countries for monetary union. They examined some macroeconomic variables for their convergence and concluded that the region was not yet ready for monetary union.

Most of the studies on the measurement of the potential effects of forming a monetary union are based on the experience of the European Union (EU) (Bofinger, 1994; von Hagen and Hammond, 1995; Artis and Zhang, 1997; Bauyomi and Prasad, 1995; Erkel-Rousse and Melitz, 1995; among others). However, instead of estimating the degree of factor mobility, the degree of openness and the degree of diversification within nations intending to form a monetary union, their preoccupations have been on asymmetric shocks and exchange rate variability. Only a few studies concentrated on the measurement of transaction costs that will be eliminated as a result of the formation of a union. The review here, which is in two parts (asymmetric shocks and measurement of transaction costs), will be on the method of analysis used by these scholars. The purpose is to generate a method of analysis for this study.

The concentration of the investigation of monetary union on analysis of asymmetric shocks is informed by the sustainability of the union. The point is that even if other factors (economic and political) are taken into consideration in the formation of a monetary union, the sustainability of the union depends on the response of member countries to external shocks: symmetric or asymmetric. The more the members' response is symmetric, the less the need for policy coordination. Similarly, the wider the range of policy variables tied by international treaty, the smaller the likelihood of compliance (Jenkins and Thomas, 1996). This is more important for the West Africa subregion given the poor level of implementation and compliance with the regional agreements including the ECOWAS treaty. The fact is that the higher the asymmetric shocks the higher the possibility of non-compliance with the protocol on monetary union.

Because of the importance of asymmetric shocks in the analysis of the cost of a monetary union, a great deal of attention has been focused on how to measure such shocks. Vaubel (1978), singled out as the pioneer attempt at measuring symmetry disturbances across members of a potential monetary union, focused on the variance of real exchange rates as a measure of asymmetric shocks. Von Hagen and Neumann (1994) adopted similar approaches. The major issue in this approach has been the determination of a benchmark of the real exchange rate variation. The use of observed real exchange rate (RER) variances within an existing union and the comparison of RER among countries with different economic structures are popular approaches to this problem. Some other studies have examined the correlation of output movements across potential members of a monetary union as a measure of asymmetric shocks.

Empirical methods of analysing the asymmetric shocks for a country intending to join a monetary union include correlation between business cycle and cluster analysis (Artis and Zhang, 1997). Another method of analysing the asymmetric shocks is the structural vector autoregressive (VAR) approach by Erkel-Rousse and Melitz (1995). There have also been studies that compared asymmetric shocks among different countries in two areas especially between the European Union and the United States.

The approach to the measurement of the benefits of monetary union is not as developed as that of its costs. The assumption is that if the costs of monetary union are minimized, the net benefits are likely to be significant. Nevertheless, there are studies that have calculated transaction costs, such as Chipeta and Mkandawire (1994) and Emerson et al. (1992). The savings from transaction costs for Malawi in the context of the Southern

African Development Cooperation (SADC) for the years 1989 to 1991 were calculated as foreign exchange profits by banks in the country on international transactions involving Malawi and other members of SADC. The foreign exchange profit is made up of gross revenue from exchange and commission. As part of the benefits of monetary union, Chipeta and Mkandawire also calculated savings in foreign exchange on intra-union trade as the value of intra-union imports.

4. Real exchange rate model

The method of analysing the costs of a viable monetary union in West Africa follows closely the methodology developed by von Hagen and Neumann (1994) and applied to the European Union (EU). In what follows, the method is generalized and presented as an application to ECOWAS. Von Hagen and Neumann's approach appealed for this study because of the way it handles the benchmark of RER variances. The study used RER variances in Europe as the standard to assess the RER variances among the European currency areas. Apart from taking care of differences in shocks or economic structures, the approach also fits the currency arrangement in West Africa. In general, the approach involves calculating the conditional variances of RER.

Real exchange rate variability as a measure of viability of a monetary union

Assume two groups of countries, A and B, where the group B countries operate a fixed exchange rate. This assumption fits the current monetary arrangement in the ECOWAS subregion where the countries in group B are the seven CFA zone West African countries (Benin, Burkina Faso, Côte d'Ivoire, Mali, Niger, Senegal and Togo). The non-CFA countries (group A) consist of Guinea, Liberia, Sierra Leone, Cape Verde, The Gambia, Ghana, Guinea Bissau, Mauritania and Nigeria. The fulcrum of the real exchange rate (RER) model is the comparative analysis of RER variability between two groups of countries.

RER between a country in group A (non-CFA zone countries) and any country (in either group A or group B) can be expressed as

$$Q_{aib,t} = P_{ai,t} + S_{abi,t} - P_{b,t} \quad (1)$$

where $Q_{aib,t}$ is the logarithm of the real exchange rate between country i in group A and any country in group B at time t. $P_{ai,t}$ is the consumer price index (CPI) of country i in group A, at time t expressed in logarithm. $S_{abi,t}$ is the logarithm of the nominal exchange rate between country i's currency (i belonging to group A countries) and the currency of group B countries at time t. $P_{bi,t}$ is the logarithm of the CPI of country j in group B at time t.

RER between any pair of group B countries (that is, CFA zone countries) is determined in a similar manner. However, since the nominal exchange rate between any pair of countries in the group is fixed, only the CPIs determine the RER. Thus, the RER between any two group B countries is defined as:

$$Q_{bj,bk,t} = P_{bj,t} - P_{bk,t} \quad (2)$$

where $P_{bj,t}$ is the CPI of country j in group B at time t expressed in logarithm. $P_{bk,t}$ is the logarithm of the CPI of country k in group B.

Define the observed changes in RER between two countries in group A or between country i in group A and any other country in group B at time t as $DQ_{aib,t}$. Similarly, define the observed changes in RER between country j in group B and country k in the same group as $DQ_{bjbk,t}$. These changes are regressed on four dummies for the quarterly model and 12 dummies for the monthly model in order to eliminate seasonal effects. Thus for the non-CFA zone countries we estimated:

$$DQ_{aib,t} = \acute{Y} B_m D_m + e_{aib,t} \quad (3)$$

where B_m are the parameters to be estimated and D_m are the quarterly/monthly dummies. $e_{aib,t}$ are the regression residuals, which are interpretable as seasonally adjusted RER changes. For the CFA zone West African countries the estimated equations are:

$$DQ_{bjbk,t} = \acute{Y} B_m D_m + e_{bjbk,t} \quad (4)$$

As in the equations for non-CFA zone West African countries, $e_{bjbk,t}$ is the residual of the regression interpretable as seasonally adjusted RER changes.

In order to eliminate the unexpected components of the seasonally adjusted RER changes, a vector autoregressive model was estimated, i.e., the seasonally adjusted RER change was regressed on its lag. The number of lags depends on when the residuals from the autoregressive are not autocorrelated. The residuals from the autoregressive models are referred to as RER shocks and their variances are the conditional RER variance. Let $m_{aib,t}$ and $m_{bjbk,t}$ be the residual of the autoregressive model for groups of countries A and B, respectively. Their variances are interpretable as the conditional RER variances. If these variances are averaged over the number of countries in group B, then we have:

$$V_{ai} = 1/b \acute{Y} \{\text{variance } (m_{aib,t})\}^{0.5} \quad (5)$$

$$V_{bj} = 1/b \acute{Y} \{\text{variance } (m_{bjbk,t})\}^{0.5} \quad (6)$$

For the real exchange rate variability model, two periods – pre- and post-structural adjustment –were considered. Specifically, 1970 to 1986 was used in the estimation of the pre-SAP period and 1992 to 1997 denotes the post-SAP period. The two periods are necessary to evaluate whether structural adjustment has brought about a change in RER

variability. The consumer price index, at a nominal exchange rate, for all the West African countries will be required at quarterly and monthly levels. However, the required data for the implementation of the RER variability model (i.e., CPIs and nominal exchange rates) were only available on a consistent basis for eight of the 16 West African countries. These are five CFA zone countries (Benin, Côte d'Ivoire, Niger, Senegal and Togo) and three non-CFA zone countries (The Gambia, Ghana and Nigeria). Monthly and quarterly data on CPIs and exchange rates for these countries from January 1970 to December 1997 were obtained from International Monetary Fund (IMF) sources.

Monthly RER model

The implementation of equations 1– 4 yielded seasonally adjusted RER changes for the selected West African countries. The process of eliminating the unexpected components requires an autoregressive model. The daunting task was to determine the number of lags to be included in the model necessary for its residuals to be non-autocorrelated. The Breush–Godfrey–Lagrange multiplier test for serially correlated disturbances was adopted. For most of the regression models nine lags were sufficient to make the residuals non-autocorrelated. These residuals were interpreted as RER shocks. The standard deviations (SDs) of the RER were analysed, beginning with the SDs of RER shocks for the entire West Africa covering the period from January 1970 to December 1997. For the entire West Africa, subperiods of the sample were considered, i.e., 1970–*1986* as pre-*SAP* era and *1992–1997* as post-*SAP*.

Second, the SDs of RER shocks were analysed along the CFA zone and non-CFA zone divide. Again, the analysis was carried out on the entire sample period as well as on the two subsample periods. The first level of analysis throws more light on the developments in RER shocks over time. More importantly, the second level of analysis attempts to gauge the effects of SAP, and to compare SDs of RER shocks in CFA zone countries with those of non-CFA zone countries.

Monthly RER shocks in ECOWAS, 1970 to 1997

The summary statistics of the RER shocks for the eight countries between January 1970 and December 1997 are shown in Appendix Figure A1. Table 3, which summarizes information on RER shocks in ECOWAS, is derived from Appendix Tables A1–A4.

First, the bilateral RER shocks for the entire period ranged between -0.091 and 2.351. Even within the set of countries, the minimum RER shocks in one country can be a multiple of the minimum RER shocks in another country. The maximum RER shocks also vary between 0.100 and 2.365 among countries. The standard deviations of the RER shocks for the entire period ranged between 0.026 and 0.22.

Table 3: Summary statistics of the bilateral monthly RER shocks for ECOWAS, 1970 to 1997

	1970 to 1997	1970 to 1986	1987 to1991	1992 to 1997
Range for min RER shocks	-0.091 to -2.351	-0.091 to -2.351	-0.034 to -0.640	-0.043 to -0.718
Range for max RER shocks	0.100 to 2.365	0.100 to 2.365	0.031 to 0.619	0.036 to 0.679
Range for std deviation	0.0259 to 0.216	0.030 to 0.249	0.016 to 0.170	0.018 to 0.146

The pre-SAP (1970–1986) analysis revealed that the ranges for minimum and maximum RER shocks were the same as for the 1970–1997 period. A slight change in the standard deviations of RER shocks was noted, however. For the pre-SAP era the SDs of RER shocks ranged between 0.03 and 0.25, as against between 0.026 and 0.22 for the entire period.

