An Analysis of the Proposed Currency Union of the Economic Community of West African States (ECOWAS)

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Submitted in accordance with the requirements for the degree of Doctor of Philosophy

The University of Leeds
Leeds University Business School

July 2015

The candidate confirms that the work submitted is his own and that appropriate credit has been given where reference has been made to the work of others

Acknowledgements

The path through a PhD is long and demanding and to be at the end of it is a blessing from Almighty Allah and the result of the contribution from many stakeholders. First and foremost I would like to thank and glorify Allah for giving me the direction to start a PhD and the ability to complete it.

My special thanks and gratitude go to my supervisors Professor Malcolm Sawyer and Professor Giuseppe Fontana whose invaluable academic guidance, support, understanding and flexibility made it possible to complete my work successfully. The financial support of my Employer, Leeds Beckett University is a valuable contribution to my study and would like to thank the university especially my head of department Dr Roberta Bampton whose support and encouragement made my PhD funding possible.

During the period of my study I have managed three important things: Full time work, PhD and family. It is impossible to do this alone without the love, support and understanding of my wife, Mrs Ramatu Kamara and my children Haja, Kadija, Rahim and Moharam. I extend exceptional thanks and love to all five of you and hope you continue to be the source of my strength and success. I wish to express many thanks and appreciation to my father and late mother whose respect and value for knowledge led them to sacrifice their very little resources for my education. Without their wise decision yesterday I would not have been here today.

The business school and the university as a whole provided a system of support and facilities that are extremely invaluable for research and therefore extend my thanks and appreciation to all the staff for creating and supporting the system. To my PhD colleagues in the department of Economics and others I say many thanks to you for the tolerance and friendly atmosphere we enjoyed together. For those that played a part to my study but have not mentioned, you are not forgotten and please accept my thanks.

May God bless you all.

Abstract

This thesis provides an analysis of the proposed currency union of the fifteen countries of the Economic Community of West African States (ECOWAS). The study attempts to answer the following questions: (1) is ECOWAS an optimum currency area? In other words, are ECOWAS countries good candidates for a currency union? (2) are the ECOWAS countries ready for an independent currency union? And (3) are the economic benefits to the ECOWAS countries justifiable for a currency union?

To address these research questions we applied the framework of the Optimum currency area theory pioneered by Mundell (1961), McKinnon (1963) and Kenen (1969). To investigate the impact of currency union and exchange rate volatility on intra-ECOWAS trade we estimate the augmented version of the gravity model of international trade using panel data over the period 1980-2012. After controlling for zero trade we found that currency union has a negative and non-significant impact on exports and imports and negative and significant impact on total trade. Whatever trade measure we use, both before and after controlling for zero trade, there is no evidence to support the trade creation argument of currency union in the decades of WAEMU existence. We found the effect of exchange rate volatility to be negative and significant on exports, imports and total trade before controlling for zero trade but the effect on all the three trade measures becomes statistically insignificant after the control for zero trade. We carried out perturbations with different exchange rate volatility measures and found our results to be insensitive and robust in all cases. We also found that while ECOWAS countries trade extensively with the rest of the world, trade with each other is very low. With a cluster analysis methodology we found a high degree of heterogeneity in ECOWAS countries' macroeconomic characteristics especially those that are not members of the West African Economic and Monetary Union (WAEMU). While the eight WAEMU countries clustered together, the others are in fragmented clusters indicating the degree of dissimilarity. These findings are robust even with the use of alternative agglomerative methods of merging the countries.

We conclude from our findings that ECOWAS is not an optimum currency area and that the countries are not good candidates for a currency union which makes them at this stage not ready for a full-fledged currency union. The thesis provides no evidence that the level of trade within ECOWAS justifies the formation of a currency union.

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List of Abbreviations

AACB	Association of African Central Banks
AMCP	African Monetary Cooperation Programme
AMU	Arab Maghreb Union
ASEAN	Association of Southeast Asian Nations
AU	African Union
BCEAO	Banque Centrale des Etats de l'Afrique de l'Ouest (the Central Bank of WAEMU)
BEAC	Banque des etats de l'Afrique Centrale (the Central Bank of CAEMC)
CAEMC	Central African Economic and Monetary Community (CEMAC in French)
CEN-SAD	Community of Sahel-Saharan States
CEPGL	Economic Community of Great Lakes Countries
CES	COMESA-EAC-SADC
CFA	for Colonies Francaises d'Afrique (Franc CFA stands for franc de la Communaute Financiere d'Afrique for WAEMU and franc de la Cooperation Financiere en Afique Centrale for CAEMC)
CMA	Common Market Area
COMESA	Common Market for Eastern and Southern Africa
CSD	Cross sectional dependence
CSP	Country Strategy Paper
EAC	East African Community
EACSO	East African Common Services Organisation
EAEMC	East African Economic and Monetary Community
ECA	Economic commission for Africa
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
EMCP	ECOWAS Monetary Cooperation Programme
EMS	European Monetary System
ERM	Exchange Rate Mechanism
EU	European Union
IGAD	Inter-Governmental Authority on Development
IOC	Indian Ocean Commission
LDV	Lagged dependent variable
MRU	Mano River Union
NEPAD	New Economic Partnership for African Development
OAU	Organisation of African Unity
OCA	Optimum Currency Area
PTA	Preferential trade agreement
SACU	Southern Africa Customs Union
SADC	Southern Africa Development Community
SADCC	Southern African Development Coordination Conference
SSA	Sub-Saharan Africa
WACB	West African Central Bank
WAEMU	West African Economic and Monetary Union (CFA West Africa Franc Zone)
WAMI	West African Monetary Institute
WAMZ	West African Monetary Zone

Chapter 1 Introduction

1.1 Background

The African continent has a long history of economic integration dating back to 1963 when the Organisation of African Unity (OAU) was formed. Understanding the African plan is vital for a better understanding of the rationale for sub-regional economic integration proposals. Since independence in the late 1950s and the early 1960s African countries have always favoured economic and political integration as a means to achieve higher growth and development, accelerate poverty reduction and enhance national security (Asante, 2007; Ojo, 2001). These aspirations led to the formation of the OAU whose stated objectives are

> *'to rid the continent of the remaining vestiges of colonization and apartheid; to promote unity and solidarity among African States; to coordinate and intensify cooperation for development; to safeguard the sovereignty and territorial integrity of Member States and to promote international cooperation within the framework of the United Nations.'(AU web site)*

In 1991, the 27th summit of the OAU established in Abuja, Nigeria, the African Economic Community (AEC) in order to consolidate the progress of economic integration at the sub regional level and also to enable the continent to better face the challenges posed by the evolving trends in the global economy. AEC is the economic wing of the OAU and its operation rests on Regional Economic Communities (RECs) as pillars. Article 44 of the 1991 Abuja Treaty requires the establishment of a number of protocols requiring member states, within a time table to be determined by the OAU, to harmonise their monetary, financial and payment policies, and boost intra-community trade in goods, services as well as enhance monetary cooperation among member states. The strategy of the AEC involves the formation of regional trading blocs, intensification of globalisation and liberalisation. This process is enshrined in the African Monetary Cooperation Programme (AMCP) managed by the Association of African Central Banks (AACB). The objectives of the AMCP involve the "adoption of collective policy measures to achieve a harmonized monetary system and common management institutions. It envisages the harmonization of the monetary cooperation programs of the various sub-regional groupings as building blocks with the ultimate aim of evolving a single monetary zone by the year 2021 with a common currency and a common Central Bank at the continental level" (AACB, 2002).

The lack of progress in the achievement of the objectives of the OAU and the growing challenges in the global economy led to the realisation of the need for a total adjustment of the continent's organisation for more effective and lasting solutions to the African problems. This consensus led to the Sirte Declaration and the Constitutive Act of the AU that led to the creation of the African Union (AU) in 2000. With similar objectives to the OAU, the AU's slight change of focus is the reorientation towards African integration.

After the transformation of the OAU into the AU, there was a call for the strengthening of existing RECs as the pillars of the African integration programme, and the establishment of new ones where they do not exist. Virtually every African country belongs to one or more of the regional economic groupings on the continent and these include: Arab Maghreb Union (AMU), Common Market for Eastern and Southern Africa (COMESA), Southern Africa Development Community (SADC), Economic Community of Central African States (ECCAS), Economic Community of West African States (ECOWAS), to name a few (more details in chapter 2). Most of these RECs have duplicating and overlapping membership and mandates and also they are very poorly funded (Asante, 2007).

Following the formation of the OAU in 1963, West African countries established the Economic Community of West African States (ECOWAS) in May 1975. The ECOWAS mission is to promote economic integration in all fields of economic activity, particularly industry, transport, agriculture, natural resources, commerce, monetary and financial issues, social and cultural matters. In 1987, ECOWAS adopted a programme of monetary cooperation as a means to facilitate regional trade and cross-border transactions and achieve regional currency convertibility (Ojo, 2001). Following the African reorientation towards economic integration as seen in the change from OAU to AU in 1991, the ECOWAS (the community) treaty was revised in 1993. The aims of the Community, as stated in Article 3 of its revised treaty are to promote co-operation and integration, leading to the establishment of an economic union in West Africa in order to raise the living standards of its peoples, and to maintain and enhance economic stability, foster relations among Member States and contribute to the progress and development of the African Continent.

