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## **“A Common Currency and Exchange Rate System for the West African Monetary Zone: Is the Coronation Approach Feasible?”**

by

**Prof. Edward E. Ghartey**

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### **Abstract**

*The paper examines the coronation or economist approach of meeting convergence criteria before adopting a common currency and exchange rate system in the West African Monetary Zone (WAMZ). The empirical evidence shows that the WAMZ economies are small and are becoming more closed with time. Herfindhal indices show that they are specialized in few agricultural, mineral mining, petroleum and its related products. Correlations of demand, supply and monetary shocks are relatively asymmetric, except The Gambia which has significant symmetrical relationship with the rest of the members. Shocks variations are larger across members as compared to the US. Relative sizes of shocks are larger compared to the US, the ideal monetary union; and they are slow in adjusting to shocks. Considering that the WAMZ members do*

*not meet most of the optimum currency area (OCA) criteria, are less diversified, experience asymmetric shocks and fiscal dominance, it is not feasible for them to follow the coronation approach to adopt monetary union. I recommend that members of the WAMZ adopt the monetarist approach which argues that by first adopting a common currency and exchange rate system, it will eliminate exchange rate uncertainty, reduce transaction cost, intensify trade integration and synchronize their business cycles to meet the OCA criteria, ex-post, as those criteria are endogenous. The loss of monetary autonomy will prevent members from addressing country-specific shocks with monetary policy, curb their inflation, and impose fiscal discipline on them, as it will no longer be easy for members to print money to finance their deficits.*

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**Keywords:** A common Currency; Optimum Currency Area Criteria; West African Monetary Zone; Correlation; Shocks.  
**JEL.:** C2, C5, F31 and F36

## **1: Introduction**

The adoption of the euro as a single currency by the members of European Union (EU) has heightened the desire of other regional economic blocs to achieve similar status. The Economic Community of West African States (ECOWAS) has made it an urgent goal to introduce a single currency among its members. Besides, the EU has declared that it will not be dealing with individual countries by January 2008. This declaration has placed an added burden on members of the African, Caribbean and Pacific (ACP) countries to hasten their effort to become a viable trade bloc (a) to enable them to maintain a common international voice in their trade, economic and political negotiations with other regional blocs, and the World Trade Organization (WTO), especially after the removal of preferential treatments extended to the ACP members by the latter in 2007, and (b) to deepen economic and trade integrations among members within the ECOWAS.

Thus the adoption of a common currency will assist the ECOWAS to adopt policies to ensure free mobility of capital, labor, goods and services within its members, as the current intra members' trade which is barely under ten percent is simply a cause for concern, and it militates against the aspirations of the ECOWAS becoming a viable single market economy. Additionally, the compelling reasons for the ECOWAS to integrate economies of its members have become stronger, requiring it to modify its approach toward greater monetary integration and regional exchange rate stability, by setting up the West African Monetary Zone (WAMZ), and tasking it to expedite the convergence process in the region by following the path of the EU. To this end, the West African Monetary Institute (WAMI) was set up as a formal institution of the ECOWAS to establish a well-coordinated economic and financial monitoring system to drive the English speaking West African countries and Guinea, a former independent French colony which was not a member of the CFA zone (or West Africa Monetary Union (WAMU)), to achieve a West Africa Single Economic and Monetary Union (WASEMU) or ECOWAS Single Market Economy (ESME).

The adoption of a single currency by the ECOWAS will greatly enhance monetary and

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economic integration of its members. A single currency is also referred to as an international or a common currency used by a union of national economies. It is adopted by sovereign nations, when they endow a single institution with authority to issue money, and conduct monetary policy on behalf of its members, in this case, the WASEMU. Members of a single currency area do not independently issue their own money. They abrogate their money issuing ability to prevent any member country from independently creating money to enjoy the gains from seigniorage while transferring the resulting cost of inflation to all members within the union.

The ECOWAS has adopted a position of independently assisting members of both the CFA zone and WAMZ to achieve the status of economic and monetary union, with the intention of joining the two unions later into the WASEMU. A single market certainly requires a single currency, but in the absence of a single currency, the members within the single market can adopt 'irrevocable' fixed exchange rates. A precedent is the exchange rate mechanism adopted by the European Communities following the Maastricht Treaty in 1991. Since members of the WAMZ have their independent sovereign currency, an exchange rate band can be set up for its members to allow their national currencies to be adjusted within. It must be emphasized that by adopting an 'irrevocable' fixed exchange rate within an accepted band, the full gains from a single currency in the areas of efficient service as a medium of exchange, a store of value, a unit of account and a standard for deferred payment within a single market cannot be fully realized. Additionally, with 'irrevocable' fixed exchange rates, members can still exit from the single market without incurring the cost burden of printing new national money. See R. Mundell (1961), R. McKinnon (1963), P. Kenen (1969), and C. Bean (1992).

There are indeed macroeconomic costs associated to currency union, as the proposed WASEMU members will lose part of their seigniorage, and the stable prices it carries in its trail, may retard their economic growth. The loss of monetary autonomy will make it difficult for members to use monetary policy to address country-specific shocks. Additionally, the road to convergence will be difficult, considering the fiscal dominance which prevails among aspiring

members of the WAMZ. Note that members of a monetary union are constrained from setting their tax schedules different from other members. As a result, they cannot afford to run continuous excess budget deficits with impunity, as it will prevent them from raising funds in the future by issuing bonds and other debt instruments. The adoption of a single currency will impose fiscal discipline on the WAMZ members.