Between 1987 and 1992, when SAPs were being implemented by these countries, the SDs of RER shocks narrowed to between 0.016 and 0.17. The ranges for both minimum RER shocks also narrowed from -0.091–2.351 in the pre-SAP era to between -0.034 and 0.64 during SAP implementation. A similar trend is visible in the case of maximum values of RER shocks, which narrowed from 0.100–2.365 in the pre-SAP era to 0.031–0.0619 during SAP implementation. The post-SAP analysis reveals further convergence in the SDs of RER shocks; for the period they ranged from 0.081 to 0.146. The ranges for the minimum and the maximum RER shocks also contracted.

Some important observations from this analysis are noteworthy. First, SDs of RER shocks in the pre-SAP period dominated the analysis for the entire period. Second, SDs of the RER shocks in the pre-SAP era were higher than those in the post-SAP. Thus, variability of RER shocks was minimized in the post-SAP period. The observed trend can be attributed to the implementation of liberalized trade, payment and exchange rate regimes.

Monthly RER shocks in ECOWAS: CFA zone versus non-CFA zone countries

For the purpose of the analysis in the subsection, the bilateral RER shocks are partitioned into three: intra-CFA zone RER shocks; intra-non-CFA zone RER shocks; and RER shocks between CFA and non-CFA zone countries.

The SDs of the intra-CFA RER shocks ranged between 0.0267 and 0.0429 for the period from 1970 to 1997 (see Table 4). During the pre-SAP period (1970–1986), the SDs of intra-CFA RER shocks ranged from 0.0311 to 0.0505. In the post-SAP period, SDs of intra-CFA RER shocks ranged between 0.0176 and 0.0463, suggesting a further contraction in the spread of SDs of intra-CFA RER shocks.

Since the CFA-zone countries were in a monetary zone even before the implementation of structural adjustment, the result suggests deepened monetary integration among these economies after the implementation of SAP. Thus, the result confirmed the effectiveness of UEMOA, which was an amalgamation of the West African Economic Community and the West Africa Monetary Union (late 1993).

Table 4: Standard deviations of monthly RER shocks, 1970–1997.

		Côte d'Ivoire	Niger	Senegal	Togo	Gambia	Ghana	Nigeria
Benin	1970–1997	0.0374	0.0429	0.0394	0.0294	0.0764	0.2164	0.1156
	1970–1986	0.0455	0.0505	0.0471	0.0473	0.0783	0.2495	0.1089
	1992–1997	0.0202	0.0463	0.0218	0.0183	0.0895	0.1444	0.1205
Côte d'Ivoire	1970–1997	-	0.0303	0.0267	0.0286	0.0670	0.2097	0.1075
	1970–1986	-	0.0351	0.0311	0.0329	0.0632	0.2418	0.817
	1992–1997	-	0.0195	0.0176	0.0196	0.0879	0.1374	0.1173
Niger	1970–1997		-	0.0309	0.0314	0.0702	0.2121	0.117
	1970–1986		-	0.0355	0.0351	0.0679	0.2416	0.0848
	1992–1997		-	0.1243	0.0183	0.00839	0.0976	0.0403
Senegal	1970–1997			-	0.0286	0.0708	0.2135	0.116
	1970–1986			-	0.0329	0.0640	0.2426	0.0823
	1992–1997			-	0.0345	0.0447	0.0987	0.0349
Togo	1970–1997				-	0.0687	0.2127	0.11
	1970–1986				-	0.0679	0.2449	0.0832
	1992–1997				-	0.0457	0.0958	0.0385
Gambia	1970–1997					-	0.1965	0.0702
	1970–1986					-	0.2247	0.073
	1992–1997					-	0.0893	0.0368
Ghana	1970–1997						-	0.1846
	1970–1986						-	0.2311
	1992–1997						-	0.0901

The global minimum SDs of the RER shocks of intra-CFA zone corresponds to the minimum for the entire ECOWAS, but none of the intra-CFA zone of the SDs of the RER shocks corresponds to the global maximum.

The SDs of the RER shocks of intra-non CFA countries ranged between 0.0913 and 0.197 for the entire period, 1970 to 1997. The pre-SAP (1986–1992) figures showed a wider range, from 0.0857 to 0.227. During SAP, the range of the SDs of the RER shocks of the intra-non-CFA currencies narrows to between 0.105 and 0.146. The range was further reduced to between 0.09 and 0.115. Although the SDs of RER shocks of intra-non-CFA currencies have greatly reduced, they are still far from what obtains in the CFA zone even in the pre-SAP era. While the range of SDs of intra-CFA currencies in 1970–1986 was between 0.0298 and 0.0511, the SDs of intra-non-CFA currencies was between 0.09 and 0.115 for 1992–1997. SAP implementation helped in reducing RER variability in both the CFA and non-CFA currencies, but the SDs of the RER shocks show that monetary union among CFA and non-CFA countries will require further convergence in the RER variability.

How comparable are the variations in the RER shocks in CFA zone countries with those of non-CFA zone countries? Table 5 provides the average real exchange rate shocks over all the countries in the sample, both CFA zone and non-CFA zone. The table reveals that SDs of RER shocks between CFA and non-CFA West African countries are much larger than among the CFA countries. For the entire period, non-CFA countries had SDs ranging between 3.4 and 4.2 times larger than the intra-CFA SDs. For the pre-SAP period

(1970–1986), countries outside the CFA zone had SDs of RER shocks ranging between 3.0 and 3.6 times larger than the intra CFA zone SDs. During the post-SAP period, however, the countries outside the CFA zone had STDs of RER shocks of 1.6–1.8 times those of the intra-CFA zone. No doubt, the conditional RER variability has declined dramatically with the implementation of SAP by West African countries.

Table 5: Average standard deviations of monthly RER shocks, 1970–1997

		Benin	Côte d'Ivoire	Niger	Senegal	Togo	Gambia	Ghana	Nigeria
Average over	1970 - 1997	0.0811	0.0725	0.0756	0.0745	0.0742	0.0855	0.2065	0.1159
ALL countries	1970 - 1986	0.0870	0.0759	0.0786	0.0765	0.0777	0.0912	0.2394	0.1043
	1992 - 1997	0.0558	0.0441	0.0451	0.0467	0.0457	0.0507	0.0967	0.0479
Average over	1970 - 1997	0.0398	0.0308	0.0339	0.0314	0.0320	0.0706	0.2129	0.113
CFA countries	1970 - 1986	0.0474	0.0361	0.0391	0.0367	0.0369	0.0681	0.2440	0.0851
	1992 - 1997	0.0440	0.0325	0.0333	0.0371	0.0349	0.0457	0.0995	0.0416
Average over	1970 - 1997	0.1361	0.1281	0.1313	0.132	0.1305	0.1334	0.1906	0.1274
Non-CFA countries	1970 - 1986	0.1398	0.1289	0.1314	0.1296	0.132	0.1489	0.2279	0.1521
	1992 - 1997	0.072	0.0596	0.609	0.0594	0.06	0.0631	0.09	0.0635

Source: Computed by the author.

Quarterly RER model

The results of the quarterly data model are presented in tables 6 through 8. For comparison purposes a similar pattern of analysis was used. The RER shocks in ECOWAS between 1970 and 1997 are presented in Table 6, which points to narrowing RER variations. The range for minimum RER shocks was between -2.283 and -0.099 for the entire period covered by the analysis. The range for maximum RER shocks was between 0.099 and 2.323 and the standard deviations of the RER shocks were between 0.035 and 0.356. Both the minimum and the maximum values followed the observed pattern in the monthly model. Noteworthy is the shrinking of the range of the SDs from 0.04–0.404 in the pre-SAP era to 0.030–0.1151 in the post-SAP era. Thus, the quarterly model confirms the convergence in SDs of RER shocks noted in the monthly model. On the development of RER shocks over the years, it can be concluded that these shocks have been converging and there is no evidence that further convergence is feasible.

Is there any difference between the RER shocks among the CFA zone West African countries and among other countries in the region? Analysis of the results along CFA zone divides shows that each country in the CFA zone exhibits minimum RER shocks. The shocks among this group of countries are also comparable with each other.

Table 6: Summary statistics of quarterly RER shocks

	Entire period			Pre-SAP			Post-SAP		
	SD	MIN	MAX	SD	MIN	MAX	STD	MIN	MAX
Benin-Côte d'Ivoire	0.042	-0.101	0.127	0.050	-0.109	0.124	0.044	-0.081	0.067
Benin-Niger	0.053	-0.153	0.165	0.061	-0.132	0.155	0.052	-0.102	0.089
Benin-Senegal	0.045	-0.106	0.185	0.054	-0.099	0.168	0.055	-0.118	0.084
Benin-Togo	0.044	-0.116	0.131	0.052	-0.117	0.127	0.051	-0.131	0.065
Benin-Gambia	0.140	-0.929	0.669	0.146	-0.921	0.185	0.077	-0.173	0.099
Benin-Ghana	0.355	-2.266	0.379	0.403	-2.187	0.411	0.145	-0.420	0.266
Benin-Nigeria	0.191	-0.839	0.521	0.137	-0.522	0.151	0.075	-0.164	0.100
Côte d'Ivoire-Benin	0.042	-0.101	0.127	0.050	-0.109	0.124	0.044	-0.081	0.067
Côte d'Ivoire-Niger	0.043	-0.154	0.157	0.048	-0.144	0.140	0.030	-0.055	0.086
Côte d'Ivoire-Senegal	0.035	-0.114	0.166	0.040	-0.121	0.158	0.042	-0.147	0.036
Côte d'Ivoire-Togo	0.037	-0.099	0.099	0.043	-0.106	0.117	0.044	-0.074	0.130
Côte d'Ivoire-Gambia	0.132	-0.877	0.716	0.132	-0.858	0.163	0.071	-0.168	0.139
Côte d'Ivoire-Ghana	0.348	-2.283	0.358	0.397	-2.213	0.381	0.145	-0.463	0.209
Côte d'Ivoire-Nigeria	0.180	-0.785	0.569	0.118	-0.420	0.149	0.064	-0.155	0.121
Niger-Benin	0.053	-0.153	0.165	0.061	-0.132	0.155	0.052	-0.102	0.089
Niger-Côte d'Ivoire	0.043	-0.154	0.157	0.048	-0.144	0.140	0.030	-0.055	0.086
Niger-Senegal	0.040	-0.120	0.150	0.048	-0.124	0.153	0.047	-0.143	0.045
Niger-Togo	0.040	-0.109	0.123	0.042	-0.089	0.112	0.035	-0.067	0.078
Niger-Ghana	0.354	-0.368	2.217	0.398	-0.388	2.145	0.151	-0.210	0.474
Niger-Gambia	0.142	-0.756	0.957	0.137	-0.102	0.917	0.066	-0.111	0.178
Niger-Nigeria	0.191	-0.832	0.610	0.122	-0.479	0.143	0.059	-0.160	0.093
Senegal-Benin	0.045	-0.106	0.185	0.054	-0.099	0.168	0.055	-0.118	0.084
Senegal-Niger	0.040	-0.120	0.150	0.048	-0.124	0.153	0.047	-0.143	0.045
Senegal-Côte d'Ivoire	0.035	-0.114	0.166	0.040	-0.121	0.158	0.042	-0.147	0.036
Senegal-Togo	0.037	-0.099	0.099	0.043	-0.106	0.117	0.044	-0.074	0.130
Senegal-Gambia	0.137	-0.769	0.887	0.132	-0.104	0.868	0.051	-0.115	0.111
Senegal-Ghana	0.356	-0.367	2.271	0.401	-0.388	2.207	0.141	-0.197	0.477
Senegal-Nigeria	0.187	-0.623	0.801	0.123	-0.186	0.486	0.048	-0.090	0.117
Togo-Benin	0.044	-0.116	0.131	0.052	-0.117	0.127	0.051	-0.131	0.065
Togo-Niger	0.040	-0.109	0.123	0.042	-0.089	0.112	0.035	-0.067	0.078
Togo-Senegal	0.037	-0.099	0.099	0.043	-0.106	0.117	0.044	-0.074	0.130
Togo-Côte d'Ivoire	0.037	-0.099	0.099	0.043	-0.106	0.117	0.044	-0.074	0.130
Togo-Gambia	0.137	-0.740	0.901	0.135	-0.102	0.879	0.070	-0.123	0.153
Togo-Ghana	0.356	-0.365	2.323	0.404	-0.390	2.249	0.140	-0.195	0.420
Togo-Nigeria	0.187	-0.592	0.825	0.120	-0.135	0.457	0.058	-0.103	0.139
Gambia-Benin	0.140	-0.929	0.669	0.146	-0.921	0.185	0.077	-0.173	0.099
Gambia-Niger	0.142	-0.756	0.957	0.137	-0.102	0.917	0.066	-0.111	0.178
Gambia-Senegal	0.137	-0.769	0.887	0.132	-0.104	0.868	0.051	-0.115	0.111
Gambia-Togo	0.137	-0.740	0.901	0.135	-0.102	0.879	0.070	-0.123	0.153
Gambia-Côte d'Ivoire	0.132	-0.877	0.716	0.132	-0.858	0.163	0.071	-0.168	0.139
Gambia-Ghana	0.328	-2.267	0.316	0.376	-2.212	0.357	0.142	-0.455	0.165
Gambia-Nigeria	0.168	-0.782	0.678	0.137	-0.533	0.700	0.059	-0.185	0.107