An offshoot of the African Monetary Cooperation Programme is the ECOWAS monetary cooperation programme (EMCP) which outlined the integration programme for the West African sub region and is monitored by West African Monetary Agency

(WAMA). A two track approach was established for ECOWAS monetary union with the ultimate aim of introducing the ECOWAS single currency in 2020. Track 1 is the already established monetary union WAEMU with its single currency (CFA franc) pegged to the euro and supported by France. This monetary zone is made up of eight countries: Benin, Burkina Faso, Cote d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo. All are former French colonies except Guinea Bissau. A second monetary zone, the West African Monetary Zone (WAMZ), was established by the other countries mainly English speaking: Ghana, Guinea, Liberia, Nigeria, Sierra Leone and the Gambia with Cape Verde given the option to join either of the two zones. WAMZ single currency, the ECO, was to come into existence in 2003 but due to lack of convergence it was postponed to 2005 and again to 2009. In 2009 not only WAMZ countries but almost all the other ECOWAS countries failed to meet the ECOWAS convergence criteria (see chapter 2) for the introduction of the single currency. This led to another postponement with the new date of January 2015. Another convergence failure of the countries made the target date of 2015 impossible. The lack of progress on the ECOWAS single currency programme finally resulted to the decision to abandon the two track approach and adopt a single track approach as reflected in the 2014 ECOWAS annual report "on the bid to accelerate progress towards the realisation of the ECOWAS single currency by 2020, the single track approach for the monetary integration programme was adopted… and the revision of the roadmap for the ECOWAS single currency" (ECOWAS, 2014:14).

The above background has given us not only an understanding of the motivation for the proposed ECOWAS single currency and the economic integration events in the African continent but also gave an indication of the lack of progress in achieving integration objectives despite the growing number of bilateral and multilateral economic and political treaties in Africa. Many commentators have pointed out the disappointing performance of the continent in the enhancement of the process of regional integration due to many problems encountered by the regional integration blocks. Among the most important of these problems are: the political instability and bad governance that have plagued many of the countries; the weakness of the national economies and their insufficient diversification; the absence of reliable roads, telecommunications and energy infrastructure; the insufficient political will exhibited by some member States; the bad economic policies in certain cases; the multiplicity of organisations for regional integration with the same objectives; the irregularity in the payment of financial

contributions to the budgets of the institutions; the failure to involve the civil society, the private sector and mass movements in the process of integration; the defective nature of the integrational machinery in certain cases (Ezenwe, 1994; ECOWAS website; Masson and Patillo, 2005; Mistry, 2000; Ojo, 2001).

The rest of this chapter is structured as follows: the next section gives a brief outline of the OCA theory and the research questions, objectives and rationale of the thesis and section 1.3 provides the organisation of the thesis and a summary of the contents of each chapter with methodology and findings where appropriate. Throughout this thesis the phrases 'currency union' and 'monetary union' are used interchangeably but they mean the same thing.

1.2 Research questions, objectives and study rationale

Since the collapse of the Bretton Woods system in the early 1970s countries were left with the crucial decision on which exchange rate regime to adopt- floating exchange rates, fixed exchange rates or managed floating exchange rates. The choice between free floating and fixing of exchange rates remained an intense academic debate in the literature. It is argued that higher exchange rate volatility that may result from a floating exchange rate regime leads to higher cost for risk-averse traders and to less foreign trade. The literature on this proposition is inconclusive. A collective approach to managing exchange rates is the formation of monetary union by a number of countries. The successful launch of the euro in 1999 is the most recent example of currency union that may have increased the motivation for other regions to follow. The argument is that currency union removes exchange rate volatility that is the source of risk and therefore should increase trade between its members. This argument gained empirical support from the seminal paper of Rose (2000a) where he found that currency union increases trade for its members by 300% as compared to non-members. Rose's paper triggers the debate on the impact of currency union on trade and since then a number of empirical studies has been undertaken with varying results. However abandoning a national currency for a single currency with others is not free of cost. The economic cost, argued, of this decision is the loss of monetary autonomy as monetary policy decisions will be vested in the hands of the common central bank.

Mundell (1961) put forward his celebrated OCA theory which emphasises the importance of factor mobility (labour and capital), wage flexibility and the absence of asymmetric macroeconomic shocks. His theory was subsequently extended by

McKinnon (1963) and Kenen (1969). Since this theoretical development the OCA became enormously influential as the organising framework for the analysis in most empirical work involving currency union and trade.

In the background of this chapter, section 1.1, we present at length the developments in economic integration in Africa and in particular ECOWAS, the focus of this thesis. A proposal to abandon national currencies by fifteen countries is a fundamental economic decision that should not be left to chance. The failure of ECOWAS countries to converge on a number of occasions has led to several postponements of the commencement of the single currency. It has also led to the most recent shift, by the ECOWAS authorities, from a two track to a single track approach to speed up the adoption of a single currency by the target date of 2020. These developments provide relevance and strengthened the case for a study on the ECOWAS single currency proposal. This study therefore investigates into two research questions:

1. Is ECOWAS an optimum currency area? In other words, are ECOWAS countries good candidates to form a currency union?
2. Are the economic benefits to the ECOWAS countries justifiable for a currency union?

   To answer these research questions the thesis considered the following research objectives:

I. Examine the extent of intra-regional trade flows in ECOWAS and the potential for increase in trade
II. Assess the impact of currency union and exchange rate volatility on intra-ECOWAS bilateral trade flows and
III. Examine the degree of similarity of ECOWAS countries' macroeconomic characteristics and determine their level of convergence.

1.2.1 Contribution of the study to the literature

Ever since the seminal paper of Rose (2000a), where he found that countries in a currency union trade three times more than those not in a currency union, a number of studies have been conducted on this topic with diverse results, some closely but slightly lower than Rose's figure of 300% but others significantly lower. One of the features of the early studies on currency union is that they constitute a large number of countries drawn from different parts of the world with different economic structures and great diversity in terms of their development. For instance Rose used a sample of 186

countries selected globally for the period 1970-1990 and Glick and Rose (2002) used a sample size of 217 countries, also globally, for the period 1948-1997. Glick and Rose found that countries joining currency union doubled their trade and those leaving currency unions halved their trade and this was economically and statistically significant. Both of these early studies sample included all the 15 ECOWAS countries except Cape Verde in the case of Rose (2000a). Subsequent studies also included either all or almost all of these countries. Other studies are based entirely on other continents not including ECOWAS; example Europe has attracted a number of empirical studies in the area of currency union. This is not surprising given the long history of European integration and Europe now been an established currency union.

There is an important policy question for regional integration blocs especially ECOWAS that is of interest to this thesis. The question is should the findings of a large and statistically significant positive impact of currency union on trade from Rose and other global sample studies be taken as a justification to form a single currency in different regions such as the ECOWAS proposal? Perhaps the size and statistical significance from those studies may have come from the bigger and developed nations, with extensive trade relations, in the sample without which the results may have been otherwise. Vicarelli and de Nardis (2003) in their study focussing mainly on the Euro countries also argued in a similar line and they described the Rose sample as large and heterogeneous. What is also commonly commented on in the literature about these global samples is that some of the countries included are small and poor and this comment seems relevant for most, if not all, the ECOWAS countries. On this same issue Danny Quah in his critique of Rose's paper commented that

> *'the partition between subgroups, the first not having single currency characteristics and the second having them, is frighteningly skewed: less than 1% of the total sample is in the single currency group. Researchers have discarded subsamples larger than that in the pursuit of statistical robustness. Yet, it is what provides the author with the strong results that he has.'*

From the above discussion one would consider it to be a serious policy mistake if ECOWAS single currency is to come into existence without conducting the study focussing specifically on the 15 ECOWAS countries to see whether the global sample studies' findings are applicable in ECOWAS. After all, the ECOWAS proposal is not for a global monetary union but a monetary union for its fifteen member states and therefore we argued that a generalisation of global studies with their global conclusions could ignore the idiosyncrasies of other nations especially at regional levels. In this context, this thesis with specific focus on ECOWAS will make a contribution that will

be of interest to academics, policy makers and many other stakeholders. The thesis contribution is justified in a number of ways. First, it is specifically focused on ECOWAS, a region that is planning to move towards monetary union with less specific attention from the literature. Second, unlike many studies, as mentioned in the global samples above, the sample split, in this thesis, between currency union (53%) and non-currency union (47%) is well balanced, thus the robustness of the results could not be questioned on the basis of skewed sample. Finally, the application of different methodologies such as panel data and cluster analysis supported by comparative data analysis with consistent findings, is to the best of my knowledge, the first of its kind for ECOWAS. Panel data accounts for heterogeneity in the trading pairs which addresses the potential biasness of some of the earlier studies.

1.3 The structure and contents of the thesis

Chapter 2 described the general background of the African integration agenda since the establishment of the OAU after independence of most countries. The motivation for the formation of the OAU, its aims and objectives and its subsequent transformation into African Union which outlines the six stage road map for the establishment of the African single currency. The chapter then narrows down its attention to ECOWAS with a detailed description and discussion of its aims, objectives, integration plan and its implementation with particular emphasis on free trade, customs union, free movement of goods, persons and capital and the obstacles that the trade liberalisation programme has encountered. The contents of this chapter fed into the analysis and discussion of our results within the framework of the OCA in chapters 5, 6 and 7.

Chapter 3 provides a detailed description of the historical and macroeconomic characteristics of the fifteen ECOWAS countries. The rationale of the chapter is that an understanding of the economic characteristics of these countries aids our understanding of the results and enhances our engagement in their interpretation. The chapter covers key areas including GDP and GDP growth, the composition of ECOWAS GDP and population by country and for each country the components of GDP (primary, secondary and tertiary), unemployment/underemployment, political instability and colonial links. The chapter uncovered many key common characteristics of ECOWAS countries that have important implications for the OCA literature discussed in chapter 4 and our analysis in chapters 5, 6 and 7. These characteristics include: major dependent in the primary sector mainly dominated by agriculture, lack of diversification of economic activities as indicated by the overreliance on one or few commodities for

exports, low manufacturing sector, poor and inadequate infrastructures (roads, energy, and manufacturing), high unemployment and underemployment especially for the youth, and political instability. We also found in this chapter that ECOWAS is dominated by one country, Nigeria, with 70% of the GDP and 53% of the population.

Chapter 4 outlines and discusses the literature on the OCA which forms the basis for the analysis in this thesis. The chapter examines the OCA theory criteria (factor mobility: labour and capital, wage flexibility, trade openness, product diversification and inflation similarity) and political criteria: fiscal transfers and solidarity versus nationalism. It further gave account of the contentious debates in the literature on the link between monetary union and political union, the endogeneity of the OCA criteria and the critics' response to the OCA theory. The final sections of the chapter are devoted on the benefits and other costs of monetary union and the empirical literature on the impact of currency union and exchange rate volatility on bilateral trade following the pioneering work of Rose (2000a) and Hooper and Kohlhagen (1978) respectively.