Additionally, a single currency in the WAMZ will result in benefits of reduced transaction costs, reduced uncertainty, reduced currency risk, stable prices and exchange rates, low interest rates, fiscal discipline, and promotion of economies of scale and efficiency, due to increased market of 176.9 million people in 2003 which covers a land size of about 1.5 million sq. km. J.A. Frankel (1999) and Frankel and A.K. Rose (1998, 2000) also argue that countries that fail to meet optimum currency area (OCA) criteria *ex-ante*, can meet those criteria after becoming members of a currency union. A currency union will increase trade within the WAMZ, enhance the objectives of the ECOWAS to form a WASEMU to be realized, and reduce the volatility of real exchange rates in the region. See Rose and C. Engel (2000).

The object of this study is to attempt to find out whether the OCA criteria pertaining to symmetry of shocks across regional economies, which are used to determine the adoption of a single currency for a group of countries, can be met by the WAMZ.

We have also examined whether economies of the WAMZ which have certain common characteristics, such as being closed economies as measured by their degree of openness, and are primary producers of agricultural, mineral mining, petroleum and its related products, have been converging as suggested in endogenous growth theory.

We have also estimated the structural shocks of the WAMZ economies by using a structural vector error correction model (VECM)<sup>1</sup> which consists of three macroeconomic variables, namely: output,

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1. Bayoumi and Eichengreen, and Zhang et al. (2004) used the vector autoregressive (VAR) model, and employed Blanchard and Quah's (1989) method to identify the VAR model. We have employed the VECM as suggested by M. Lippi and L. Reichlin (1993). See E. E. Ghartey (2001) for application.

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exchange rates and national price levels, to study the underlying shocks of supply, demand and monetary fluctuations, respectively that influence economies of the WAMZ.

We have also employed impulse response functions to measure relative sizes of underlying shocks and their speed of adjustment to disturbances. Note that asymmetric shocks cannot adversely affect economies if sizes of those shocks are smaller, and the responsiveness to such shocks by respective economies are fast. Additionally, we shall expect an economy which meets the OCA criteria to have a high correlation of its underlying supply shocks, because the literature of endogenous OCA criteria suggests that an increase in trade produces more highly correlated business cycle, which intensifies trade integration. See Frankel (1999) and Frankel and Rose (1998). Macroeconomic variables such as real GDP and prices from the United States of America (USA) are also used in a VECM and decomposed into supply and demand shocks, respectively, as was done by Bayoumi and Eichengreen, and results are compared with those obtained for the WAMZ members, to test the robustness of our findings.

## **2: The case for a common currency or monetary union**

The OCA literature presents a list of criteria for the use of a single currency. These are (1) openness to mutual trade, (2) diversification of economies within the union, (3) mobility of factors of production across the union, (4) correlation of underlying shocks or convergence of business cycles among members, (5) similarities in characteristics, (6) flexibility in setting wages and prices to allow members to respond effectively to external shocks without depending on changes in interest rates and exchange rates, and (7) finally, versatile fiscal institutions to allow net transfers to replace immobile factors of production by ensuring a system of risk-sharing among members.<sup>2</sup> See Robert A. Mundell (1961), Ronald I. McKinnon (1963), and Peter B. Kenen (1969). But if indeed the OCA criteria are jointly endogenous, then simply meeting them on the basis of historical

data cannot be the only justification for becoming a member of a currency union. See Frankel (1999) and Frankel and Rose (1998).

### **2.1: The coronation approach followed by the EU**

The EU had its genesis in the Treaty of Rome which was signed on March 1957 by West Germany, France, Italy, Belgium, the Netherlands and Luxembourg to establish the European Common Market in January 1958. Prime Minister and Finance Minister of Luxembourg, Pierre Werner in 1971, in The Werner Report by his committee, proposed three programs that led to members adopting fixed exchange rates, and integrating all central banks of member countries into the European System of Central Banks (ESCB). The Single Europe Act of 1985 which entrusted Jacques Delors, the then President of the European Commission to conduct a preliminary study, recommended in his committee's 1989 Report, three stages of activities for member countries to undergo to achieve convergence of macroeconomic policies through cooperation.

In 1991 the Maastricht Treaty conditioned members of the EU to satisfy five criteria, namely: (i) Inflation rates were not to be more than 1.5 percent of three members with lowest inflation. (ii) Exchange rates were to be maintained within the exchange rate mechanism (ERM) without independent devaluation. (iii) Long-term interest rates were not to be more than two points above the average interest rates of three members with lowest inflation rates. (iv) Budget deficits were not to be more than 3 percent of GDP unless it was necessitated by unforeseen events, and (v) National debts were not to be more than 60 percent of GDP or show that policies were being pursued to reach that goal. In 1999, the EU became a full-fledged single market with extended membership of 15 countries.

Thus the EU adopted the economist's view in introducing the euro dollar, which is the European single currency in 1999, after members were given a decade to transform their economies to meet the conditions stipulated in the Delor's 1989 Report.

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2. For a discussion on 'New' Theory of Optimum Currency Area, see George S. Tavlas (1993)

## 2.2: The coronation approach followed by the WAMZ.

The ECOWAS was founded on June 10, 1975 but it became functionally operational in January 1977. It consisted of 16 member countries of different economic and political interests, a combined population of 150 million in 1985 in the West African sub-region with a principal objective of achieving economic integration. In the ECOWAS Treaty of 1993, the idea of creating a WAMZ was born, and on 20 April 2000 it was established as an economic and monetary union as stipulated in the ECOWAS Treaty of 1993. The initial members include The Gambia, Ghana, Guinea, Liberia, Nigeria and Sierra Leone, and they were required to lay the foundation for the establishment of a second single monetary zone after the WAMU, within the framework of the ECOWAS single monetary zone objective by 2004. All the countries except Liberia which was then faced with social and political unrest signed on to be members of the WAMZ. Members of the WAMZ agreed to adjust their macroeconomic policy to meet convergence criteria which were stipulated as follows:

- (a) single digit inflation rate by the year 2000 and 5% by 2003
- (b) gross international reserves were to be accumulated to finance at least three months of imports by 2000, and six months of imports by the close of 2003
- (c) central banks were to finance at most 10% of the previous year's tax revenue equivalent of budget deficits, and finally
- (d) the ratio of budget deficits (net of grants) to GDP must be at most 5% by 2000 and 4% by 2002

The WAMZ was rescheduled to take off by adopting a single currency, eco, on July 1, 2005 from the previous agreed date of January 1, 2003, as members failed to meet the convergence criteria. According to reports of the WAMI, members' macroeconomic conditions to meet the convergence criteria deteriorated from their achievements in 2002. It was however, established that the principal reason for the failure of the WAMZ members to meet the convergence criteria in 2003 was due to fiscal dominance, which was caused by the continuous financing of budget deficits by central banks through money printing. But Dornbusch (1997)

concludes: '... that the concern with fiscal criteria lacks a basis once an independent central bank with a precise stability mandate and no-bailout provision are in place.'<sup>3</sup> It is therefore imperative that the WAMZ members reconsider their current quest to become a single currency area by following the path of the EU, and rather adopt the monetarist approach which recommends members of a regional bloc to first adopt a single currency, and use it as a vehicle to advance trade and economic integration required for a viable single market economy. This is more so considering that the EU took 41 years from the commencement of the European common market, and ten years after the Delor's Report on convergence criteria to adopt the euro. Recent global developments make it incumbent upon the WAMZ members to seriously consider the monetarist approach alternative to adopt the eco.

## 2.3: The WAMZ market economies

The WAMZ members need not follow the same path as the EU, because they are different from the EU members. They are relatively closed, and their degrees of openness (imports/GDP or exports/GDP) ratios are less than 35 percent in 1995, and even fell below 20 percent in 2003. See Table 1. They are very specialized as their degree of trade specialization measured by the Herfindhal index which is defined as the sum of squared of shares of specific export products of each member country is near unity.<sup>4</sup> Thus they have an extremely low level of diversification, with Nigeria reporting about 95 percent of export earnings from petroleum and related products. The rest of the countries' export earnings are from minerals and agricultural primary products. As a result, the WAMZ members are more likely to be adversely affected by asymmetric shocks, unless of course

3. Note that Germany, one of the largest members of the EU has run budget deficits for more than three consecutive years, and even in 2004 its forecast budget deficit of 3.3% of GDP and Italy's budget deficit of more than 4 % exceed the 3% criterion in the Maastricht Treaty.

4.  $H_i = \sum_{j=1}^{I_i} (x_{ij}/X_i)^2$  where  $x_{ij}$  denotes export of SITC subgroup product  $j$  in year  $t$  for country  $i$ ,  $X_i$  denotes total export products of country  $i$  at year  $t$ , and it is summed over the entire SITC subgroups.  $H$  ranges from zero to unity. A high value of  $H$  implies that the country is specialized in few goods, whereas a low value of  $H$  implies that the country is well diversified.

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such shocks are small in size and they can adjust to them rather quickly.

The WAMZ members do not meet the labor mobility criterion of the OCA. Most of the Anglophone economies of ECOWAS are not contiguous as they are separated by the Francophone countries. Additionally, unlike their European counterparts, they do not have any well laid infrastructure or transportation networks like roads and railways to connect them. Unfortunately, we could not estimate gravity models to determine whether distance between any two capitals of a pair of economies within the WAMZ enhance or adversely affects their international trade because of absence of recorded intra trade time series data among members. The only positive effect among the WAMZ members is that with the exception of Guinea, they all share a common language which is English.<sup>5</sup>

Prices are not well integrated although a casual view of the degrees of correlation between prices range from 79 percent to 99 percent, and their respective graphs show some convergence as it is shown in Figure 3. The mean of inflation rates over 1970 to 2002 ranges from 11.3 percent in Gambia to 41.4 percent in Sierra Leone. The amplitude of inflation in the WAMZ over the sample period is 94 percent. The degree of correlation of inflation indicates a high divergence as most members record negative correlation. It must be noted though that the significance of inflation as an OCA criterion is contentious. Fleming (1971) for instance considers it to be a very useful criterion because of the policy implications of Philips curve, whereas Parkin (1972) does not attribute any usefulness to it.

Mundell (1961) has argued that economies with highly synchronized business cycles as measured by correlation between real GDP, are more likely to succeed at adopting a common currency. This criterion appears to be met, as the correlation between real GDP of the WAMZ economies ranges from 82 percent for Nigeria and Gambia to 97 percent for Nigeria and Ghana. Thus their real GDP are highly and systematically correlated. Again, one can argue that this is not a very strong OCA criterion, as even the nine initial signatories of the EU treaty

in Maastricht did not meet this convergence criterion.

Additionally, symmetric correlations of real GDP have conflated information which can be attributed to either an increase in productivity or upsurge in demand due to world-wide boom or both. It is for this reason that Bayoumi and Eichengreen employed the VAR method in the tradition of Blanchard and Quah to decompose real GDP into supply shocks. On the other hand, Frankel and Rose (2000) also argue that the formation of a common currency area fosters the degree of economic integration among economies. According to Rose (2000) the international business cycles correlations increase for economies that belong to a common currency area by 10 percent.