continued next page

Table 6: continued

	Entire period			Pre-SAP			Post-SAP		
	SD	MIN	MAX	SD	MIN	MAX	SD	MIN	MAX
Ghana-Benin	0.355	-2.266	0.379	0.403	-2.187	0.411	0.145	-0.420	0.266
Ghana-Niger	0.354	-0.368	2.217	0.398	-0.388	2.145	0.151	-0.210	0.474
Ghana-Senegal	0.356	-0.367	2.271	0.401	-0.388	2.207	0.141	-0.197	0.477
Ghana-Togo	0.356	-0.365	2.323	0.404	-0.390	2.249	0.140	-0.195	0.420
Ghana-Côte d'Ivoire	0.348	-2.283	0.358	0.397	-2.213	0.381	0.145	-0.463	0.209
Ghana-Gambia	0.328	-2.267	0.316	0.376	-2.212	0.357	0.142	-0.455	0.165
Ghana-Nigeria	0.311	-0.747	2.306	0.385	-0.817	2.256	0.134	-0.202	0.455
Nigeria-Benin	0.191	-0.839	0.521	0.137	-0.522	0.151	0.075	-0.164	0.100
Nigeria-Côte d'Ivoire	0.180	-0.785	0.569	0.118	-0.420	0.149	0.064	-0.155	0.121
Nigeria-Senegal	0.187	-0.623	0.801	0.123	-0.186	0.486	0.048	-0.090	0.117
Nigeria-Togo	0.187	-0.592	0.825	0.120	-0.135	0.457	0.058	-0.103	0.139
Nigeria-Niger	0.191	-0.832	0.610	0.122	-0.479	0.143	0.059	-0.160	0.093
Nigeria-Gambia	0.168	-0.782	0.678	0.137	-0.533	0.700	0.059	-0.185	0.107
Nigeria-Ghana	0.311	-0.747	2.306	0.385	-0.817	2.256	0.134	-0.202	0.455

For example, in the pre-SAP era, the average (over all countries in the sample (CFA and non-CFA West African countries) SDs of RER shocks was between 0.118 and 0.129. Similar trends were observed for other categorization of countries in the sample (see Table 7).

Pre-SAP and post-SAP analyses revealed that average SDs of RER shocks declined slightly in almost all the selected CFA zone countries. The observed impact of SAPs on the SDs of RER shocks in these countries can be attributed to the restraints on monetary, exchange rate and other policies even prior to the introduction of SAPs in this group of countries. Apart from Senegal, which recorded a slight increase in the SDs of RER shocks, all other CFA zone countries in the sample recorded a decrease in the SDs of RER shocks.

Historically, SDs of RER shocks of non-CFA zone West African countries were high. The average SDs of RER shocks for this group of countries (over all the selected countries for the entire period) was between 0.169 and 0.344. Pre-SAP and post-SAP analyses revealed a significant convergence. In all cases the post-SAP era SD of RER shocks was less than half of its pre-SAP figure.

The historical development in SDs of RER shocks across the CFA and non-CFA zone West African countries and between monthly and quarterly models is clearly brought out in Table 8, which shows that both quarterly and monthly models capture the development in the RER shocks in the subregion. The last column of the table shows that the changes in non-CFA countries in the region were higher than those in the CFA zone. Notwithstanding these substantial changes, the SDs of RER shocks in the non-CFA were still higher than their counterparts in the CFA zone.

Table 7: Standard deviations of quarterly RER shocks, 1970–1997

CFA zone countries				Non-CFA zone countries			
	1970-97	1970-86	1992-97		1970-97	1970-86	1992-97
	Entire period	Pre-SAP	Post-SAP		Entire period	Pre-SAP	Post-SAP
Benin				*Gambia*			
All	0.124	0.129	0.071	All	0.169	0.171	0.077
CFA	0.046	0.054	0.051	CFA	0.139	0.138	0.066
Non-CFA	0.229	0.229	0.099	Non-CFA	0.209	0.215	0.091
Côte d'Ivoire				*Ghana*			
All	0.117	0.118	0.063	All	0.344	0.395	0.143
CFA	0.039	0.045	0.040	CFA	0.355	0.402	0.144
Non-CFA	0.220	0.216	0.093	Non-CFA	0.329	0.386	0.141
Niger				*Nigeria*			
All	0.123	0.122	0.063	All	0.202	0.163	0.071
CFA	0.044	0.050	0.041	CFA	0.186	0.125	0.061
Non-CFA	0.229	0.219	0.092	Non-CFA	0.223	0.215	0.084
Senegal							
All	0.120	0.120	0.061				
CFA	0.039	0.046	0.047				
Non-CFA	0.227	0.219	0.080				
Togo							
All	0.120	0.120	0.063				
CFA	0.040	0.045	0.043				
Non-CFA	0.226	0.220	0.089				

Thus, a monetary union among the CFA and non-CFA countries in West Africa today has better prospects than it did earlier. However, since the non-CFA zone countries have SDs higher than SDs those within the CFA zone, there is still need for further convergence before any monetary zone among the CFA zone countries and their non-CFA counterparts can be sustainable. It should be noted that the monetary arrangement in the CFA zone is far from ideal, thus a further improvement is still expected from the benchmark RER shocks. Perhaps a comparison of the RER shocks in the EU will throw more light.

Table 8: Monthly and quarterly STDs of RER shocks

	Pre-SAP	Post-SAP	% change
Quarterly model			
CFA West African countries			
Benin	0.054	0.051	5.56
Côte d'Ivoire	0.045	0.040	11.11
Niger	0.050	0.041	18.00
Senegal	0.046	0.047	-2.17
Togo	0.045	0.043	4.44
Non-CFA West African countries			
Gambia	0.138	0.066	52.17
Ghana	0.402	0.144	64.18
Nigeria	0.125	0.061	51.20
Monthly model			
CFA West African countries			
Benin	0.047	0.044	6.38
Côte d'Ivoire	0.036	0.032	11.11
Niger	0.039	0.033	15.38
Senegal	0.037	0.037	0.00
Togo	0.037	0.035	5.41
Non-CFA West African countries			
Gambia	0.068	0.046	32.35
Ghana	0.244	0.100	59.02
Nigeria	0.085	0.042	50.59

Test for constant variances

A test for constant variances was performed on the estimates. Again two levels of analysis were involved: the monthly and the quarterly models. White's test for heteroscedasticity was performed on each of the 28 equations per model. The averages of significant levels over the CFA zone countries were computed and presented in tables 9 and 10.

As seen in Table 9, the variances of monthly bilateral RER shocks average over all countries for the entire period, 1970–1997, were significantly different from zero at less than 5% for the CFA zone countries and Nigeria. For the other non-CFA zone countries, The Gambia was marginally significant at 10.8% and there is evidence of strong homoscedasticity in the case of Ghana. This pattern was also observed in the subperiod,

1970–1986, when for most CFA zone countries and Nigeria the test statistics were significant at 10%. An exception to the group of CFA zone countries is Niger, where it was only significant at about 10.5%. Gambia was significant at about 13%, while Ghana's case still depicts the presence of strong homoscedasticity. Still, on average over all countries, the post-SAP 1992–1997 period revealed that the estimates of variances are constant for all the countries in the sample, CFA and non-CFA zone countries alike, at below 10% level of significance. An exception is Senegal, which is a borderline case as it was only significant at 10.3%.

In the case of the average over CFA zone countries, the averages of the tests for constant variances follow a similar pattern to those of the averages over all the countries in the sample. In summary, all the estimates for all the CFA zone countries and Nigeria were statistically different from zero at less than 10%; in most cases they were significant at less than 5% for the entire period, 1970–1997. Turning to subperiods, the pre-SAP estimates present a mix result. Only the results for Benin, Niger and Senegal in the CFA zone countries and Nigeria in the non-CFA zone countries were statistically significant at 10%. Côte d'Ivoire and Togo results show evidence of homoscedasticity. Both The Gambia's and Ghana's results show evidence of strong homoscedasticity. More mixed results were obtained in the case of the last subsample period, the post-SAP. In the CFA zone group of countries, only the results for Côte d'Ivoire and Niger were significant at the 10% level. The results for other non-CFA zone countries were only significant at below 15%. The results for all the non-CFA countries were, however, statistically significant at less that 10%.

The averages over non-CFA zone countries for the entire period, 1970 to 1997, reflected the presence of homoscedasticity with respect to all the CFA zone countries and Ghana. However, the subperiods (pre- and post-SAP) revealed constant variances for all the countries except Ghana in the pre-SAP period and The Gambia in the post-SAP period. Both Senegal and Nigeria were at borderline as they were significant at about 10.3 and 10.7% level of significant in the post-SAP period. The result points to the appropriateness of periodization in the analysis of the test for constant variances.