Recognising one of the limitations of the OCA theory such as the lack of cut-off points for its criteria, chapter 5 opens up the analysis of the thesis by applying the OCA criteria on ECOWAS countries by using an already established currency union, the euro, as a benchmark for our analysis. The aim of the chapter is to assess the suitability of ECOWAS countries for currency union in light of the framework of the OCA with the euro as a comparator. We considered the seven OCA and political criteria discussed in chapter 4. We found that ECOWAS countries have not done well in any of the criteria under consideration which means by definition of the OCA theory, they are not good candidates to form a currency union.

Chapter 6 continues the analysis started in chapter 5. We attempt to answer two important questions in this chapter. First, do currency unions have any impact on bilateral trade in ECOWAS? Secondly do exchange rate volatility (ERV) has an impact on ECOWAS bilateral trade? These two research questions, especially the first one, play a very important role in determining whether there are any benefits to be derived from the proposed single currency in ECOWAS. To address these questions we applied an augmented gravity equation of international trade using panel data methodology over the period 1980 to 2012. We used pooled OLS (OLS), and fixed effects (FE) estimators to provide estimates for the full period (1980-2012). We estimate the gravity model in both triple and double index forms. We carried out perturbations with alternative exchange rate measures to check the robustness of our results. The fixed effects model

revealed that the existing single currency arrangement in ECOWAS (the WAEMU) has a negative and insignificant impact on exports and imports, negative and significant effect on total trade after controlling for zero trade. With the FE estimator, before accounting for zero trade, we found the exchange rate volatility to be negative and significant on exports, imports and total trade but the effect on all the three trade measures becomes statistically insignificant after controlling for zero trade. These findings are robust with the different perturbations used in the analysis.

In chapter 5 we examined the ECOWAS countries with comparative data analysis with the euro as a benchmark. In chapter 7 we further this analysis with cluster analysis methodology. The aim of the analysis in this chapter is to assess whether ECOWAS countries are similar in terms of their macroeconomic characteristics. We used eight variables in grouping the countries: Synchronisation in the business cycle, trade openness, terms of trade synchronisation, convergence of inflation, volatility in the real exchange rate, government/fiscal balance, debt servicing requirement, and current account balance. We applied a hierarchical clustering technique with the agglomerative algorithm with the highest cophenetic correlation coefficient to merge the countries into groups. The results revealed a high degree of dissimilarities among ECOWAS countries especially within WAMZ. We find the eight WAEMU countries to exhibit high degree of similarities and belong to the same cluster in almost all our clustering results. On the other hand, WAMZ countries are very heterogeneous making them fragmented into different clusters and hardly to find most of these countries in the same cluster with WAEMU countries. We found our results to be robust in different perturbations.

Chapter 8 summarises the findings of our study after a brief background on economic integration in ECOWAS and theory and methodology. The chapter concludes the thesis in section 8.3.2 and provides policy implications and suggestion for further research in the last two sections.

1.4 Conclusions

We draw two conclusions based on our findings. Firstly, the existing trade flows within ECOWAS countries are inadequate to yield economic benefits that could justify the formation of a currency union. Secondly, ECOWAS is not an optimum currency area which means that the fifteen countries together do not exhibit the characteristics that should qualify them to be good candidates for the formation of a currency union.

Chapter 2 Developments in African Economic Cooperation and Integration

2.1 Introduction

This chapter gave the background on the development of Africa's long history of economic cooperation with its aims, objectives and institutional setting. The complexities arising from the multiplicity of structural arrangement are also outlined. The final sections looked at ECOWAS trade liberalisation programme since its formation in 1975 covering free trade arrangement, customs union, capital mobility, free movement of persons and the implementation problems encountered.

2.2 Background

Since the era of independence of African countries, African leaders have been working together towards the unity and integration of the continent. A number of bilateral and multilateral agreements have been signed, see appendix A.1, with the hope of bringing African nations to the common goal and objectives of integration. The initial initiative of the African leaders' effort saw the formation of the Organisation of African Unity (OAU) in 1963 whose main objectives were:

> *'to rid the continent of the remaining vestiges of colonization and apartheid; to promote unity and solidarity among African States; to coordinate and intensify cooperation for development; to safeguard the sovereignty and territorial integrity of Member States and to promote international cooperation within the framework of the United Nations.'(AU web site[1], accessed July 2015)*

Despite the growing number of bilateral and multilateral economic and political treaties in Africa many commentators have pointed out the disappointing performance of the continent in the enhancement of the process of regional integration due to many problems encountered by the regional integration blocks. Among the most important of these problems are: the political instability and bad governance that have plagued many of the countries; the weakness of the national economies and their insufficient diversification; the absence of reliable roads, telecommunications and energy infrastructure; the insufficient political will exhibited by some member States; the bad

[1] http://www.au.int/en/about/nutshell

economic policies in certain cases; the multiplicity of organisations for regional integration with the same objectives; the irregularity in the payment of financial contributions to the budgets of the institutions; the failure to involve the civil society, the private sector and mass movements in the process of integration; the defective nature of the integrational machinery in certain cases (Masson and Patillo, 2005; Mistry, 2000).

The overriding objective of the African economic integration is to overcome the economic disadvantages of small size of the African countries, low per capita incomes, spares populations and narrow resource bases, and of making possible a higher rate of economic growth and development (Asante, 2007). The author further commented that regional integration is not only desirable but also necessary if Africa is to reduce poverty, to industrialise, develop intra-regional trade, strengthen capacities to benefit from globalisation, reduce her vulnerability to fluctuating overseas markets, mobilise and maximise scarce resources of capital and skills, and finally forge the way to effective African unity, both political and economic. However, the failure of the African integration efforts is in no way closer to addressing the economic challenges facing the continent such as the payment of heavy external debts, development financing, regional and continental integration, industrialisation and economic and political governance (Kouassi, 2007). To enable Africa to find effective and lasting solutions to these problems, African leaders realised the need for a total adjustment of the continent's organisation. This consensus led to the Sirte Declaration and the Constitutive Act of the AU (appendix A.1) that led to the creation of the African union in 2000. To enable the AU to achieve its objectives the African Heads of State and Government adopted, in 2001, the New Economic Partnership for Africa's Development (NEPAD) programme. The vision of the African Union is to have

> *'An integrated, prosperous and peaceful Africa, driven by its own citizens and representing a dynamic force in global arena.'*

The main difference between the AU and its predecessor, OAU, is the shift from supporting liberalisation movements in the erstwhile African territories under colonialism and apartheid to Africa's development and integration. In order to achieve its vision, the AU's main objectives which are similar to those of the OAU in many areas include: African unity and solidarity; political and socio-economic integration of Africa; peace, security, and stability; sustainable development; integration of African

economies; raise the living standards of African peoples; coordinate and harmonize the policies between the existing and future RECs for the gradual attainment of the objectives of the union. In order to achieve the integration of Africa as stated in the AU vision, African leaders in 1991, signed the treaty of the African Economic Community (AEC) (appendix A.1) which is the economic wing of the AU. The AEC is the framework for Africa's Economic and monetary integration and this is discussed in the next section.

2.3 African Economic Community (AEC)

In June 1991, the 27th summit of the OAU established in Abuja, Nigeria the African Economic Community (AEC) in order to consolidate the progress of economic integration at the sub regional level and also to enable the continent to better face the challenges posed by the evolving trends in the global economy. Article 44 of the 1991 Abuja Treaty provided that 'in accordance with relevant protocols, member states shall within a time table to be determined by the OAU, harmonise their monetary, financial and payment policies, and boost intra-community trade in goods, services as well as enhance monetary cooperation among member states.' The AEC strategy involves the formation of regional trading blocs, intensification of globalisation and liberalisation. This process is enshrined in the African Monetary Cooperation Programme (AMCP) managed by the Association of African Central Banks (AACB) which meets once a year to review developments on the AMCP. The objectives of the AMCP involve the "adoption of collective policy measures to achieve a harmonized monetary system and common management institution. It envisages the harmonization of the monetary cooperation programmes of the various sub-regional groupings as building blocks with the ultimate aim of evolving a single monetary zone by the year 2021 with a common currency and a common Central Bank at the continental level" (AACB, 2002)

Given the importance of macroeconomic convergence, the measures to achieve the objective of the African Monetary Cooperation Programme would include, the adjustment of exchange rate of member countries to their equilibrium levels, eventual liberalization of current and capital account transactions, adoption of harmonized exchange rate system, harmonization of ceiling on Central Banks' credit to government in order to ensure fiscal policy harmonization and the adoption of market-oriented approach to the conduct of monetary policy.

The ultimate objective of this process of gradual regional and sub-regional integration is the creation of a single monetary zone for Africa by 2021. The rationale of the gradual regional and sub-regional integration programme is that if the sub-regional monetary arrangements are effective and efficient, then the AMCP would be as effective as the sub-regional monetary cooperation groupings and vice-versa. The AEC stipulated six stages through which the AMCP should pass before the formation of the African Monetary Union outlined in the next section.

2.3.1 The six stages of the African Economic and Monetary Integration

The African Monetary Union is intended to be established in stage six. The requirement is that a minimum of 51% of the countries in the various sub-regions will have to fulfil the convergence criteria before the creation of the African Monetary Union.

Stage I (Year 2002-2003)

I. Establishment of Sub-regional Committees of the AACB where they do not exist and revitalization of existing Committees.
II. Adoption by each Sub-region of formal monetary integration programme.

Stage II (Year 2004 - 2008)

I. Harmonization and coordination of macroeconomic and monetary policies as Well as concepts.
II. Gradual interconnection of payments and clearing system.
III. Promotion of African banking networks.
IV. Promotion of sub-regional and regional stock exchanges.
V. Strengthening and harmonization of banking and financial supervision.
VI. Observance of the following macro-economic indicators by year 2008:
    a. Budget deficit/GDP ratio not exceeding 5 per cent.
    b. Central Bank credits to government not exceeding 10 per cent of previous year's tax revenue.
    c. Single digit Inflation rate.
    d. External reserves/import cover of at least 3 months.