Thus the WAMZ members will be better suited by adopting the monetarist approach to achieve a common currency, since it does not require the fulfillment of the 'impossibility triangle', namely: stable exchange rates, full capital mobility and independent monetary policy. Additionally, the fact that the OCA criteria are endogenous, means that they need not be relied on *ex-ante* to admit countries into a currency union, because they are subject to the Lucas critique. We have therefore tested stochastic convergence which shows that shocks to (relative) per capita income are temporary. We have also employed the VECM to estimate correlation between underlying structural shocks of supply, demand and monetary disturbances to determine the viability of forming the WAMZ. We have also employed impulse response functions to measure the size of the underlying shocks and the speed by which these economies adjust to them, and compare the findings with results of the US to assess the suitability of the WAMZ members to become a monetary union.

### 3: Empirical Evidence

The empirical evidence indicate that the WAMZ members are small but closed with degrees of openness below 20 percent; and highly specialized as judged by their Herfindhal indices of near unity, as most of their exports earnings are from agricultural, mineral mining, petroleum and its related products. Their economies converge at declining trends as the

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5. Guinea is not included in the empirical study because of inadequate data.

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first different forms of their per capita incomes are stationary which show that shocks to their economies are temporary. See Tables 4 and 5. Figures 3 and 4 shows that graphs of their prices and nominal exchange rates converge; but correlation of their real growth rates, inflation and depreciation are mostly less than 50 percent, with only The Gambia and Nigeria, The Gambia and S. Leone, and S. Leone and Nigeria showing depreciation correlation slightly greater than 50 percent. See Table 3 in the Appendix.

The variability of supply shocks, demand shocks and monetary shocks in Table 6 are relatively high as compared to the US, except the monetary shocks of Ghana, which suggest that as compared to the US, they are not suitable to adopt a common currency and exchange rate system. Correlation of supply shocks between The Gambia and S. Leone is significant; demand shocks between Ghana and Nigeria, and The Gambia and S. Leone are significant; and monetary shocks between The Gambia and all three members, and S. Leone and Nigeria are significant. See Table 7a. Thus apart from these symmetry results, majority of the members experience asymmetrical shocks. When the US is included in the study, as shown in Table 7b, the results virtually remain the same except that the correlation of demand shocks between Ghana and Nigeria becomes asymmetric. In fact the correlation of supply shocks between Nigeria and the US becomes significant which means that they experience symmetrical shocks. The correlation of monetary shocks between the US and S. Leone are highly significant. From Table 8a, the relative sizes of supply and demand shocks, except The Gambia, are greater than their speed of adjustments to shocks, making members unsuitable to adopt a common monetary policy. As compared to the US in Table 8b, the WAMZ members do not meet the OCA criteria to qualify them to use a common currency and exchange rate system.

This means that if we are to judge how suitable the WAMZ members are to adopt a common currency and exchange rate system by the OCA convergence criteria, they will not qualify. But the OCA criteria are endogenous, so it is important that the WAMZ members re-assess the coronation approach they are now pursuing, and rather adopt the monetarist approach. According to this latter approach, adoption of a

single currency will impose fiscal discipline on members, assist them to intensify their economic and trade integration, and hasten their efforts to meet convergence criteria which so far have eluded them.

#### 4: Conclusion

Small and large countries have different expectations to join a currency union, a conundrum which is termed as 'the impossibility theorem' by A.H. Hallett and S.E.H. Jensen (2001). According to this theorem, small countries prefer to join currency unions that have already undergone reform, whereas larger countries prefer to undergo market reform within before they join a currency union. Additionally, currency unions prefer to admit into their membership, countries that have undergone market reforms, whereas small countries are not prepared to undergo extensive reform within, *ex-ante*, before they join a currency union. Considering that most of the WAMZ members are small in terms of the size of their economies, this theorem seems to suggest that they will never join a currency union, to form a single market in the region.

The WAMZ members are specialized, and as compared to the US, they experience large relative sizes of shocks and are slow in adjusting to shocks. Correlations of their structural shocks of supply, demand and monetary disturbances between them are generally asymmetric, except The Gambia and the rest of the members. Although their economies converge as judged by the unit root tests of their per capita (real) incomes, their trends indicate a decline.

Thus, if specialization disqualifies countries from adopting a common currency, and diversification qualifies them, then the persuasive argument presented in the form of "logic of drawing boundaries around ever-larger geographic areas" versus the OCA logic of slicing up geographic areas into smaller floating rate areas,<sup>6</sup> and the theory of endogenous currency area, will indicate that forward-looking monetary cooperation will elevate the WAMZ countries which are small but closed, and have not completed market reforms, to undergo changes to meet optimum currency area criteria

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6. See Frankel (1999) and Mundell (1961).

over time, after becoming members of a currency union. Thus over time, members of a currency union, as a result of eliminating exchange rate uncertainty and reducing various transaction costs, will undergo transformation to meet trade integration and business cycle synchronization. According to Rose and Engel, increase trade between countries increase the integration of their economies, reduce their exchange rates volatilities, and increase correlations of their incomes.

Therefore, the adoption of a currency union will greatly enhance the implementation of the WASEMU by promoting free mobility of labor, other factors of production, goods and services. The increase in mobility of factors of

production will substitute for inflexible prices and wages, by making them responsive to external shocks without disrupting interest rates and exchange rates. The currency union, will also lend credibility to policy, and assist members that are adversely affected by inflation, persistent budget deficits and huge debt, to efficiently deal with them. The absence of any dominant country or inflation fighting currency in the region means that a currency union can be introduced for the WAMZ members by following the monetarist view, without passing through the phase of 'irrevocable' fixed exchange rate regime or exchange rate mechanism, which the EU undertook.

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and manage some aspects of data from the IMF's IFS CD ROM 2000. Copyright is reserved. The paper is not to be quoted without the consent of the author.