Table 9: Test for constant monthly variances, 1970–1997

		Benin	Côte d'Ivoire	Niger	Senegal	Togo	Gambia	Ghana	Nigeria
Average over	1970–1997	0.001671	0.009405	0.000843	0.004872	0.047609	0.108451	0.999988	0.001890
ALL countries	1970–1986	0.028806	0.054127	0.010529	0.039384	0.071524	0.130847	0.999992	0.000018
	1992–1997	0.092059	0.072092	0.075831	0.103403	0.090657	0.091786	0.058414	0.086402
Average over	1970–1997	0.000018	0.000510	0.000011	0.000391	0.008941	0.361719	0.999989	0.050426
CFA countries	1970–1986	0.065473	0.192978	0.011457	0.023454	0.313849	0.958658	0.999999	0.000008
	1992–1997	0.123201	0.071929	0.078443	0.141210	0.115342	0.078294	0.054601	0.077362
Average over	1970–1997	0.677815	0.457651	0.264289	0.140809	0.442711	0.002449	0.999979	0.005371
non-CFA countries	1970–1986	0.009639	0.009938	0.009406	0.078607	0.009956	0.001000	0.999972	0.000100
	1992–1997	0.062421	0.072092	0.076103	0.103403	0.066277	0.173328	0.068808	0.107420

Source: Computed by the author.

Table 10 presents the summary of the test for constant variances at quarterly data level. A major observation is that the tests that variances are constant at quarterly level is generally true at least when compared with the monthly data. Indeed most of the tests are significant at less than 10%. A few exceptions are noted such as the case of Nigeria in the pre-SAP period and Benin, Senegal, Togo and Nigeria in the post-SAP period. Surprisingly, unlike in the case of monthly data, tests on Ghana's estimates are highly significant.

Table 10: Test for constant quarterly variances, 1970–1997

		Benin	Côte d'Ivoire	Niger	Senegal	Togo	Gambia	Ghana	Nigeria
Average over	1970–1997	0.031972	0.000968	0.000398	0.002818	0.005828	0.008990	0.006212	0.000188
ALL countries	1970–1986	0.019494	0.012369	0.000128	0.003800	0.069810	0.000094	0.007753	0.639462
	1992–1997	0.094091	0.063250	0.052125	0.114549	0.086199	0.010340	0.041363	0.063515
Average over	1970–1997	0.031972	0.000968	0.000398	0.002818	0.016306	0.000000	0.000000	0.000045
CFA countries	1970–1986	0.019494	0.008022	0.000128	0.003800	0.069810	0.000000	0.000000	0.000000
	1992–1997	0.179593	0.054422	0.067972	0.116764	0.152546	0.007156	0.077666	0.115245
Average over	1970–1997	0.000000	0.000000	0.000000	0.000000	0.000266	0.008990	0.006212	0.000385
non-CFA countries	1970–1986	0.000000	0.023680	0.000000	0.000000	0.000000	0.000094	0.007753	0.639462
	1992–1997	0.039740	0.101394	0.032158	0.044319	0.062181	0.025364	0.041363	0.031957

Source: Computed by the author.

The analysis of the test for the constant variances shows that the CFA zone, in general, was characterized by relatively constant variances. The result also shows that the variances tend to be more constant over the entire period, 1970–1997, compared with the results for the subperiods. Another noticeable pattern is that the variances of the CFA zone countries tended to be more constant in the pre-SAP period compared with post-SAP. In the case of non-CFA zone countries the pattern is reversed; constant variances were recorded in the post-SAP period, suggesting that the implementation of SAP brought about stability in real exchange rate shocks in this group of countries.

Since the test for constant variances encompasses tests for independence of regressors and mis-specification test, our observation of constant variances also touches on exchange rate management, and macroeconomic policy management in general and inflation policy in particular. These factors no doubt have contributed to the observed significant differences between the CFA zone countries and their non-CFA zone counterparts. These factors might also be responsible for changes in the constancy of the variances of RER shocks in the CFA and non-CFA zones over the pre- and post-SAP periods.

5. Costs and benefits of a single monetary zone in West Africa

While the preceding analysis pointed to a more viable monetary union among ECOWAS now than before, the rest of the analysis focuses on potential benefits and costs of such a union. Three indicators of costs and benefits are examined. The first indicator, on the benefit side, is reduced exchange rate risk, which has potential for increasing intra-regional trade and investment. The others are on the negative side: loss of tax revenue on the intra-regional trade and loss of seigniorage.

The concept of compensable trade or payment is used in the measurement of the potential benefits from the reduced exchange rate risk. The method involves comparison of total intra-regional trade that did not require the use of foreign exchange with total value of intra-regional trade. The method involves comparison of levels of intra-regional trade that are settled using the facilities of WAMA. For the purpose of calculating the potential effects of reduced exchange rate risk, total transactions that passed through the West African Monetary Agency are distinguished from those that were actually settled using the net balances of trading countries as opposed to those settled in foreign currencies.

Table 2 showed that a very small proportion of the value of intra-regional trade that passed through the WAMA was cleared. A substantial number of transactions involved the use of foreign exchange. More importantly, only a small fraction of intra-ECOWAS trade was channelled through the Agency. An effective monetary arrangement has the potential of saving the foreign exchange currently being used in the intra-regional transactions. The table also revealed that since 1985, settlement in foreign exchange has dominated rather than clearing of net balances, which was at its peak in 1984. Even in the pre-1985 era, clearing of net balances accounted for, at best, about 25% of transactions that passed through the Agency. The table also shows that the ratio of intra-regional trade to total trade cleared through the agency has declined since 1985, and by 1996 the ratio was less than 1%. The effect of exchange rate regimes was captured by this trend. The clearing house was established during highly restrictive exchange rate regimes. By the late 1980s, however, most of the economies in the region had embraced trade, exchange and payment liberalization. The implication is that an effective monetary union will be beneficial in terms of conserving foreign exchange, since an insignificant proportion of the current intra-regional trade was cleared through net balances of accounts.

It should be noted that not all the proportion of intra-regional trade that is settled through foreign exchange could be attributed to the exchange rate risk, as other factors came into play in denominating intra-regional trade in third-country currencies. It is assumed that exchange rate risk is an important factor in the valuation of the intra-regional trade. More importantly, implementation of regional programmes, especially in the area of infrastructure such as transportation and telecommunication, will go a long way in complementing a regional monetary arrangement.

The loss of the use of monetary and exchange rate policies was estimated by calculating seigniorage. Our approach follows that of the World Bank (1994), where seigniorage is determined as:

$$(M1_t - M1_{t-1})/GDP_t - g_t(M1/GDP)_t \quad (7)$$

where M1[19] is the stock of money at the end of period t, GDP_t is gross domestic product at time t and g_t is the real GDP growth. This implies that seigniorage measures the inflationary impact of money creation. Equation 8 was estimated for eight West African countries[20] (four each from CFA and non-CFA zones).

Table 11 shows that seigniorage has been declining. Apart from confirming World Bank (1994), it is noted that there is a clear distinction between seigniorage in the CFA zone countries and that in their counterpart in the non-CFA zone. CFA zone countries are less dependent on seigniorage as a policy tool. More importantly, the level of seigniorage in these countries has continued to decrease. As shown in the table, all CFA zone countries achieved significant reduction in the level of seigniorage. Only The Gambia in the set of non-CFA zone countries achieved a comparable reduction in dependence on this policy handle. The use of inflation tax increased in Nigeria and slightly in Sierra Leone. It decreased only slightly in Ghana. The table also suggests that the non-CFA countries are yet to achieve the level of seigniorage achieved by the CFA zone countries in the pre-SAP era.

Still on the cost side, the loss of tax revenue was calculated as the percentage share of taxes on international trade in government revenue. This shows the importance of this source of revenue to the government and hence what will be lost to the regional body when monetary union is established.

Table 11: Seigniorage* in West Africa, percentage of GDP

	1970–1985: Pre-SAP	1986–1994: Post-SAP
Non-CFA zone countries		
Gambia	2.63	1.41
Ghana	4.35	3.26
Nigeria	2.19	4.22
Sierra Leone	3.67	3.97
CFA zone countries		
Côte d'Ivoire	2.52	0.33
Niger	1.44	0.11
Senegal	2.30	0.39
Togo	2.67	-0.23

* See footnote 5.
Source: Author's calculation.

Table 12 shows that the ratio of revenue from taxes on international trade to total government revenue is high for most of the selected countries, at between 12 and 44%. Nigeria and Mali recorded the lowest share of this type of revenue. Nigeria's low rate is largely due to its heavy dependence on oil revenue. Mali's low rate is attributable to its landlocked nature. Unlike the case of SDs of RER shocks and seigniorage, where there are marked differences between CFA and non-CFA zones countries, revenue from taxes on international trade is a significant factor that cuts across the CFA zone divides.

Table 12: Share of revenues from taxes on international trade in government revenues for selected West African countries (%)

	1972	1987	1989	1990
CFA zone countries				
Mali	..	28.1	12.0	12.0
Burkina Faso	51.8	38.9	39.4	..
Togo	..	32.3	32.3	45.2
Non-CFA zone countries				
Sierra Leone	42.4	24.7	44.6	44.6
Nigeria	17.5	6.6	16.4	..
Ghana	40.6	42.5	35.2	35.2
Liberia	31.6	26.9	34.6	34.6

Source: Author's calculation.

The dependence of West African countries on this type of tax for government revenue is an indication of poor tax management systems. Taxes on international trade are easier to administer than other types of taxes, but heavy dependence on trade taxes has its costs. It creates informal trade and distorts natural comparative advantages among other effects. Thus, reliance on taxes on international trade accounts for the high level of unrecorded trans-border trade in the region. Perhaps it is time for these countries to look to other type of taxes.

6. Summary and policy recommendations

This paper evaluated the viability of a single monetary zone in the Economic Community of West African States (ECOWAS) within the context of the theory of optimum currency area (OCA). An attempt was made to summarize all the postulates of OCA under real exchange rate (RER) shocks. Very low RER shocks that are comparable to those of other countries are essential for a stable monetary union. The RER shocks for CFA zone West African countries were used as the benchmark. Thus, an RER model was developed and applied to both monthly and quarterly data of some West African countries. The paper also examined the cost and benefits of a single monetary zone to the region.

Summary

Both the monthly and the quarterly data showed that the SDs of RER shocks of countries in West Africa have been declining over time. The model also suggested that the implementation of structural adjustment programmes has had a positive impact on the development of the RER shocks in the region. The wide differences in the pre- and post-SAP results are some of the indicators of this observed pattern.