Stage III (Year 2009 - 2012)

Observance of the following macroeconomic indicators by year 2012

I. Budget deficit/GDP ratio not exceeding 3 per cent by 2012.
II. Elimination of Central Bank credit to government.
III. Inflation rate of less than 5 per cent.
IV. External reserves/imports cover of equal or greater than 6 months.

Stage IV (Year 2013-2015)

Assessment of macroeconomic performance and negotiation for the establishment of a common Central Bank (Year 2015). At this stage:

I. Countries would be required to consolidate achievements made at the third stage. The activities under this stage would include:
   a. Inflation rate of less than 3 per cent.
   b. Continued observance of macroeconomic indicators of convergence.
   c. The macroeconomic indicators of each country/sub-region would be Assessed against the convergence criteria. A comparative analysis would be made thereafter to the Convergence Council.
   d. Commissioning of a study on the establishment of an African Exchange Rate Mechanism.

Stage V (Year 2016-2020)

Finalization of arrangements required for the launching of the African Monetary Union (2016 - 2020). This is the completion stage before the take-off of the common Central Bank. The following activities are expected to be undertaken:

I. Preparation of institutional, administrative and legal framework for setting up the common Central Bank and currency of the African Monetary Union.
II. Adoption of the institutional, administrative and legal framework for the setting up of the common Central Bank and currency of the African Monetary Union.
III. Review of commissioned study on the African Exchange Rate Mechanism and operationalization of Exchange Rate Mechanism.
IV. Appointment of key officers of the Common Central Bank.
V. Preparation for the introduction of a common currency.
VI. Recruitment of staff of the Bank.
VII. Mid-term assessment of country performance.
VIII. Final assessment of countries' performance against convergence criteria.

Stage VI (Year 2021)

The stage involves the introduction and circulation of the common African currency (2021) and a transitional period during which sub-regional monetary institutions would operate alongside the African Central Bank.

2.4 Regional Economic Communities (RECs)

The operation of AEC, relies on the regional economic communities (RECs) as its pillars. There are many, 14 according to Asante, regional economic communities established for the African integration. Most of these integration schemes have duplicating and overlapping membership and mandates and also they are very poorly funded (Asante, 2007). The RECs, taken from different sources, are listed below and some of these are described in this section.

I. Arab Maghreb Union (AMU)
II. Central African Economic and Monetary Community (CAEMC)
III. Common Market for Eastern and Southern Africa (COMESA)
IV. Community of Sahel-Saharan States (CEN-SAD)
V. East African Community (EAC)
VI. Economic Community of Central African States (ECCAS)
VII. Economic Community of Great Lakes Countries (CEPGL)
VIII. Economic Community of West African States (ECOWAS)
IX. Indian Ocean Commission (IOC)
X. Inter-Governmental Authority on Development (IGAD)
XI. Mano River Union (MRU)
XII. Southern Africa Customs Union (SACU)
XIII. Southern Africa Development Community (SADC)
XIV. West African Economic and Monetary Union (WAEMU)
XV. West African Monetary Zone (WAMZ)

2.4.1 Southern African Development Community (SADC)

SADC was established in a Treaty of Heads of member states in August 1992 in Windhoek (Namibia). The treaty was a transformation of its predecessor, the Southern African Development Coordination Conference (SADCC) which was established in the Lusaka (Zambia) Declaration in April 1980. The transformation of SADCC to SADC

followed the end of the struggle against colonialism in the region with a shift to economic integration. As at October 2012 the membership of SADC, comprised of 15 countries (see appendix A.2). The SADC Mission is

> *"To promote sustainable and equitable economic growth and socio-economic development through efficient productive systems, deeper co-operation and integration, good governance, and durable peace and security, so that the region emerges as a competitive and effective player in international relations and the world economy" (SADC, 1992).*

Some of the objectives of SADC (Article 5 of the treaty) include: sustainable and equitable economic growth; poverty alleviation; enhance the standard and quality of life of the people of Southern Africa through regional integration; common political values; self-sustaining development; utilisation of resources of the Region; combat HIV/AIDS or other deadly and communicable diseases.

2.4.2 Common Market for Eastern and Southern Africa (COMESA)

The idea of the establishment of COMESA was given impetus by the economic commission for Africa (ECA) who convened a meeting of the newly independent states of the two regions, in 1965, to consider the proposal for the creation of a system for the promotion of sub-regional economic integration. The first initiative to this call saw the signing of a treaty in Lusaka on 21st December 1981 to establish the preferential trade agreement (PTA). The treaty came into force on 30th September 1982. The aim of the PTA was to take advantage of large market size, to share the region's common heritage and destiny and to allow greater social and economic co-operation with the ultimate objective of creating an economic community. The plan was to gradually upgrade the PTA over a ten-year period to a common market until the community had been established. The transformation of the PTA to a common market took place on 5th November 1993 when the treaty that established the common market for eastern and southern Africa (COMESA) was signed in Kampala (Uganda) which came into force on 8th December 1994 after its ratification in Lilongwe (Malawi). Both the formation of the PTA and its subsequent transformation to a common market are consistent with the objectives of the African integration agenda stated in the Lagos Plan of Action (LPA) and the Final Act of Lagos (FAL) of the OAU. The membership of COMESA is shown in appendix A.2 and its vision is to

> *"be a fully integrated, internationally competitive regional economic community with high standards of living for all its people ready to merge into an African Economic Community"*

and the mission is to

> *"Endeavour to achieve sustainable economic and social progress in all Member States through increased co-operation and integration in all fields of development particularly in trade, customs and monetary affairs, transport, communication and information, technology, industry and energy, gender, agriculture, environment and natural resources", the Secretariat was guided to develop its specific Mission Statement as follows: "To provide excellent technical services to COMESA in order to facilitate the region's sustained development through economic integration" (COMESA, 1992).*

Some of the aims and objectives of COMESA, as in Article 3 of the Treaty include: sustainable growth and development; joint development in all fields of economic activity; joint adoption of macro-economic policies and programmes to raise the standard of living of its peoples; peace, security and stability; contribute towards the realisation of the objectives of the AEC.

2.4.3 East African Community (EAC)

The EAC has an evolutionary history as it has gone through successive regional integration arrangements ranging from co-operation and finally to community. It all started in 1917 when Kenya and Uganda formed a customs union which was later joined in 1927 by the then Tanganyika. Since then the co-operation, in the region, has taken different forms: The East African High Commission (1948-1961); the East African Common Services Organisation (1961-1967); the East African Community (1967-1977) and the East African Co-operation (1993-2000). In 1984 the former members of EAC signed an agreement for the division of its assets and liabilities following it dissolution in 1977 although the agreement made a provision for future cooperation. On the 30th November 1993 the three member states, after series of meetings, signed an agreement for the establishment of the Permanent Tripartite Commission for East African Co-operation. The secretariat of the commission was launched at the Headquarter Arusha (Tanzania) marking the commencement of full operation of East African Co-operation. The need to consolidate regional co-operation motivated members toward the preparation of a treaty for the establishment of East African Community (EAC) which was signed in Arusha on 30th November 1999. The treaty became effective on 7th July 2000. The EAC established a customs union in its

March 2004 protocol which became operational in January 2005. Rwanda and Burundi joined the EAC in July 2007 and the EAC common market was created in November 2009. Article 5 of the EAC treaty states the objectives of the community as:

> *"to develop policies and programmes aimed at widening and deepening co-operation among the Partner States in political, economic, social and cultural fields, research and technology, defence, security and legal and judicial affairs, for their mutual benefit. In pursuance of these objectives the members states agree to establish among themselves and in accordance with the provisions of the Treaty, a Customs Union, a Common Market , subsequently a Monetary Union and ultimately a Political Federation in order to strengthen and regulate the industrial, commercial, infrastructural, cultural, social, political and other relations of the member states to the end that there shall be accelerated, harmonious and balanced development and sustained expansion of economic activities, the benefit of which shall be equitably shared" (EAC, 1999).*

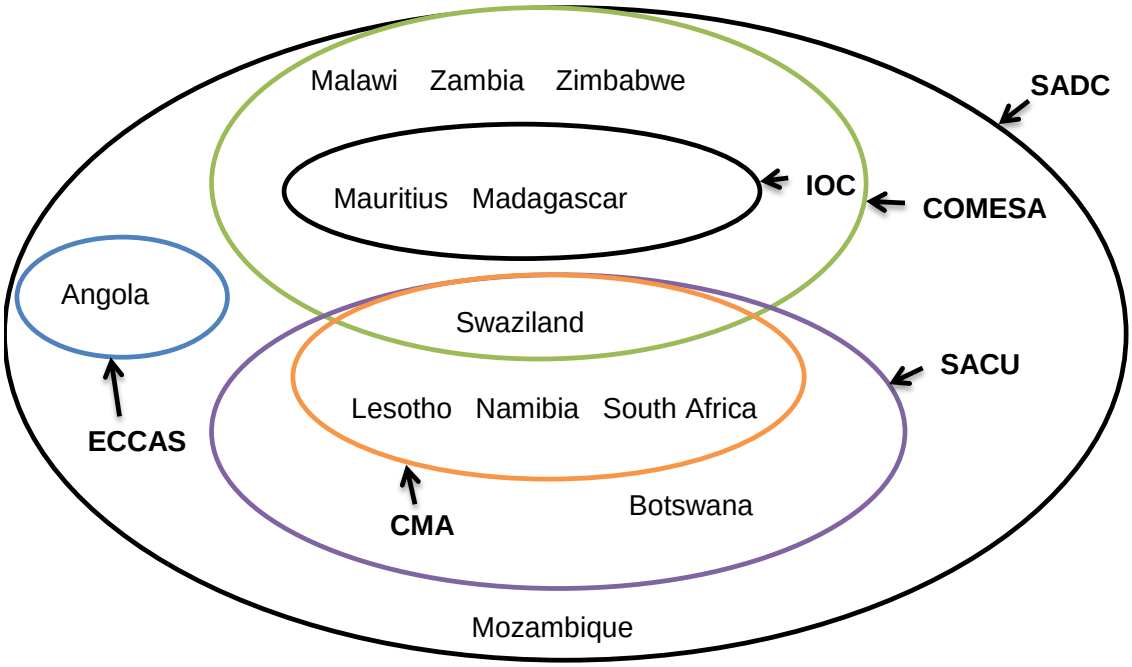
2.4.4 COMESA-EAC-SADC (CES)

The COMESA-EAC-SADC (CES) Tripartite Arrangement was launched in October 2008 which represents a further step in the regional integration agenda. The idea started in 2006 when the CES Tripartite Arrangement was created to assist in the process of harmonising programmes and policies within and between the three Regional Economic Communities of COMESA, EAC and SADC and to advance the establishment of the African Economic Community.