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## Appendix: Tables and Graphs

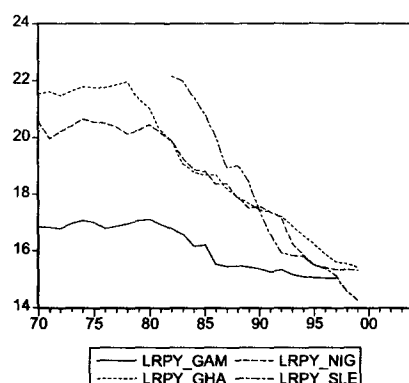
Table 1: Some Important Indicators in 2003

		Gambia	Ghana	Guinea	Nigeria	S. Leone
X(\$m)		156	2642	726	21800	49(02)
X(\$m)		-	1581.85(95)	-	31011.65(95)	171.97(95)
M(\$m)		271	3240	646	14540	264(02)
M(\$m)		-	2119.4(95)	-	22014.16(95)	177.4(95)
GDP(\$m)		2560	44440	19020	114800	3057
GDP(\$m)		-	6458.18(95)	-	90340.26(95)	870.74(95)
DOP1(%)		6.09	5.94	3.82	18.99	1.60
DOP1(%)		-	24.49(95)	-	34.33 (95)	19.75(95)
DOP2(%)		10.58	7.29	3.40	1.27	8.63
DOP2(%)		-	32.82(95)	-	24.37 (95)	20.37(95)
DOP3(%)		16.68	13.24	35.92	31.65	10.24
DOP3(%)		-	57.31(95)	-	58.70(95)	40.12(95)
p (%)		14	26.7	12.9	13.8	1
p (%)		7.08(95)	59.90(95)	-	73.08(95)	26.04(95)
yr (%)		3	4.7	3	7.1	6.5
BD(\$m)		-4.01	-249.0	-297.8	-3070.0	-255.0
BD(\$m)		-	58.56(95)	-	45.67(95)	-52.75(95)
CAB (\$b)		-42	110	-0.252	1.439	-
FRS (\$m)		118	1469	191	7128	-
ED (\$m)		476 (01)	7398	3250 (01)	31070	1500 (02)
Pop. Below Poverty Line (%)		-	31.4	40	60	68
Gini coefficient (%)		-	40.7 (99)	40.3 (94)	50.6 (97)	62.9 (89)
Pop. (m)		1.55 (04)	20.76	9.25	137.25	5.88
Area (sq. km)		11300	239400	245857	923768	71740

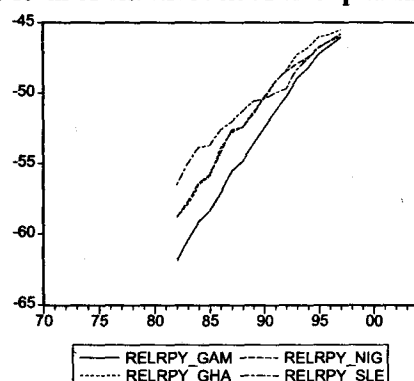
Notes: Data above are sourced from CIA World Factbook which contains estimates and projections from the countries own Finance and Planning Ministry's budget projections and estimates. The figures in parentheses are the dates of the data in question. The 1995 data are sourced from International Monetary Funds' International Financial Statistics Yearbook 2004. X denotes exports of goods and services,

M is imports of goods and services, GDP is gross domestic output, DOP1 is X/GDP ratio, DOP2 is M/GDP ratio, DPO3 is (X+M)/GDP ratio, p is inflation rates, yr is real GDP growth rates, BD is budget deficits, CAB is current account balance, FRS is foreign exchange reserves including gold, ED is external balance, Pop is population, and \$m is millions of dollars.

**Figure 1: Graph of logarithmic form of Per Capita Real Income (LRPY) of the WAMZ Members, 1970-2001**



**Figure 2: Graph of logarithmic form of Relative Real Per Capita Income of the WAMZ Members, 1983-1998**



**Table 2: Some Growth Rates Statistics of the WAMZ Members, 1970-2003**

Percentages	Gambia	Ghana	Nigeria	S. Leone
Mean of growth in real per capita income	-6.67	-21.03	-18.21	-46.48
Std. of growth in real per capita income	17.76	25.13	28.39	34.94
Mean of growth in per capita income	4.21	1.50	1.35	0.05
Std. of growth in per capita income	13.3	9.54	22.12	16.56
Mean of growth in real income	-7.09	-24.19	-25.48	-46.00
Std. of growth in real income	18.61	18.70	26.48	35.48
Mean of growth in income	7.32	4.25	4.27	1.69
Std. growth in income	11.87	9.42	22.14	16.61
Mean of inflation rates	10.53	29.10	18.74	33.18
Std. of inflation rates	8.84	18.84	14.42	27.73
Mean of depreciation	5.83	26.72	15.37	23.79
Std. of depreciation	14.16	32.40	31.07	31.02

*Notes: The author's calculations from IMF's IFS Statistical Yearbook of various years. The real GDP extends to 1998 so it affects all variables which involve it.*

Table 3: Correlation of Growth in Real GDP, Inflation and Depreciation between the WAMZ Members

	Economic Growth or Growth in Real GDP			
	Gambia	Ghana	Nigeria	S. Leone
Gambia	1.000			
Ghana	-0.204	1.000		
Nigeria	0.250	0.286	1.000	
S. Leone	0.305	-0.383	-0.549	1.000
	Inflation Rates			
Gambia	1.000			
Ghana	-0.048	1.000		
Nigeria	-0.394	0.138	1.000	
S. Leone	0.460	-0.313	-0.405	1.000
	Depreciation			
Gambia	1.000			
Ghana	0.349	1.000		
Nigeria	0.555	-0.021	1.000	
S. Leone	0.520	-0.037	0.519	1.000

Note: See Table 7a.