There are still wide differences between the SDs of RER shocks of CFA zone West African countries and their non-CFA zone counterparts. The analysis revealed that historically CFA zone West African countries have been characterized by low SDs of RER shocks and that there are no wide variations among these countries on this ground. The opposite holds in the case of non-CFA zone countries. They are, historically, characterized by high SDs of RER shocks and they are not homogeneous on this count (i.e., there are wide variations among countries in this group).

It was noted that the changes in the SDs of RER shocks in CFA zone countries were relatively small compared with the corresponding changes in the SDs of RER shocks in the non-CFA zone countries. Thus the non-CFA zone countries achieved a relatively higher reduction in the SDs of RER shocks in the post-SAP era compared with the development in the CFA zone countries. Notwithstanding this substantial reduction in the SDs of RER shocks by the non-CFA zone countries in West Africa, the SDs of RER shocks of these countries are still higher than those of the CFA countries in the post-SAP era.

The wide variations in the SDs of RER shocks of non-CFA zone countries in the region ruled out the possibility of a viable two-speed monetary union unless drastic

policy reforms and strong political commitments are in place. In the absence of these prerequisites, piecemeal ascension to the existing region may be an economically viable option. If this is politically feasible then the analysis in this paper showed that only The Gambia out of the selected non-CFA zone West African countries is close to the development of the CFA zone countries. Thus only The Gambia is ready to join the CFA zone without much further reform and without exhibiting significant instability to the zone. Notwithstanding this conclusion, West African countries are closer to forming a single monetary union now than before.

On the costs and benefits of a monetary union to the region, the analysis showed that there are significant potential benefits. Significant savings on foreign exchange will likely be realized as a result of reduced exchange rate risk. Increased intra-regional trade and investments are other potential benefits.The benefits come at the cost of loss of seigniorage, however, as well as loss of revenue from taxes on intra-regional trade.

On seigniorage, a clear CFA and non-CFA zone pattern emerged just as in the case of SDs of RER shocks. The results showed that CFA zone countries' dependence on seigniorage is less than that of non-CFA countries. Pre- and post-SAP analyses showed that CFA countries also reduced their dependence on seigniorage in the post-SAP era. Seigniorage was not only high among the non-CFA zone West African countries, but it also witnessed a marginal change over the pre-SAP era. Indeed, there were slight increases in the use of seigniorage in Nigeria and Sierra Leone. As noted earlier, a necessary condition for seigniorage not standing as a stumbling block for the establishment of a viable monetary zone is its equitable allocation. Therefore, unless a firm allocation rule is in place, and members agree and establish a credible rule to ensure that deficits will not be monetized, the loss of seigniorage will continue to be a hindrance to the establishment of a monetary union in the subregion.

Policy implications

The findings of this study present ECOWAS with some policy options on the future of the monetary integration arrangement. In order to appreciate the policy options a general perception of the effects of exchange rate variability on trade is outlined. The analysis of RER shocks, especially in the context of a regional monetary arrangement, is incomplete without alluding to the possible effects of exchange rate variability (volatility) on trade. Theoretically, an increase in exchange rate volatility should be a hindrance to trade flows. However, various empirical analyses showed that the effects of exchange rate volatility on trade (and on virtually any macroeconomic aggregates) are ambiguous. This difference between theoretical postulates and empirical findings has been termed the exchange rate disconnect puzzle (Obstfeld and Rogoff, 2000). Even where evidence points to negative effects of exchange rate volatility on trade, such effects are usually weak except in the long run.

While not providing empirical evidence on the exchange rate volatility/trade relationship, this paper's position is clear: as long as exchange rate volatility affects transaction costs, and adjustment to such cost is neither free nor automatic, trade flows

will be negatively affected. Most of the plausible explanations for a weak relationship between exchange rate volatility and trade may not hold in the case of the West Africa of today. The usual risk analysis within the context of full information or forward markets is not tenable in the region for many reasons. Firms in the region are not in possession of full information, nor is a forward exchange rate market developed. Even if forward markets are developed they come with costs and more so are not likely to be perfect substitutes for spot markets. In summary, hedging instruments are not only underdeveloped in the region, but they also entail exorbitant costs. By implication, a single monetary zone in the region is capable of minimizing costs of transactions and therefore would promote intra-regional trade.

Thus, irrespective of empirical findings on the effects of exchange rate variability on trade and other macroeconomic variables, there is potential for a single monetary zone to positively affect intra-regional trade in West Africa.

On the basis of the findings of this study, the regional body should decide on and implement the necessary policy reform. There seems to be no shortcut to harmonization and coordination of policies necessary for the pursuance of a single monetary zone in the region. The implementation of SAPs by different countries in the region, though not coordinated at regional level, has been shown to positively affect the conditions for the formation of a single monetary zone in the region. There is no doubt that coordination at regional level would have enhanced the conditions for establishing regional currency. While there is no doubt that the region is closer to forming a region-wide monetary zone now than before, there is also need for further reform before a single monetary zone can be viable in the region.

In the immediate, the decision on a one- or two-speed monetary zone will inform the type of reform that is required. If a single monetary zone is favoured, then substantial policy reform is needed in the non-CFA zone West African countries to support a stable and viable single monetary zone in the region. This is informed by the wide differences in the RER shocks between the CFA zone West African countries and their counterpart non-CFA zone countries. A two-speed regional monetary zone is not supported by the analysis. To achieve a two-speed regional monetary zone, the non-CFA zone countries would have to harmonize their policies to a level that could sustain a viable monetary zone among them. As the analysis revealed, the RER shocks in non-CFA countries varied widely. The possible option of a piecemeal approach to a region-wide monetary zone was supported by the analysis in this study. For example, The Gambia is a better candidate for a single monetary zone with the CFA zone countries than Ghana. Furthermore, since the CFA zone, which exhibited characteristics of a monetary union, is not yet a perfect monetary union, further convergence of policies is required at all levels.

The expected net benefits accruing to trade from a regional currency arrangement are usually unevenly distributed among the member states. According to the theory of optimum currency areas (OCA), countries that are characterized by a high share of manufactures, diversified production structures, high flexible factor markets and flexible fiscal policy, among other factors, are likely to benefit more than other groups of countries. Since RER shocks are assumed to summarize these factors, the implication is that CFA zone countries and Nigeria are the potential high beneficiaries of a single monetary zone

in the region. Apart from this, Nigeria is likely to benefit from a regional arrangement more than other countries given its population and other characteristics. The implication of this for a viable and sustainable regional monetary arrangement is the importance of a regional redistribution policy that takes care of the relatively less developed countries.

Finally, the analysis showed that dependence on revenue from tax on international transactions was high and in some cases accounted for about 50% of government recurrent revenue. This is common to all the groups in the region. Thus, for a viable and stable monetary union in the region, alternatives to revenue from taxes on intra-regional must be sought.

Notes

1 See *Vanguard* Newspaper of Tuesday, 10 March 1998, for details.

2 An estimate puts the level of UTT at several multiples of the official intra-regional trade (ECOWAS, 1980).

3 Prior to 1 January 1999, the CFA franc was pegged to the French franc. Before 1994, the rate was CFAF50 to one French franc. It was devalued in 1994 by 50%.

4 Convergence of a group of economies can be measured in many ways, including s-convergence and b-convergence.

s-convergence is achieved when the dispersion of cross-sectional income levels diminishes over time. This can occur in various ways. First, the growth of the early starters may be declining while the late starters begin to degenerate with them. Second, it is not impossible for the early starters to be degenerating faster than the rate at which others are declining. Other measures of convergence include b-convergence. This occurs when the b-coefficient of the cross-section regression of growth rates on initial levels of GDP per capita is negative. Thus those countries whose per capita income was below average for all countries at the beginning of the period should have higher average growth rate subsequently. For our purpose, the concept of s-convergence was adopted. The dispersion is measured by standard deviation of per capita income.

5 Clearing, where instruments are traded, rather than settlement, where hard currencies are exchanged, is ideal for achieving the objectives of savings in the use of foreign exchange.

6 Article X establishing WACH listed the following objectives: To promote the use of the currencies of the members of the clearing house for subregional trade and other transactions; to bring about savings in the use of foreign reserves of the members of the clearing house; to encourage the members of the clearing house to liberalize trade among their respective countries; and to promote monetary cooperation and consultation among the members of the clearing house.

7 Chipeta and Mkandawire (1994) identified five stages/models of monetary integration as: limited currency convertibility; the European Monetary System

(EMS); parallel union currency; single common currency; and full economic and monetary union. Taylor (1994) identified a single currency system, partial monetary union and limited convertibility arrangement. Similarly, McLenaghan et al. (1982) identified a convertibility arrangement, a partial monetary union and a full monetary union.

8 The Cobham and Robson (1992) approach is cast along the degree of formalization involved. That is, whether the exchange rate is informal or formal prior to full monetary union. Eight characteristics of monetary integration were used in distinguishing among informal exchange rate union, formal exchange rate union and full monetary union. These characteristics are further grouped into two: those measures between member states such as: (a) current account convertibility, (b) capital market integration, (c) exchange rate fixity, and (d) ex-ante credibility of parities, and others, which are (e) types of currencies, (f) single/common/several central banks, (g) reserve pooling and (h) mode of foreign exchange market intervention.

9 Recently there have been attempts to formalize the traditional OCA literature, i.e., quantifying and developing a formal model that encompasses all the various postulates.

10 Of course, country level analysis is important for designing redistribution of gains from forming a monetary union in case there are uneven net cost-benefit to individual cooperating countries.

11 There can be other reasons, apart from economic ones, for forming a monetary union of which political reason is one. These other reasons are captured by the analysis being attempted in this study.

12 For more on recent developments and general discussions in this area see Tavlas (1994).

13 The process of de-seasonalizing the data before estimating is capable of destroying the underlying properties of the data. An alternative to this two-stage procedure is to estimate the autoregressive model together with seasonal components at once. This was attempted and both approaches yielded a similar result. Indeed, the correlation coefficient between the residuals generated from the two models is 0.98. The line graphs for the residuals are similar. Hence we stick to the two-stage procedure.

14 It is easier to determine the pre-SAP period than the post-SAP period because while some countries adopted SAP measures in the early 1980s, some did not until the middle to late 1980s. Our definition of the SAP period is in line with World Bank (1994) definition of 1987 to 1991.

15 Some transformations were also carried out such as converting the nominal local currency/US dollar exchange rates to bilateral ones.

16 This is the World Bank classification of adjustment periods.

17 White's test for heteroscedasticity is a test of the null hypothesis of no heteroscedasticity (or that the variance is constant). The test is asymptotically distributed as a chi-squared. It should be noted that the test also passes for a general test of model mis-specification.

18 Geometric means were calculated for non-zero marginal significant levels and average over different groups of countries in the sample for different models differentiated by the sample periods.

19 M1 is the narrow definition of money. It is the summation of demand deposits and currency outside banks.

20 The sample was based purely on availability of data and not on any other consideration.

21 Of course, the most appropriate data in this context are intra-regional trade, which are not available. The data used also point to the fact that intra-regional trade is likely to be small, hence the lost revenue from taxes on intra-regional trade that will be reduced to zero when a single monetary zone is established is expected to be very small.