The three main pillars of the Tripartite strategy, as contained in the Vision and Strategy document that was endorsed at the second Tripartite Summit in June 2011 are Market Integration, Infrastructure Development and Industrial Development. The launch of the CES is an attempt not only to address the problem of multiple memberships (see figure 2.1) but also to facilitate the collaboration of the RECs and subsequent merger into one REC. According to the African Development Bank Group (2011), CES Tripartite Arrangement covers 26 countries accounting for 56% of the population and 58% of the combined GDP of Africa in 2008. The key provisions of the CES Tripartite arrangement include: (i) establishing CES tripartite Free Trade Agreement to promote deeper trade integration; (ii) developing joint infrastructure programmes, financing and implementation; (iii) designing joint programmes for agricultural development and food security; (iv) developing programmes to enhance the movement of business persons, labour and services across the region; (v) harmonising legal and institutional

framework; and (vi) preparing common regional positions and strategies in multilateral and international trade negotiations.

Figure 2.1 Southern and East African Integration blocs



Source: (ADB, 2011:4)

2.4.5 The Community of Sahel-Saharan States (CEN-SAD)

CEN-SAD was founded in 1998 following the Conference of Leaders and Heads of States held in Tripoli. The treaty on the creation of the community was initially signed by five countries. Since then, its membership has expanded to 23 members (see appendix A.2). CEN-SAD is a framework for integration and complementarity. It intends to work, together with the other regional economic communities and the Organization of African Unity, to strengthen peace, security and stability and achieve global economic and social development. CEN-SAD was established to achieve the following objectives:

I. Establishment of a comprehensive economic union based on a strategy implemented in accordance with a developmental plan that would be integrated

in the national development plans of the member states. It includes investment in the agricultural, industrial, social, cultural and energy fields.

II. Elimination of all obstacles impeding the unity of its member states through adopting measures that would guarantee the following:

- Facilitating the free movement of individuals, capital and meeting the interest of member states citizens.
- Freedom of residence, work, ownership and economic activity.
- Freedom of the movement of national goods, merchandise and services.
- Encouragement of foreign trade through drawing up and implementing an investment policy for member states.
- Enhancement and improvement of land, air and sea transportation and telecommunications among member states through the implementation of joint projects.
- Consent of the community member states to give the citizens of member states the same rights and privileges provided for in the constitution of each member state.
- Coordination of pedagogical and educational systems at the various educational levels, and in the cultural, scientific and technical fields

2.5 Economic Community of West African States (ECOWAS)

In May 1975, fifteen sub-Saharan African countries formed ECOWAS as a regional organisation. Its mission is to promote economic integration in all fields of economic activity, particularly industry, transport, agriculture, natural resources, commerce, monetary and financial issues, social and cultural matters. The vision of the founders of ECOWAS was born out of the realisation that the domestic markets of the member States taken individually were, as a result of their smallness, far from being competitive in a world environment marked by the existence of large trade blocs. ECOWAS's actions to achieve its objectives include: suppression of customs duties and equivalent taxes, establishment of a common external tariff, harmonisation of economic and financial policies, creation of a monetary zone.

The aims of the Community, as stated in Article 3 of ECOWAS revised treaty (1993), are to promote co-operation and integration, leading to the establishment of an economic union in West Africa in order to raise the living standards of its peoples, and

to maintain and enhance economic stability, foster relations among Member States and contribute to the progress and development of the African Continent. To achieve these aims ECOWAS sets out a number of objectives as follows:

1. The harmonisation and co-ordination of national policies and the promotion of integration programmes, projects and activities, particularly in food, agriculture and natural resources, industry, transports and communication, energy, trade, money and finance, taxation, economic reform policies, human resources, education, information, culture, science, technology, services, health, tourism, legal matters.
2. The harmonisation and coordination of policies for the protection of the environment.
3. The promotion of the establishment of joint product enterprises.
4. The establishment of common markets through:
   I. The liberalisation of trade by the abolition, among member states, of customs duties levied on imports and exports, and the abolition, among member states, of non-tariff barriers in order to establish a free trade area at the community level.
   II. The adoption of a common external tariff and a common trade policy vis-à-vis third countries.
   III. The removal, between member states, of obstacles to the free movement of persons, goods, service, and capital, and to the right of residence and establishment.
5. The establishment of an economic union through the adoption of common policies in the economic, financial, social, and cultural sectors, and the creation of a monetary union.
6. The adoption of measures for the integration of the private sectors, particularly the creation of an enabling environment to promote small and medium scale enterprises.
7. The promotion of balanced development of the region, paying attention to the special problems of each member state particularly those of landlocked and small island member states
8. The encouragement and strengthening of relations and the promotion of the flow of information particularly among rural populations, women and youths organisations and socio-professional organisations such as associations of the media, business men and women, workers, and trade unions.

9. The adoption of a community population policy which takes into account the need for a balance between demographic factors and socioeconomic development
10. The establishment of a fund for cooperation, compensation and development.

2.5.1 ECOWAS Monetary Cooperation Programme (EMCP)

The ECMP reflects on the African Monetary Cooperation Programme which is design to achieve the sub regional integration in West Africa. The ECOWAS integration programme outlined in the ECMP is monitored by the West African Monetary Agency (WAMA). It requires member states to fulfil the convergence criteria shown in appendix A.3. Macroeconomic performance of ECOWAS in meeting the convergence criteria is disappointing leading to series of postponements of the single currency project with the most recent date of 2020. Several reasons have been mentioned as responsible for this, some of which have already been mentioned in the general African problems above. In addition to that Adedeji (2002) commented that overconcentration on the choice of institutions needed for integration rather than actually building of the community has tended to weaken the effectiveness of regional integration arrangement (RIA) and their relevance. He cited the ECOWAS Executive Secretary in his silver jubilee interim report (2000):

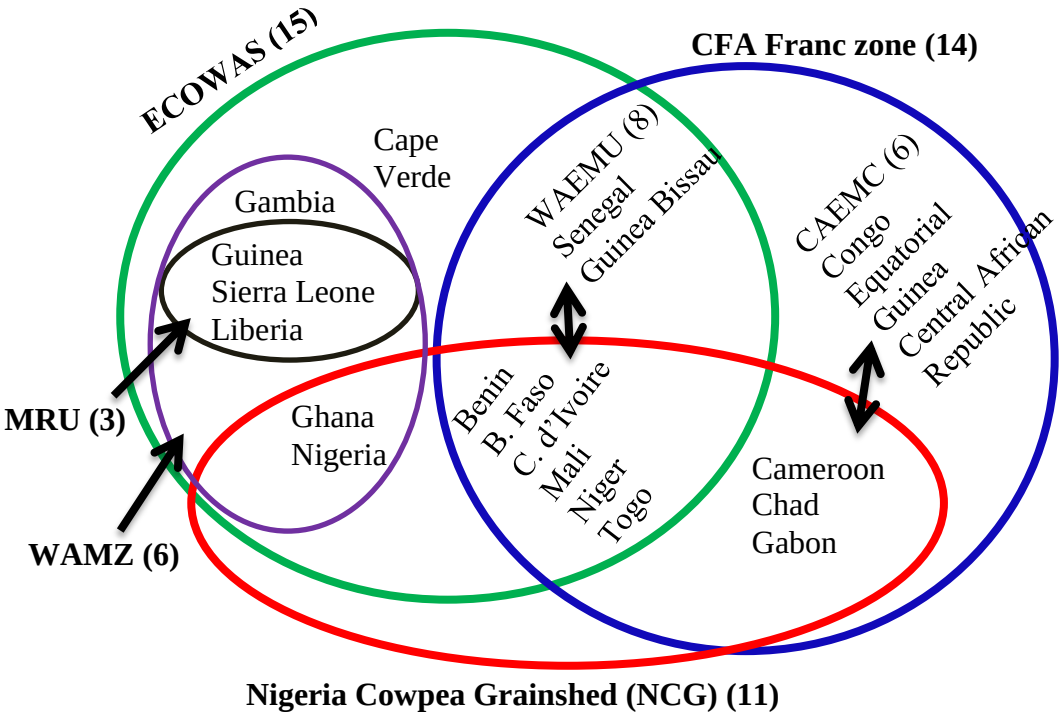
> *"instead of asking with whom, in what context and under what conditions integration might be possible, attention has rather been on the institutions to be established and the measures to be promoted. Giving priority to identifying institutional arrangements completely diverts attention from the vital tasks of determining socio-economic objectives and setting priorities."*

It is also argued that the overlapping sub-regional economic cooperation; ECOWAS, WAEMU, CEMAC, MRU, NCG and WAMZ; as shown in figure 2.2 is another obstacle to the ECOWAS integration effort. Currently eight of the fifteen ECOWAS countries, mainly French speaking, are in a monetary union known as WAEMU with the CFA as its single currency. Other six countries in the CFA are in Central Africa and have a separate monetary union known as CEMAC as in figure 2.2. The two linked CFA currency unions, WAEMU and CEMAC, are both pegged to the Euro and supported by France but with different central banks. The six CEMAC countries fall outside the scope of this thesis. In the two track approach to the ECOWAS single currency the other six ECOWAS countries- Nigeria, Ghana, The Gambia, Sierra Leone, Liberia and Guinea- are expected to form a second monetary zone known as WAMZ

with ECO as its proposed currency. Cape Verde was given the option to join either of the two monetary zones although up to date it has not done so.