Figure 3: Graphs of logarithmic form of the CPI (LP) of the WAMZ Members

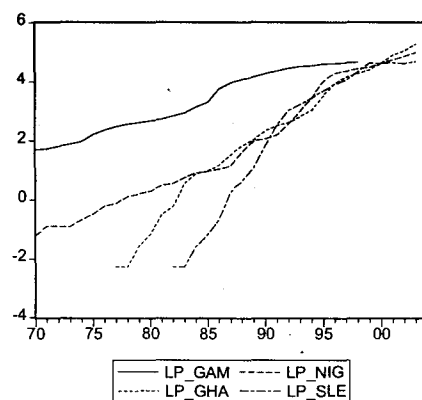


Figure 4: Graphs of logarithmic form of Nominal Effective Exchange Rates of the WAMZ Members, 1975:1-2001:1

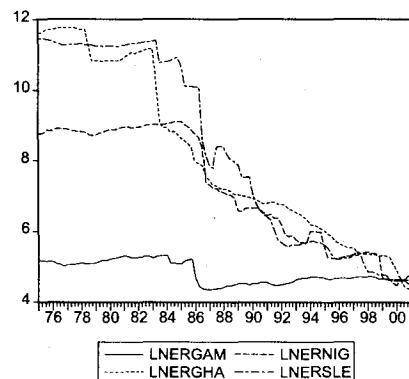


Table 4: Unit Root Tests of logarithmic form of Per Capita Income of the WAMZ Members

Country	DF Level Form			ADF	K
Gambia	3.639	0.002	-0.187	-1.841	0
	[1.899]	[0.377]			
Ghana	8.484	0.005	-0.435	-2.732	0
	[2.741]	[1.725]			
Nigeria	3.352	-0.005	-0.165	-1.723	0
	[1.751]	[1.009]			
S. Leone	2.967	-0.006	-0.149	-1.526	0
	[1.575]	[1.768]			
	First Differenced Form				
Gambia	0.139	-0.006	-1.114	-5.414*	0
	[2.247]	[1.731]			
Ghana	0.027	-0.001	-1.121	-5.667*	0
	[0.662]	[0.335]			
Nigeria	0.112	-0.006	-0.885	-4.781*	0
	[1.265]	[1.117]			
S. Leone	0.103	-0.007	-0.928	-4.681*	0
	[1.462]	[1.617]			
	PP Level Form				TL
Gambia	3.639	0.002	-1.831	-1.841	3
	[1.899]	[0.377]			
Ghana	8.484	0.005	-0.435	-2.732	3
	[2.741]	[1.725]			
Nigeria	3.352	-0.005	-0.165	-1.723	3
	[1.751]	[1.010]			
S. Leone	2.967	-0.006	-0.149	-1.526	3
	[1.884]	[1.768]			
	First Differenced Form				
Gambia	0.139	-0.006	-1.114	-5.414*	3
	[2.247]	[1.730]			
Ghana	0.027	-0.001	-1.121	-5.667*	3
	[0.662]	[0.336]			
Nigeria	0.112	-0.006	-0.885	-4.781*	3
	[1.265]	[1.117]			
S. Leone	0.103	-0.007	-0.928	-4.681*	3
	[1.462]	[1.617]			

Notes: K denotes number of augmentations, and TL denotes truncation lags; \* and \*\*\* denote 0.01 and 0.10 significant levels, respectively. The ADF test is specified as follows:  $\Delta y_t = \alpha + \beta t + \rho y_{t-1} + \sum_{i=1}^k \Delta y_{t-i} + \xi_t$ ; The PP which is a first order autoregressive process is specified as  $\Delta y_t = \alpha + \beta t + \rho y_{t-1} + \xi_t$ .

Table 5: Unit Root Tests of logarithmic form of Per Capita Real Income the WAMZ Members

Country	ADF Level Form			ADF	k
Gambia	3.487	-0.022	-0.200	-1.974	0
	[9.64]	[2.151]			
Ghana	24.046	-0.279	-1.008	-3.387***	7
	[3.330]	[3.285]			
Nigeria	3.372	-0.041	-0.158	-1.864	0
	[1.826]	[2.184]			
S. Leone	3.174	-0.051	-0.143	-0.870	0
	[0.676]	[0.607]			
	First Differenced Form				
Gambia	-0.018	-0.003	-0.980	-4.658*	0
	[0.232]	[0.681]			
Ghana	0.093	-0.003	-0.634	-3.394***	0
	[0.964]	[0.555]			
Nigeria	0.027	-0.011	-0.894	-4.832*	0
	[0.250]	[1.731]			
S. Leone	-1.069	0.029	-0.879	-3.484***	0
	[2.300]	[1.571]			
	PP Level Form				TL
Gambia	3.487	-0.022	-0.200	-1.974	3
	[1.776]	[2.151]			
Ghana	4.654	-0.061	-0.206	-2.589	3
	[2.572]	[2.572]			
Nigeria	3.372	-0.041	-0.158	-1.861	3
	[1.826]	[2.184]			
S. Leone	3.174	-0.051	-0.143	-0.971	2
	[0.676]	[0.607]			
	First Differenced Form				
Gambia	-0.018	-0.003	-0.980	-4.716*	3
	[0.232]	[0.681]			
Ghana	-0.093	-0.003	-0.634	-3.411***	3
	[0.965]	[0.555]			
Nigeria	0.027	-0.011	-0.894	-4.860*	3
	[0.250]	[1.731]			
S. Leone	-1.069	0.030	-0.879	-3.497***	2
	[2.300]	[1.571]			

Note: See Table 4

**Table 6: Standard Deviations of Various Shocks affecting the WAMZ Economies**

	Supply Shocks	Demand Shocks	Monetary Shocks
Gambia	0.166	0.145	0.105
Ghana	0.134	0.359	0.061
Nigeria	0.217	0.162	0.164
Sierra Leone	0.337	0.311	0.231
US	0.030	0.103	0.030