22 The piecemeal approach also helps in gradual expansion and strengthening of required institutions. A decision to join or not should rest with the individual country in order to ensure the effective implementation of the regional programme. A piecemeal approach also enables a country to plan its accession carefully, marshalling the expected benefits and adequately preparing for the costs.

References

African Development Bank (AfDB). 1997. *African Development Report, 1997: Fostering Private Sector Development in Africa*. Oxford: Oxford University Press.

Artis, M.J. and W. Zhang. 1997. "On identifying the core of EMU: An exploration of some empirical criteria". Centre for Economic and Policy Research (CEPR) Discussion Paper No. 1689.

Bayoumi, T., B. Eichengreen and J. von Hagen. 1997. "European monetary unification: Implications of research for policy, implications of policy for research". *Open Economies Review*, 8: 71–91.

Bayoumi, T. and E. Prasad. 1995. "Currency unions, economic fluctuation and adjustment: Some empirical evidence". Centre for Economic and Policy Research (CEPR) Discussion Paper No. 1172.

Bofinger, P. 1994. "Is Europe an optimum currency area?" Centre for Economic and Policy Research (CEPR) Discussion Paper No. 915.

Chipeta, C. and M.L.C. Mkandawire. 1994. *Monetary Harmonization in Southern Africa*. AERC Research Paper No. 30. African Economic Research Consortium, Nairobi, Kenya.

Cobham, D. and P. Robson. 1992. "Monetary integration in Africa: A deliberately European perspective". In B. Eichengreen, ed., "European Monetary Unification". *Journal of Economic Literature*, 31: 1321–57.

Devarajan, S. and J. de Melo. 1987. "Evaluating participation in African monetary unions: A statistical analysis of the CFA Zones". *World Development*, 15(4): 483–96.

Devarajan, S. and J. de Melo. 1990. "Membership in the CFA Zone: Odyssean journey or Trojan horse?" World Bank Working Paper Series No. 482.

Economic Community of West African States (ECOWAS). 1980. *Unrecorded Trade Flows within ECOWAS*. Report prepared for ECOWAS Trade Customs and Monetary Study Project by the Economic Commission for Africa and the United Nations Economic and Social Council, E/CN.14/wp.1/115.

Emerson, M., D. Gros, A. Italianer, J. Pisani-Ferry and H. Reichenbach. 1992. *One Market, One Money: An Evaluation of the Potential Benefits and Costs of Forming an Economic and Monetary Union*. Oxford: Oxford University Press.

Erkel-Rousse, H. and J. Melitz. 1995. "New empirical evidence on the costs of European monetary union". INSEE Working Paper No. 9516.

Guillaumont, P., S. Guillaumont and P. Plane. 1988. "Participating in African monetary unions: An alternative evaluation". *World Development*, 6(5): 569–76.

Jebuni, C.D., E.O. Ogunkola and C.C. Soludo. 1999. "A review of regional integration experience in Sub-Saharan Africa: A case study of the Economic Community of West African States". In T.A. Oyejide, ed., *Regional Integration and Trade Liberalization in Sub-Saharan Africa,* Volume 3. London: Longman.

Jenkins, C. and L. Thomas. 1996. "Is Southern Africa ready for regional monetary Integration?" Centre for the Study of African Economies Working Paper Series No. 97-3.

Kenen, P.B. 1969. "The theory of optimum currency areas: An eclectic view". In R.A. Mundell and A. Swoboda. eds., *Monetary Problems and International Economy.* Chicago: University of Chicago Press.

McKinnon, R..I. (1963). "Optimum Currency Area" The American Economic Review. 53(4), 717-725.

McLenaghan, J.B., S.M. Nsouli and K-W. Riechel. 1982. *Currency Convertibility in the Economic Community of West African States.* International Monetary Fund Occasional Paper No. 13.

Mundell, R.A. (1961). "A Theory of Optimum Currency Areas." The American Economic Review. 51(4), 657-665.

Medhora, R. 1990. "The allocation of seigniorage in the Franc Zone: The BEAC and BCEAO regions compared." *World Development,* CXXVIII: 513–26.

Obstfeld, M. and K. Rogoff. 2000. "The six major puzzles in international macroeconomics: Is there a common cause?" NBER Working Paper 7777, http://www.nber.org/papers/w7777

Ogunkola, E.O. 1998. *An Empirical Evaluation of Trade Potential in the Economic Community of West African States.* AERC Research Paper No. 84. African Economic Research Consortium, Nairobi, Kenya.

Taylor, A.B. 1994. "Problems of monetary and financial integration in ECOWAS". *West African Economic Journal,* 7: 143–58.

Tavlas, G.S. 1994. "The theory of monetary integration". *Open Economies Review,* 5: 211–30.

Tella, S.A. and B. Adesoye. 1998. "Monetary union in ECOWAS: Policy objectives versus policy implementation". DPC Seminar, Ibadan, 22 October 1998.

Vaubel, R. 1978. "Real exchange rate changes in the European Community: A new approach to the determination of optimum currency areas". *Journal of International Economics,* 8: 319–39.

von Hagen, J. and G.W. Hammond. 1995. "Regional insurance against asymmetric shocks: An empirical study of the EC". Centre for Economic and Policy Research (CEPR) Discussion Paper No. 1170.

von Hagen, J. and M.J.M. Neumann. 1994. "Real exchange rates within and between currency areas: How far away is EMU?" *The Review of Economics and Statistics,* 76: 236–44.

West African Bankers' Association (WABA). 1999. West African Inter-Bank Payment System (WAIPS): Feasibility Study and Business Plan, September.

West African Monetary Agency (WAMA). 1999. "Review of the West African payments/clearing mechanisms". WAMA-99/EMAC-6/iv. Freetown, September.

World Bank. 1994. *Adjustment in Africa: Reforms, Results and the Road Ahead.* Oxford: Oxford University Press.

Appendix: Supplementary data

Table A1: Summary statistics for RER shocks for ECOWAS, 1970–1997

		Mean	Standard deviation	Minimum	Maximum
1. Benin-Côte d'Ivoire	RRBC	-0.0038344	0.037428	-0.15352	0.13064
2. Benin-Niger	RRBN	-0.0004262	0.042949	-0.16658	0.11829
3. Benin-Senegal	RRBS	-0.0024245	0.039410	-015287	0.12929
4. Benin-Togo	RRBT	-0.0015217	0.029410	-0.17404	0.12376
5. Côte d'Ivoire-Niger	RRCN	0.0021595	0.030262	-0.12760	0.15725
6. Côte d'Ivoire-Togo	RRCT	0.0016227	0.025880	-0.10500	0.099611
7. Niger-Senegal	RRNS	-0.0008587	0.030932	-0.16834	0.12298
8. Niger-Togo	RRNT	-0.0008776	0.031431	-0.15828	0.12299
9. Senegal-Togo	RRST	0.0003940	0.028605	-0.90728	0.10227
10. Côte d'Ivoire-Senegal	RRCS	0.0010171	0.026730	-0.095220	0.13012
11. Benin-Gambia	RRBG	-0.0045131	0.076394	-0.52149	0.66671
12. Benin-Ghana	RRBH	-0.039702	0.21643	-2.32725	0.42208
13. Benin-Nigeria	RRBA	-0.016516	0.11561	-0.80028	0.49275
14. Côte d'Ivoire-Gambia	RRCG	-0.0030255	0.067014	-0.50933	0.67912
15. Côte d'Ivoire-Ghana	RRCH	-0.037928	0.20973	-2.35176	0.40379
16. Côte d'Ivoire-Nigeria	RRCA	-0.014675	0.10754	-0.79396	0.51298
17. Gambia-Niger	RRGN	0.0037468	0.070247	-0.64173	0.49757
18. Gambia-Senegal	RRGS	0.0036535	0.070782	-0.71830	0.50378
19. Gambia-Togo	RRGT	0.0035917	0.068663	-0.63794	0.52496
20. Ghana-Niger	RRHN	0.039047	0.21213	-0.40455	2.28690
21. Ghana-Senegal	RRHS	0.039020	0.21353	-0.41404	2.33775
22. Ghana-Togo	RRHT	0.038148	0.21272	-0.38937	2.36528
23. Niger-Nigeria	RRNA	-0.014525	0.11165	-0.79099	0.47853
24. Nigeria-Senegal	RRAS	0.014918	0.11157	-0.55556	0.77991
25. Nigeria-Togo	RRAT	0.015170	0.10997	-0.47314	0.79281
26. Gambia-Ghana	RRGH	-0.033117	0.19650	-2.33295	0.40219
27. Gambia-Nigeria	RRGA	-0.012789	0.0911301	-0.68974	0.28833

28. Ghana-Nigeria	RRHA	0.021215	0.18461	-0.86173	2.35564

Table A2: Summary statistics for RER shocks for ECOWAS, 1970–1986

		Mean	Standard deviation	Minimum	Maximum
1. Benin-Côte d'Ivoire	RRBC	-0.0023196	0.045577	-0.15352	0.13064
2. Benin-Niger	RRBN	-0.0045525	0.051128	-0.16658	0.11829
3. Benin-Senegal	RRBS	-0.0022732	0.047121	-0.15287	0.12929
4. Benin-Togo	RRBT	-0.0012305	0.047314	-0.17404	0.12376
5. Côte d'Ivoire-Niger	RRCN	0.00090410	0.035800	-0.12760	0.15725
6. Côte d'Ivoire-Togo	RRCT	0.00086979	0.029764	-0.10500	0.099611
7. Niger-Senegal	RRNS	0.000068585	0.035746	-0.16834	0.12298
8. Niger-Togo	RRNT	0.0014832	0.036354	-0.15828	0.12299
9. Senegal-Togo	RRST	0.00048442	0.033122	-0.90728	0.10227
10. Côte d'Ivoire-Senegal	RRCS	-0010838	0.031587	-0.095220	0.13012
11. Benin-Gambia	RRBG	-0.0038628	0.078329	-0.52149	0.27037
12. Benin-Ghana	RRBH	-0.040105	0.24947	-2.32725	0.42208
13. Benin-Nigeria	RRBA	-0.012729	0.10888	-0.80028	0.15692
14. Côte d'Ivoire-Gambia	RRCG	-0.0022419	0.063763	-0.050933	0.23816
15. Côte d'Ivoire-Ghana	RRCH	-0.038364	0.24278	-2.35176	0.40379
16. Côte d'Ivoire-Nigeria	RRCA	-0.010853	0.098008	-0.79396	0.15516
17. Gambia-Niger	RRGN	0.0031342	0.069123	-0.27147	0.49757
18. Gambia-Senegal	RRGS	0.0024349	0.066795	-0.26967	0.50378
19. Gambia-Togo	RRGT	0.0029292	0.067549	-0.26967	0.50378
20. Ghana-Niger	RRHN	0.039667	0.24462	-0.40455	2.28690
21. Ghana-Senegal	RRHS	0.038928	0.24611	-0.41404	2.33775
22. Ghana-Togo	RRHT	0.038606	0.24456	-0.38937	2.36528
23. Niger-Nigeria	RRNA	-0.011064	0.10401	-0.79099	0.12660
24. Nigeria-Senegal	RRAS	0.010810	0.10056	-0.14770	0.77991
25. Nigeria-Togo	RRAT	0.011531	0.099023	-0.13877	0.79281
26. Gambia-Ghana	RRGH	-0.030527	0.22679	-2.33295	0.40219
27. Gambia-Nigeria	RRGA	-0.00491	0.085667	-0.68974	0.28833