After series of postponements from 2005 to 2009 then 2015 due to lack of convergence the ECO has not been able to exist. Overall plan was to have the two monetary zones running side by side and by 2020 they are merged into one to form the ECOWAS single currency. The lack of progress in meeting convergence criteria which is holding back the single currency project has led to Heads of State and Government in their 2007 Abuja summit to call for a review of the current two track approach with the aim of replacing it with a single fast-track approach. In response to this call, WAMA/ECOWAS joint secretariat convened a meeting in Freetown, July 2007. During that meeting WAMA presented a paper with three options recommended for the way forward to the single currency. These options are outlined in the next section.

Figure 2.2 ECOWAS's overlapping Integration blocs



Note: B.Faso=Burkina Faso, C.d'Ivoire=Cote d'Ivoire
Source: Author's construction

2.5.2 Fast Tracking the ECOWAS single currency project

After considering the time needed for market interactions on the conclusion of the WAMZ project by 2009 and subsequent negotiations for the merger of WAMZ and

WAEMU blocks, WAMA was not optimistic that the realisation of the ECOWAS single currency project was feasible within the time frame in current two track proposal. In view of the need to fast track the monetary cooperation programme and also of the fact that some countries have met the basic criteria, WAMA presented a paper recommending three options each of which to be implemented by 2010.

OPTION 1: Creating the ECOWAS monetary union on the basis of prescribed eligibility quantitative and qualitative convergence criteria: Under this option each of the fifteen member states are expected to join the proposed Monetary Union as separate states based on prescribed eligibility criteria with no preferential treatment to any member state. This option is based on the assumption that the second monetary zone (WAMZ) project will continue, with all its programmes, until 2009 but without the need to establish the West African Central Bank (WACB) and the introduction of the WAMZ single currency (the ECO). It was further emphasised that the feasibility of this option largely depends on the successes achieved under the current two-stage approach. A further recommendation for this option was that countries should put measures in place to sustain the achievements already made on the convergence process which may include the harmonisation of the diverse macroeconomic convergence criteria, strengthening the quality of multilateral surveillance, introduction of sanctions to curtail non-compliance with the prescribed benchmarks and the immediate establishment of the community central bank.

OPTION 2: Creating the ECOWAS monetary union by political fiat with no prior preconditions. This option suggests an instant monetary unification of all ECOWAS countries with effect from a mutually agreed date to be specified by the political and monetary authorities. The option is based on the argument that the formation of a monetary union is basically a political decision on the recognition of geographical and cultural interdependence, commonality of political destiny and the need for solidarity among countries. The implication of this option is that macroeconomic convergence and policy harmonisation will be considered ex-post rather than ex-ante. This option has some support in the endogeneity literature where it is empirically found that countries in a monetary union are likely to converge more than before they enter the monetary union and also post monetary union is more likely to make business cycle synchronous than

the pre-monetary union (Rose, 1998). However this argument has empirical opposition (Krugman, 1993). There will be more on this argument later in chapter 4.

The WAMA report acknowledged that whilst this option has the advantage of being the easiest way forward to unification within the shortest possible time, its technical feasibility appears doubtful due to the divergent economic fundamentals between countries and instances of macroeconomic instability that cannot support the sustainability and credibility of the proposed single currency.

OPTION 3: Creating the ECOWAS monetary union through accession by the non-WAEMU zone countries to the existing WAEMU. This option involves the ECOWAS Heads of State to agree for members of the non-CFA zone countries to join WAEMU. Although it is a political decision the eligibility for accession by member states should be based on macroeconomic, legal and other considerations. The central bank of any country that adopts the CFA (WAEMU) will be transformed into a branch of BCEAO (the WAEMU central bank). The argument of this option is that WAEMU has the requisite technical ability to serve as the nucleus for an ECOWAS wide monetary union and also provides the certainty for macroeconomic stability for new entrants due to the price stability observed in WAEMU and the efficient monetary policy of (BCEAO). It is also argued that this approach has relatively insignificant costs of transition to ECOWAS monetary union compared to the situation where regional union were to be designed from scratch. However the potential problem highlighted in the report is the monetary policy links of the BCEAO and the French Treasury and the general conception that BCEAO and the CFA are accessories of the French colonial system in Africa.

Despite all these developments, the ECOWAS single currency project has suffered another disappointing date. The launch of the ECO proposed for January 2015 has not materialised. The most recent decision taking in July 2014 by the Heads of State is that the WAMZ single currency programme under the two-track approach has been merged with the ECOWAS wide single currency programme to form a single track to the ECOWAS single currency to be launched in 2020. This decision is reflected in the executive summary of the ECOWAS 2014 annual report which states

"On the bid to accelerate progress towards the realisation of the ECOWAS single currency by 2020, the single track approach for the monetary integration programme was adopted leading to the rationalisation of the macroeconomic convergence criteria and the revision of the roadmap for the ECOWAS single currency (ECOWAS, 2014:14)."

2.6 ECOWAS liberalisation of Trade and Migration

We stated the aims and objectives of ECOWAS in section 2.5. We noticed the emphasis on integration and the formation of economic union and raising the living standards of the people. To achieve these, one of its objectives as we have also seen is the establishment of a common market through the channels of trade liberalisation, common trade policy and common external tariffs, removal of obstacles to the mobility of persons. This section discusses these important areas of the ECOWAS Treaty.

2.6.1 Free movement of goods and Customs Union

Economic development, poverty reduction and self-reliance are fundamental in the ECOWAS cooperation agenda. One of the channels of achieving this aim is trade. Since its formation in 1975, ECOWAS has made several moves to foster the intra-regional trade. Trade liberalisation is paramount in article 2 of the May 1975 treaty and article 3 of the July 1993 ECOWAS revised treaty. As already stated in the revised treaty one of the objectives of achieving the ECOWAS aim is to establish a common market through the liberalisation of trade. This involved the abolition of customs duties on both imports and exports, the removal of all non-tariff barriers in order to establish a free trade area at the community level, the adoption of a common external tariff and a common trade policy and the removal of obstacles to the free movement of persons, goods, services and capital. On trade liberalisation, article 12 of the 28 May 1975 ECOWAS treaty states

"There shall be progressively established in the course of a transitional period of fifteen (15) years from the definitive entry into force of this treaty,…a customs union among the members. Within this union, customs duties or other charges with equivalent effect on imports shall be eliminated. Quota, quantitative or like restrictions or prohibitions and administrative obstacles to trade among the member states shall also be removed. Furthermore, a common customs tariff in respect of all goods imported into the member states from third countries shall be established and maintained."

The first stage (1975-77) of implementation of the trade liberalisation scheme was the collation of information about customs duty. Stage 2 (1977-85) was the reduction and

elimination of import duties. A common external tariff was expected to be established by 1990 and duties on imports from third countries were to be eliminated. This was, however, never achieved due to the lack of agreement by member states on a trade liberalisation scheme or to establish a common external tariff due to the differences in the individual country tariff preferences and those of the Francophone countries (Okolo, 1988). ECOWAS attempted to overcome this problem in 2000 (Bamako summit) by adopting the UEMOA common external tariff structure comprising the rates of (0%, 5%, 10%, and 20%) which are lower than the tariff rates charged in some of the member states on some of their products Kufuor (2006:118). This adoption enabled the standardisation of customs forms, procedures and processes of member states. Supporting evidence on the failure of the trade liberalisation scheme could also be deduced from the wording of the same trade liberalisation objective in the 1993 ECOWAS revised treaty appears to suggest that success in the area of free trade and customs unions to lead to a common market has not been achieved. Article 35 (on trade liberalisation) of the ECOWAS 1993 revised treaty states

> *"There shall be progressively established in the course of a period of ten (10) years effective from 1 January, 1990… a customs union among the member states…"*

The trade liberalisation clause has not change in the revised treaty except for the target date of achieving the common market from 15 to 10 years at a time when we should have expected the market to be in full operation.

2.6.2 Compensation for loss of revenue

Realising the potential loss of revenue resulting from the application of the trade liberalisation provision of the treaty the community made a provision for compensation for such loss of revenue. For this purpose article 21 of the revised treaty established a fund for cooperation, compensation and development establishment, status and functions. Article 25 of the May 1975 ECOWAS and article 48 of the revised treaty (1993) requires the council of ministers, to determine the appropriate compensation to be paid to a member of state which has suffered loss of import duties as a result of the application of the provision of the treaty. The formula used for this purpose, as stated in supplementary protocol (A/P2/1/03) is

$$CRL = (Cde + Str)Vcif$$

Where
CRL = Customs revenue lost
Cde = customs duty and taxes of equivalent effect
Str = Statistical taxation rate
Vcif = CIF value of product

The protocol excludes compensation for loss of revenue from internal taxes on locally produced goods and imports from within the community. Article 6 of the protocol stipulated the amount payable as compensation on a decreasing scale as in table 2.1.

Table 2.1 ECOWAS revenue loss compensation policy

A/P2/1/03	A/SP1/12/03
100% of loss incurred in 2002	100% of loss incurred in 2004
80% of loss incurred in 2003	80% of loss incurred in 2005
60% of loss incurred in 2004	60% of loss incurred in 2006
30% of loss incurred in 2005	30% of loss incurred in 2007
0% of loss incurred with effect from 1 January 2006	0% of loss incurred with effect from 1 January 2008

The above protocol (left) was amended in another protocol of A/SP1/12/03 (right) in which the same compensation calculation above was extended from 2004 to 2008.

Despite this compensation policy in place its implementation was actually problematic as reported by the ECOWAS executive secretary in his 2000 report. The problem of the implementation of the compensation policy is caused by the ECOWAS lack of own fund to pay compensation due to the affected member states. This caused the reluctance of member states to accord preferential tariffs for the fear of not receiving the expected compensation. ECOWAS decision following this problem was that UEAMOA should retain its system of reducing level of compensation until its expiry date of 2006 and ECOWAS should also adopt a reducing level of compensation along the same lines as UEMOA, with an expiry date of 2008 as shown above.