*Note: Logarithm of 0.166 is approximately equal to 16.6 percent.*

**Table 7a: Correlation of Structural Shocks between the WAMZ Members**

Supply Shocks	Gambia	Ghana	Nigeria	S. Leone
1971-1998				
Gambia	1.000			
Ghana	-0.661	1.000		
Nigeria	0.123	-0.039	1.000	
S. Leone	0.390*	-0.376	-0.535	1.000
Demand Shocks				
1971-1998				
Gambia	1.000			
Ghana	-0.088	1.000		
Nigeria	-0.394	0.258**	1.000	
S. Leone	0.488*	0.059	-0.416	1.000
Monetary Shocks				
1983-1998				
Gambia	1.000			
Ghana	0.324*	1.000		
Nigeria	0.416*	-0.182	1.000	
S. Leone	0.588*	0.016	0.373*	1.00

Notes: Fisher's variance-stabilizing transformation of estimated correlation coefficient ( $r$ ) is used to test the significance levels of correlation coefficients.  $Z = 0.5 \ln[(1+r)/(1-r)]$ , where  $z \sim N(0, \hat{s})$  and  $\hat{s} \sim (n-3)^{-1/2}$ . Thus if  $n = 28$ , then  $\hat{s} = 0.204$ . The critical value at the 5 percent significant level is absolute value of 0.24. \* and \*\* denotes 0.01 and 0.05 significant levels, respectively.

**Table 7b: Correlation of Structural Shocks between the WAMZ Members including the US or Global Shocks**

Supply Shocks	Gambia	Ghana	Nigeria	S. Leone	US
Gambia	1.000				
Ghana	-0.670	1.000			
Nigeria	0.058	-0.109	1.000		
S. Leone	0.421*	-0.344	-0.535	1.000	
US	-0.129	-0.058	0.323*	-0.063	1.000
<b>Demand Shocks</b>					
Gambia	1.000				
Ghana	-0.049	1.000			
Nigeria	-0.394	-0.001	1.000		
S. Leone	0.489*	0.148	-0.381	1.000	
US	-0.055	-0.445	0.338*	0.046	1.000
<b>Monetary Shocks</b>					
Gambia	1.000				
Ghana	0.432*	1.000			
Nigeria	0.692*	-0.055	1.000		
S. Leone	0.633*	0.116	0.564*	1.000	
US	0.266**	-0.132	0.213	0.519*	1.000

Note: See Note 7a.

**Table 8a: Relative Sizes of Shocks and Speed of Adjustment to Shocks across the WAMZ Members**

	Supply Shocks		Demand Shocks		Monetary Shocks	
	Size	Speed	Size	Speed	Size	Speed
Gambia	0.099	0.250	0.049	0.193	0.052	0.202
Ghana	0.226	0.200	0.440	0.198	-0.032	0.194
Nigeria	0.286	0.188	0.277	0.313	0.092	0.209
S. Leone	0.393	0.240	0.345	0.176	0.058	0.176

Notes: The relative size of supply, demand and monetary shocks are reported from the corresponding impulse response functions that capture the effect of a unit shock on changes in real GDP, period's average exchange rates and price levels, respectively. The speed of adjustment is summarized by the response after a year horizon as a share of the long-run effect which is measured by the five-year horizon.

**Table 8b: Relative Sizes of Shocks and Speed of Adjustment to Shocks across the WAMZ Members including the US**

	Supply Shocks		Demand Shocks	
	Size	Speed	Size	Speed
Gambia	0.129	0.314	0.085	0.210
Ghana	0.131	0.198	0.195	0.223
Nigeria	0.216	0.278	0.095	0.210
S. Leone	0.310	0.183	0.289	0.192
US	0.022	0.309	0.021	0.323

Note: See Notes in Table 7a. The US is an ideal OCA and is included as a proxy for capturing global influences.