28. Ghana-Nigeria	RRHA	0.024151	0.22145	-0.86173	2.35564

Table A3: Summary statistics for RER shocks ECOWAS, 1987–1991

		Mean	Standard deviation	Minimum	Maximum
1. Benin-Côte d'Ivoire	RRBC	-0.0052141	0.019942	-0.055128	0.031027
2. Benin-Niger	RRBN	0.0076298	0.028683	-0.047686	0.094242
3. Benin-Senegal	RRBS	-0.00017633	0.024913	-0.043818	0.044769
4. Benin-Togo	RRBT	0.0036145	0.025617	-0.056264	0.059266
5. Côte d'Ivoire-Niger	RRCN	0.0066349	0.019103	-0.033847	0.075478
6. Côte d'Ivoire-Togo	RRCT	0.0037461	0.017897	-0.071215	0.049369
7. Niger-Senegal	RRNS	-0.0024711	0.022440	-0.075110	0.43742
8. Niger-Togo	RRNT	-0.0051209	0.025752	-0.073510	0.058849
9. Senegal-Togo	RRST	0.00099487	0.019761	-0.049148	0.048875
10. Côte d'Ivoire-Senegal	RRCS	0.0048062	0.016031	-0.036472	0.038783
11. Benin-Gambia	RRBG	-0.015429	0.047433	-0.13646	0.075369
12. Benin-Ghana	RRBH	-0.046977	0.17020	-0.60068	0.12837
13. Benin-Nigeria	RRBA	-0.031183	0.13084	-0.63983	0.26288
14. Côte d'Ivoire-Gambia	RRCG	-0.013569	0.044477	-0.14623	0.079820
15. Côte d'Ivoire-Ghana	RRCH	-0.045300	0.16252	-0.57956	0.096556
16. Côte d'Ivoire-Nigeria	RRCA	-0.029371	0.12444	-0.58524	0.25769
17. Gambia-Niger	RRGN	0.013904	0.051262	-0.085493	0.18035
18. Gambia-Senegal	RRGS	0.015374	0.047482	-0.080408	0.17349
19. Gambia-Togo	RRGT	0.013843	0.045880	-0.072805	0.16793
20. Ghana-Niger	RRHN	0.047929	0.16507	-0.13031	0.58158
21. Ghana-Senegal	RRHS	0.048447	0.16581	-0.11566	0.61951
22. Ghana-Togo	RRHT	0.045938	0.16599	-0.095315	0.60110
23. Niger-Nigeria	RRNA	-0.028793	0.12727	-0.25110	0.59926
24. Nigeria-Senegal	RRAS	0.030332	0.12885	-0.25110	0.59926
25. Nigeria-Togo	RRAT	0.029820	0.12977	-0.25495	0.61292
26. Gambia-Ghana	RRGH	-0.031257	0.14649	-0.50987	0.10473
27. Gambia-Nigeria	RRGA	-0.026173	0.10794	-0.52684	0.24841
28. Ghana-Nigeria	RRHA	0.017287	0.10509	-0.14976	0.54267

Table A4: Summary statistics for RER shocks for ECOWAS, 1992–1997

		Mean	Standard deviation	Minimum	Maximum
1. Benin-Côte d'Ivoire	RRBC	-0.0067874	0.020224	-0.64618	0.040066
2. Benin-Niger	RRBN	0.0040361	0.022841	-0.082873	0.047932
3. Benin-Senegal	RRBS	-0.0047077	0.023271	-0.072570	0.060092
4. Benin-Togo	RRBT	-0.0065904	0.020510	-0.084090	0.035564
5. Côte d'Ivoire-Niger	RRCN	0.0018302	0.019450	-0.081149	0.056297
6. Côte d'Ivoire-Togo	RRCT	0.0018925	0.019570	-0.079318	0.044222
7. Niger-Senegal	RRNS	-0.0020265	0.021846	-0.084266	0.053281
8. Niger-Togo	RRNT	-0.0037354	0.018301	-0.046855	0.068236
9. Senegal-Togo	RRST	-0.0003513	0.020833	-0.057137	0.086769
10. Côte d'Ivoire-Senegal	RRCS	0.0035493	0.017615	-0.0433314	0.059556
11. Benin-Gambia	RRBG	0.0028223	0.089476	-0.13169	0.66671
12. Benin-Ghana	RRBH	-0.032546	0.14444	-0.65107	0.14372
13. Benin-Nigeria	RRBA	-0.014552	0.12052	-0.56565	0.49275
14. Côte d'Ivoire-Gambia	RRCG	0.0036385	0.087899	-0.0841126	0.67912
15. Côte d'Ivoire-Ghana	RRCH	-0.030602	0.13735	-0.61102	0.16336
16. Côte d'Ivoire-Nigeria	RRCA	-0.012778	0.11731	-0.57185	0.51298
17. Gambia-Niger	RRGN	-0.0030589	0.085344	-0.64173	0.11240
18. Gambia-Senegal	RRGS	-0.0028131	0.093687	-0.71830	0.12888
19. Gambia-Togo	RRGT	-0.0031568	0.085406	-0.63794	0.12848
20. Ghana-Niger	RRHN	0.029967	0.14255	-0.16261	0.61726
21. Ghana-Senegal	RRHS	0.031416	0.14448	-0.21375	0.62196
22. Ghana-Togo	RRHT	0.030417	0.14607	-0.16156	0.65475
23. Niger-Nigeria	RRNA	-0.012006	0.11834	-0.55113	0.47853
24. Nigeria-Senegal	RRAS	0.0133200	0.12439	-0.55556	0.56352
25. Nigeria-Togo	RRAT	0.012815	0.12047	-0.47314	0.57395
26. Gambia-Ghana	RRGH	-0.041680	0.13721	-0.54142	0.11327
27. Gambia-Nigeria	RRGA	-0.022953	0.090078	-0.51089	0.099170
28. Ghana-Nigeria	RRHA	0.016536	0.11509	-0.55029	0.35952

Figure A1: Monthly bilateral RER variations: First quarter 1970–Last quarter, 1997

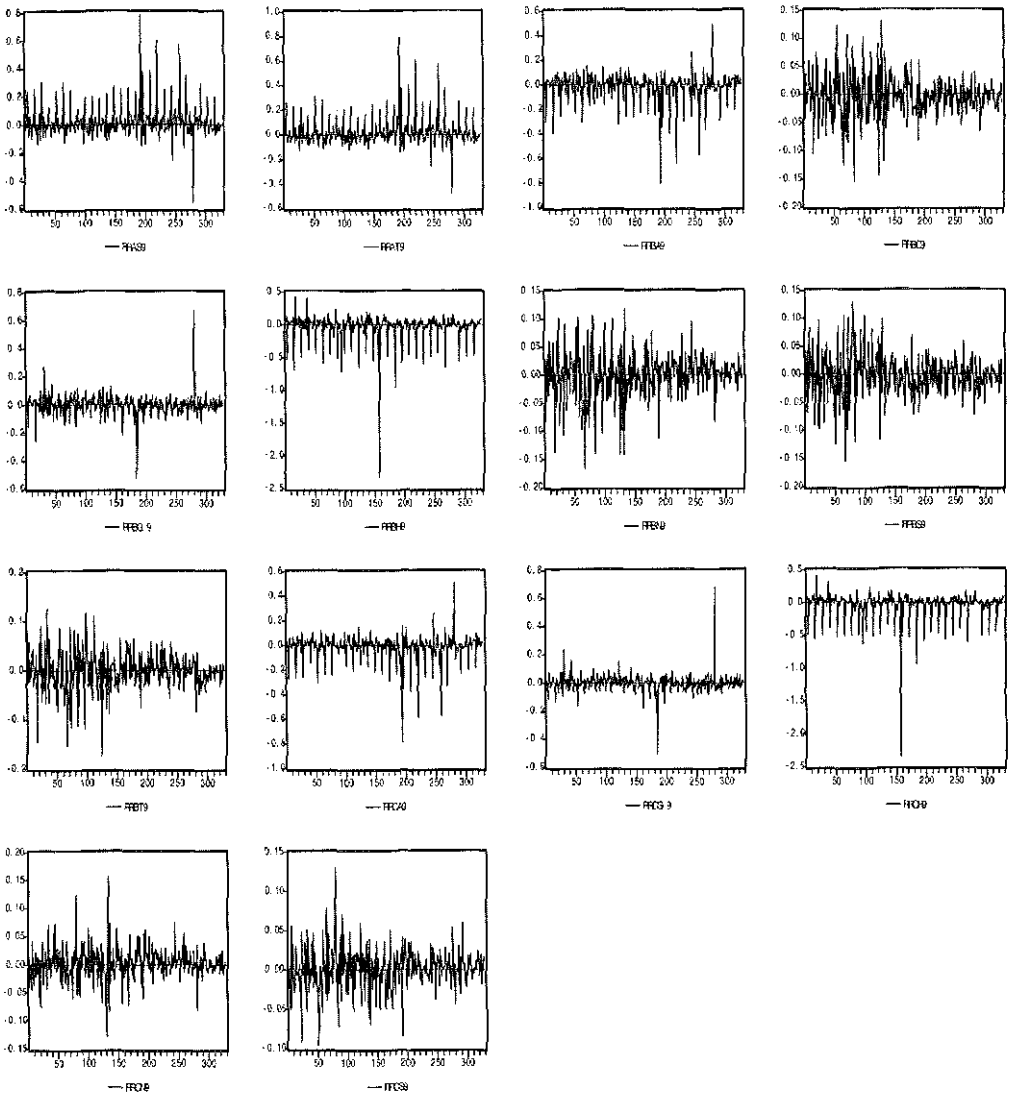


Figure A1 (Continued)