2.6.3 Free movement of persons

Article 27 of the ECOWAS Treaty (1975) provide for the citizens of member States to be given free entry into any community states without the need to hold a visa or residence permit. To effectively implement this article the member States of ECOWAS

signed a protocol in Dakar on 29th May 1979 relating to free movement of persons, residence and establishment. According to article 2 of this protocol the community citizens have the right to enter, reside and establish in the territory of member states. A maximum transition period of 15 years was stipulated from the date of this protocol for all barriers to be removed. The May 1979 protocol stipulated (article 2, paragraph 3) three phases for the accomplishment of the right of entry, residence and establishment as follows:

Phase I: Right of entry and abolition of visa (5th June 1980- 4th June 1985)

Phase II: Right of residence (4th June 1985- 4th June 1990)

Phase III: Right of establishment (4th June 1990 -)

In phase I community citizens visiting another community state requires no visa if the visit is within 90 days but require the holding of valid travel document and international health certificate. However an application for permission to extend visit beyond the 90 days limit was required. On the 6 July 1985 another protocol A/DEC. 2/7/85 was signed relating to the establishment of ECOWAS travel certificate for member states. The travel certificate was established to be used and recognised for travelling within ECOWAS without the need to hold national passports.

On the expiration of the deadline for Phase I another supplementary protocol on the second phase (right of residence) was signed in Abuja on 1 July 1986. Article 3 of this protocol states the right of residence to include the right:

I. To apply for jobs effectively offered
II. To travel for this purpose, freely, in the territory of the community
III. To reside in one of the member states in order to take up employment in accordance with the law of the states
IV. To live in the territory of member states after having held employment there.

In Phase II citizens of the community who are admitted in another states without visa but desire to reside in that territory are obliged to obtain an ECOWAS residence card or residence permit (article 5). However the application for a residence card is governed by the rules and regulations of individual member states.

Phase III (right of establishment) of the free movement of persons, right of residence and establishment was enacted in a supplementary protocol (A/SP 2/5/90) signed in

Banjul on 29 May 1990. This phase marks the completion of ECOWAS effort to establish a uniform implementation of its objective on free movement of persons, goods, services, within the community. The May 1990 protocol gave ECOWAS citizens the right to settle or establish in another member state and have access to economic activities and setting up enterprises under the same conditions as the national of the particular state of residence. While this protocol discourages discrimination between nationals and non-nationals of ECOWAS citizens, paragraph 2 of article 2 allows such a practice by member states for a given specific activity, although such should be justified. The protocol further states that other member states shall not be bound to accord non-discriminatory treatment to nationals and companies of the state concerned.

2.6.4 Free movement of capital

The transformation of the ECOWAS cooperation programme is reflected in its revised treaty of 24 July 1993. The key additional emphasis in the revised treaty is the integration of ECOWAS following the continent wide economic integration agenda in the treaty that established the AU. To promote the integration and formation of ECOWAS monetary union the importance of integrating the monetary and financial sector was brought on board. This is seen in articles 51 and 53 of the ECOWAS revised treaty which required member states to

I. Harmonise their monetary, financial and payment policies,
II. Facilitate the liberalisation of intra-regional payments transactions,
III. Promote the role of the commercial banks in intra-community trade financing,
IV. Improve the multilateral system for clearing of payments transactions between member states
V. Take necessary measures to promote the activities of WAMA so as to ensure convertibility of currencies and creation of a single currency zone.
VI. Establish a common central bank and a common currency zone.

The revised treaty also set up a capital issues committee whose duties are to:

I. Ensure the uninterrupted flow of capital within ECOWAS through
   - The removal of controls on the transfer of capital among the member states in accordance with a set time table

- The encouragement of the establishment of national and regional stock exchanges
- The integration of capital markets and stock exchanges

II. Ensure that nationals of member states are given the opportunity of acquiring stocks, shares and other securities or otherwise of investing in enterprises in the territories of other member states

III. Establish machinery for the wide dissemination in the member states of stock exchange quotations of each member state.

IV. Ensure appropriate system for the regulation of the capital market to ensure its proper functioning and protection of investors.

2.6.5 Sanctions for non-fulfilment of obligations

The revised ECOWAS treaty made provision in article 77 for the imposition of sanctions on member states failing to fulfil its obligations to the community. At the decision of the authority the sanctions may include:

I. Suspension of new community loans or assistance,

II. Suspension of disbursement on on-going community projects or assistance programmes'

III. Exclusion from presenting candidates for community posts

IV. Suspension from voting

V. Suspension from participating in the activities of the community

The decision to sanction a member is based on the circumstances surrounding the non-fulfilment failure and the supporting evidence.

2.7 Progress and obstacles on Trade liberalisation

Despite the continuous attempts by the ECOWAS authority to progressively eliminate all forms of trade barriers in order to establish a free trade area, customs union and then a common market with the hope of a balanced and enhanced growth in the region through larger and competitive market the achievements of the community has fallen far below expectations (Okolo, 1988). The failure of ECOWAS in its aspiration to foster intra-regional trade has been associated with a number of obstacles ranging from the sub regional factors, international and domestic forces acting interactively. The first obstacle, as already mentioned earlier, is members' disagreement on a trade

liberalisation scheme and the diversity of tariff preferences in the region. The removal of non-tariff barriers was initially left at the discretion of member states which may have contributed to the failure of meeting the May 1985 target for their complete elimination. Okolo (1988) classified the obstacles to ECOWAS trade liberalisation agenda into five categories which we discussed in the next few sections.

2.7.1 The nature of West African economies

In this grouping Okolo (1988) raised among other things the unequal distribution of ECOWAS population and GDP which are mainly dominated by Nigeria and also the fact that West Africa is a region of poverty and economic underdevelopment. The second obstacle under this category is that the economic activities of the region heavily relied on primary production. Exports of all ECOWAS countries are dominated by agriculture and/or extractive industries. The contribution of the manufacturing sector to total output is very small. The similarity in the endowment of natural resources made the ECOWAS countries competitive in the world market rather than being complementary. For instance gem and industrial diamonds are found in Sierra Leone, Ghana, Liberia, Nigeria, Mauritania, and many other countries. Agricultural produce such as cocoa beans, groundnuts, palm kernels, wood and wood products, pineapples etc are common in most West African countries. Due to this primary produce dependency ECOWAS intra-regional trade is dominated mainly by food items, handicrafts and petroleum and petroleum products from Nigeria (the world sixth largest oil producer) and few other countries. The nature of the ECOWAS economies is such that trade at the horizontal level is limited leaving trade pattern of these countries to vertically interact with mainly industrialised countries making it impossible to gain from comparative advantage. The problem is compounded by the affiliation of ECOWAS member states with the EU where they are accorded preferential treatment on duties, hence diverting their trade attention from the sub-region to those countries where they feel can derive greater benefit.

2.7.2 Transport and communication facilities

Inadequate transport and communications facilities in and among member states, in the form of road, rail, sea or air, are considered one of the obstacles to ECOWAS intra-regional trade. There are few trans-West African ways linking ECOWAS countries. The available roads are mostly in deplorable conditions with bumps, slippery, muddy

depending on the season of the year and sometimes even breakdowns of trucks causing undue delay in shipment of goods. The road conditions create risk of shipping perishable items, mainly food and therefore discourage intra-regional trade.

Even if the roads are available another related problem is the lack of vehicles to move goods from one country to another. It is also evident in table 2.2 that the number of check points existing in highways may act as another hindrance on the free and speedy movement of goods and people. The delays at these checkpoints and the extortion of money from travellers and drivers may act as a disincentive to cross border trading.

Table 2.2 Checkpoints along intra-ECOWAS Highways

High Ways	Distance (KM)	Checkpoints	Check points posts/100km
Lagos-Abidjan	992	69	7
Cotonou-Niamey	1036	34	3
Lome-Ouagadouou	989	34	4
Accra- Ouagadouou	972	15	2
Abidjan-Ouagadouou	1122	37	3
Niamey-Ouagadouou	529	20	4

Source (McDonald, 2005)

2.7.3 Currency problems

The multiplicity of currencies in ECOWAS is also said to be a problem to intra-regional trade. There are many but weak currencies in the region most of which are not convertible to each other except those that are pegged to outside currencies e.g. Liberian dollar and the CFA. The multiplicity of currencies also create the exchange rate risk and uncertainty, a problem that is usually associated with the persistent of underground trading in the form of cross border smuggling expanding unrecorded trade which is usually argued to be substantial. In ECOWAS, smugglers usually purchase locally manufacture goods at discounted black market rate and smuggle the goods to countries whose currency is convertible. They then use the sales proceeds to buy goods in that country and smuggled them back to their country thus creating an environment in which local manufacturers may not be able to compete. The existence of smuggling activities thus prevents the official exports of goods for which demand exists. Smuggling of this

type was said to have benefited stronger currency countries with external peg such as the CFA and Liberia dollar.

2.7.4 Competition from other sub-regional economic unions

The existence of sub-regional intergovernmental organisations such as the Mano River Union (MRU) and WAEMU who also has free trade and customs union objectives made the ECOWAS trade liberalisation scheme more problematic.

2.7.5 Legal and administrative problems

Lack of members' commitment to comply with the ECOWAS treaties and protocols especially those relating to trade liberalisation have been mentioned as one of the impediments to the success of the liberalisation scheme. In some cases questionnaires sent to member states for data collection to assess the impact of trade liberalisation by the ECOWAS secretariat are not really responded to and even follow up reminders made no difference. Added to the administrative bottle necks are the complication arising from the implementation of the regional mechanism for approval procedures for industrial products which are increasingly cumbersome and time consuming. The community's requirements for a certificate of origin and an exports declaration form for goods originating from the community, particularly unprocessed goods, worsened the problem of compliance to the scheme (McDonald, 2005).