**Figure 5: Graphs of Impulse Response Functions of the WAMZ Members and the US**

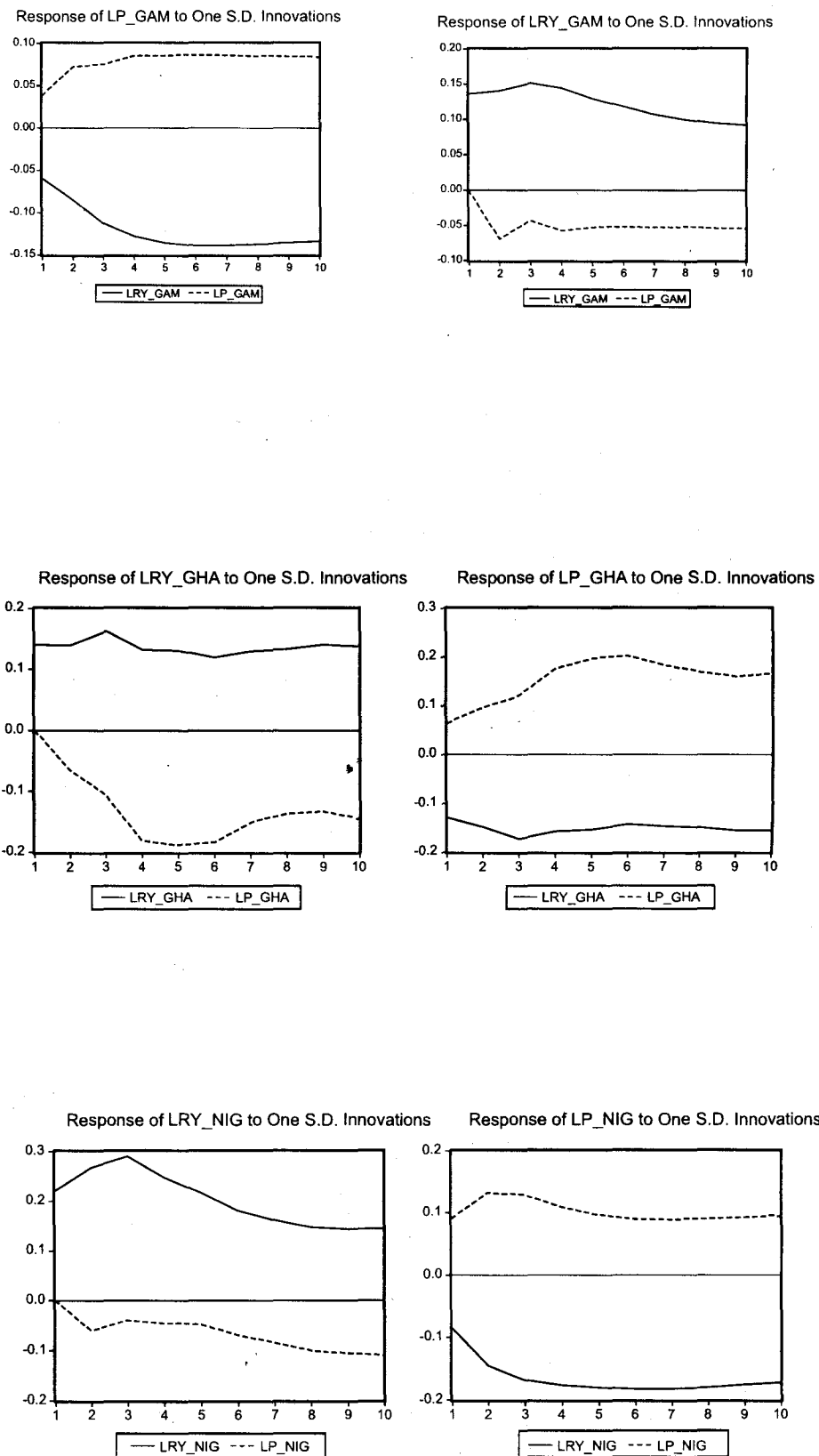
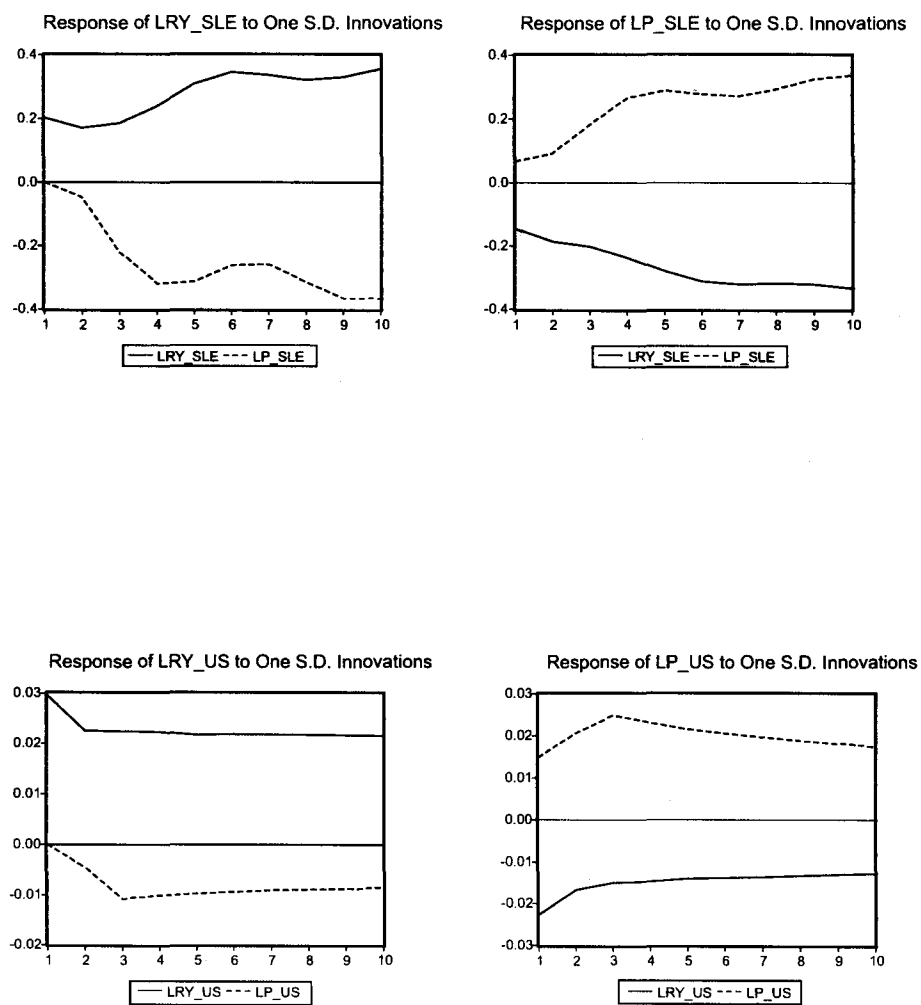




Figure 5: Graphs of Impulse Response Functions of the WAMZ Members



Notes: GAM is The Gambia; GHA is Ghana; NIG is Nigeria; SLE is Sierra Leone; US is United States of America. LP is logarithm of price level, and LRY is logarithm of real income.

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Professor Edward Ghartey, Senior Fellow of The Institute of Economic Affairs

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**Note:** Nothing written herein is to be constructed as necessarily reflecting the views of  
The Institute of Economic Affairs

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