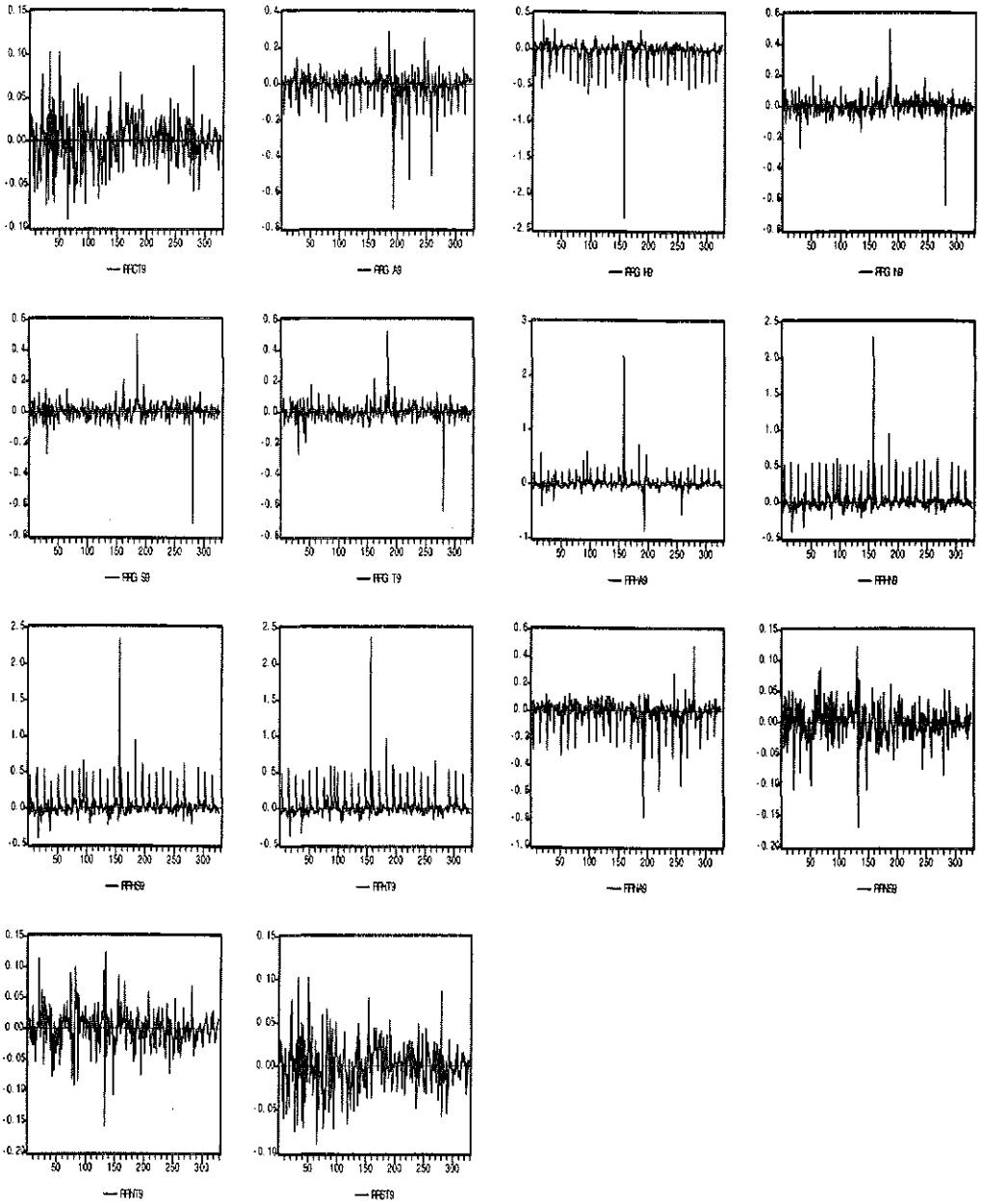


Figure A2: Quarterly bilateral RER variations: First quarter 1970–Last quarter, 1997

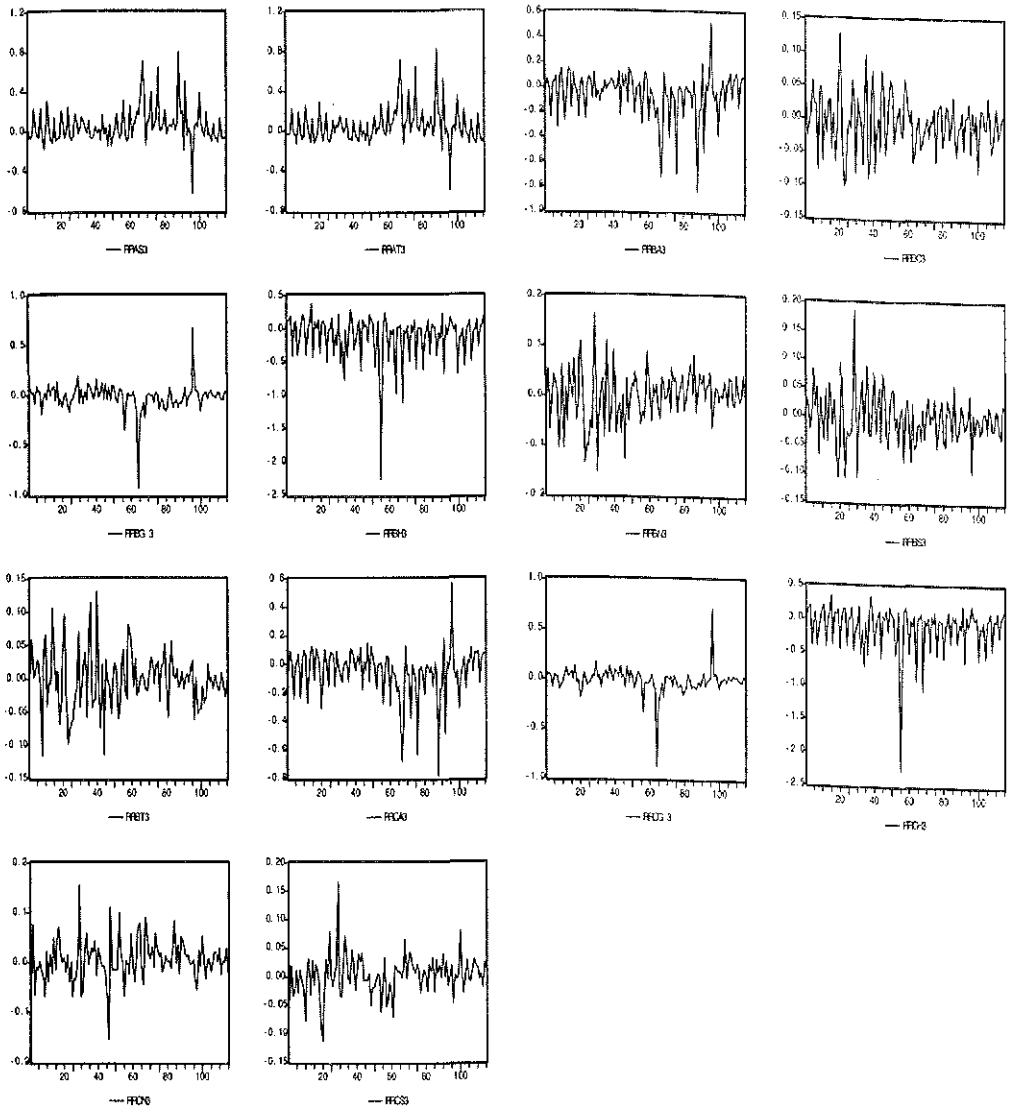
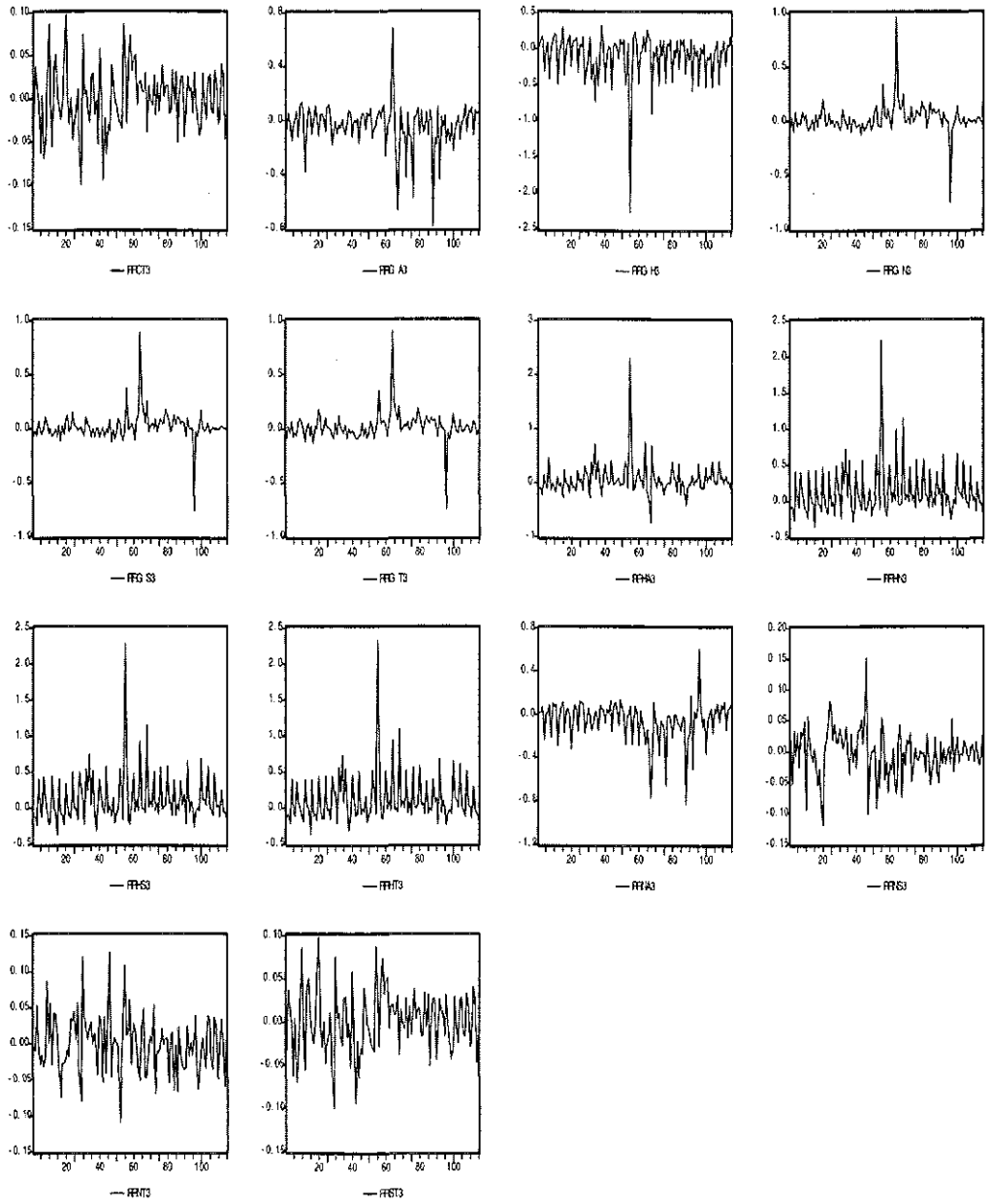


Figure A2 (Continued)



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