2.7.6 Loss of Revenue from tariff collection

Elimination of trade barriers in countries that are mostly dependent on tariff revenue as sources of government revenue complicates the inter-temporal trade-off between the long term benefits that trade liberalisation may bring and the immediate benefits of tariff collection. There is a high adjustment costs involved through loss of revenue from tariffs and in the absence of a credible and sustainable compensation scheme compliance with removal of trade barriers cannot be guaranteed. As already mention earlier due to lack of its own fund ECOWAS compensation scheme was not effectively operational hence hindering compliance by member states.

2.8 Progress and obstacles on liberalisation of labour mobility

Facilitating free movement of goods, services, capital and persons is paramount on the ECOWAS agenda. The steps taken by ECOWAS to realise this objective since its

formation in 1975 have already been discussed above. We have already described the obstacles to trade liberalisation and this section focuses on the obstacles on the free movement of persons in the community.

2.8.1 Economic booms and burst

In highly diverse economies like ECOWAS a boom in one country attracts migrants, especially those from poorer countries. For instance the oil boom in Nigeria in the late 1970s and early 1980s saw a number of job seeking immigrants from neighbouring countries to Nigeria. The oil boom was followed by a rapid decline in Nigeria's economy which led to a fall in living and working conditions, currency devaluation, high inflation, wage freeze and other related economic and social problems. In 1983 and mid 1985 the deteriorating economic situation in Nigeria left the Government with no option but to revoke Articles 4 and 27 of the ECOWAS protocol, on the free movement of persons, to expel 0.9-1.3 million illegal immigrants, most of whom were Ghanaians (Adepoju, 2002). The ratification of the second phase of the ECOWAS protocol on the right of residence, which came into effect in July 1986 coincided at the time when Nigeria was implementing the structural adjustment programme. In June 1985, Nigeria expelled another 0.2 million illegal immigrants due to the deepening crisis. This development especially from Nigeria, the dominant player who should be a role model, was against the spirit of the regional integration agenda that was envisaged by the founders of ECOWAS.

2.8.2 Gender specific problem

For several reasons, in West Africa, men migrate much more than women. When women migrate they are more affected by gender specific problems. A number of problems handicapped female migration: low level of education, the balance between child bearing and career and the separation from their children, who may be left behind to be taken care of by close relatives.

2.8.3 Conflict, Political instability and ideological differences

The African continent has experienced a number of conflicts, both internal and external, over the years. The political instability and insecurity caused by this is also a trigger for most of the migration in ECOWAS. For example the war in Liberia in 1990 made Liberians to seek refuge in Neighbouring countries in Sierra Leone, Guinea. In 1992 the

war spilled over to Sierra Leone which led to Sierra Leoneans and Liberians migrating to many countries within ECOWAS and some outside ECOWAS. Migration was compounded when there was conflict slipover from Liberia and Sierra Leone to Guinea. The first post-independence leaders of Africa had the spirit of uniting African nations that were divided with borders during colonial rule. Liberal immigration policies were implemented especially by those countries with endowed natural resources but have a small labour force, as the case in Cote d'Ivoire. The Ivorian first post-independence leader encouraged immigrants from poor neighbouring countries like Burkina Faso, Liberia, Nigeria, and Senegal to work in their plantations. By 1995 about 29% of the country's population were foreigners. However, recent development has seen a shift to anti-immigrant sentiment which sometimes caused violent tension between the host citizens and other ECOWAS citizens as a result of economic competition which in turn lead to rebellion against the government, hence stimulating further political instability and insecurity (Adepoju, 2002). In war affected countries, Sierra Leone, Liberia, Cote d'Ivoire, immigrants are blamed to support rebel activities by joining as combatants leading to protraction of the conflict with more casualties and economic decline. Mass influx of migrants either as refugees or job seekers may have contributed to some ECOWAS countries to introduce discriminatory practices by introducing laws that restrict foreigners, including even ECOWAS citizens, from taking part in certain economic activities.

> *"The failure of the ECOWAS liberalisation scheme can also be seen in a number of expulsion and deportations both before and after the ratification of the Protocols on free movement of persons, right of residence and establishment: Sierra Leone (1968), Cote d'Ivoire (1958, 1964, 1999), Ghana (1969), Chad (1979), Senegal (1967, 1990), Guinea (1968), Nigeria (1983, 1985), Liberia (1983), Benin (1998)" (Adepoju, 2002 :12).*

The refusal of the call by OAU for ECOWAS member states to respect border demarcations made during colonial rule in order to avoid potential conflict is also another obstacle to the protocol on free movement of persons. Incidence of expulsion of ECOWAS citizens resulting from border dispute has been reported in the case of Senegal and Mauritania, Ghana and Togo. The colonial era left behind three partitions of West Africa: Francophone, Anglophone and Lusophone. They all have different official languages in addition to a number of local languages, different legal system and therefore different ideologies. In addition to this there are also different religions

practiced in different countries. The existence of these multiple groupings creates another barrier to migration.

2.9 Summary of the chapter

This chapter described the general background of the African integration since the establishment of the OAU after independence of most countries. The motivation for the transformation of the OAU to AU with their respective aims and objectives especially the establishment of regional integration blocs (RECs) and the six stages approach to the African single currency by 2021. The chapter covers in more detail ECOWAS, the focus of this thesis: Historical background, aims and objectives, Integration plan and implementation- free trade, customs union, free movement of goods, persons and capital and obstacles encountered by the trade liberalisation. Several issues raised in this chapter especially those regarding free movement of persons, capital and goods have implications to the OCA theory that is covered in chapter 4 and the comparative analysis in chapter 5 and empirical analysis in chapters 6 and 7.

Chapter 3 Background and Economic characteristics of ECOWAS

3.1 Introduction

Chapter 3 provides a detailed description of the historical and macroeconomic characteristics of the fifteen ECOWAS countries. An understanding of this chapter is vital as it feeds into the analysis and discussion of our results in subsequent chapters. The chapter covers many key areas including GDP and GDP growth, the composition of ECOWAS GDP and population by country and for each country the components of GDP (primary, secondary and tertiary), unemployment/underemployment, political instability and colonial links. For the GDP by sector we considered data for 2006 -2014 with three year average computed (appendices A.5 and A.6). Some of the common characteristics of these countries that emerged from the chapter include: major dependent on primary sector mainly dominated by agriculture, lack of diversification of economic activities, overreliance on one or few commodities for export, low manufacturing sector, poor and inadequate infrastructures (roads, energy, and manufacturing), high unemployment and underemployment especially for the youth, and political instability. Another important finding from the chapter, which may have a serious implication for currency union, is that the region is dominated by one country, Nigeria with 70% of the GDP and 53% of the population. In all these tables the blank cells indicate no data available and the mean is calculated excluding those cells.

3.2 Benin

Benin gained independence from France in 1960. Since then the country's population has grown by 327%, from 2,419,644 in 1960 to 10,323,474 in 2013. The country is located in a land area of 110,620 Sq Km. According to the African development Bank strategy paper (2012-2016), Benin economy is dominated by agriculture and services. This is supported by figures in appendices A.5 and A.6. Agriculture employs 50% of the labour force. The primary sector is not modernised and not diversified. Among other things, the ADB strategy paper mentioned that the sector is heavily dominated by a single product, cotton, and constrained by climatic factors, lack of water management infrastructure and inadequate and poor feeder roads to transport produce from the farm to the market. As a result of these factors the primary sector with 50% of the country's workforce is incapable of generating a significant rise in income for this major portion

of the population. The small industrial sector is inadequately developed with more focus on import substitution and agricultural processing.

The tertiary sector employs 40% of the labour force and, apart from port activities; it is dominated by informal sector activities mainly trade and re-exporting activities with neighbouring Nigeria. This trade is said to be motivated by the trade restriction policies of Nigeria on certain items, such as cereals and second-hand clothes in order to boost local production. The Nigerian economic policy and the low custom duties in Benin provided the re-exporting opportunity of the restricted commodities by Benin traders especially through the informal channels. Petroleum trade through smuggling also takes place between Benin and Nigeria and it is mentioned that over 80% of Benin's petroleum product consumption is smuggled from Nigeria through adulterated fuel, called 'kpayo' (ADB strategy paper 2012-2016). The report also mentioned Benin's vulnerability to a change in economic policy in Nigeria. For instance Nigeria's removal of tariff restrictions on the re-exported items automatically eliminated Benin's tariff advantage. The removal of subsidies on fuel by Nigeria also triggered an increase in price of fuel in Benin by over 100% which resulted to a 3.3 inflation points and 0.4% lost growth. In terms of economic performance the indicators in Table 3.1 shows mixed results, although it is more toward the negative side. The country experienced a negative growth in GDP and GDP per capita of 4.9% and 7.1% respectively in 1975. Since then GDP growth has been positive up to 2011 although at a fluctuating rate. The per capita GDP also shows positive fluctuating growth although it is negative in 2004 and 2005. Overall the average growth in GDP from 2001-2011 is 3.9%. The country has reported a deficit trade balance since 1975 up to 2011 as shown by the negative net export as a percentage of GDP in table 3.1.

This indicates a consistent dependence on imports. The current account balance as a percentage of GDP has also been consistently negative since 1975 to 2010 with an average of 7.1%. This implies that the capital account balance is also either negative (deficit) or if at all positive it is insufficient to outweigh the negative trade balance.

A deficit in the capital account balance indicates that the country's capital inflow exceeds the outflow. The external debt performance has improved from the high of 86.3% of GDP in 1985 to only 18.6% in 2010. Inflation record is low and since 2001 it

has always been below the ECOWAS 5% convergence criteria with the exception of 2005 and 2008 where it was 5.4% and 7.9% respectively.

Table 3.1 Country economic indicators – Benin

Year	GDPR	PGDP	PGDPR	EXP	IMP	E-I	CAB	CSD	Ex DS	INF	EXR
1975	-4.9	213	-7.1	14.5	33.4	-18.9	-7.9				214
1985	7.5	253	4.6	23.7	36.6	-13.0	-3.7		86.3		449
2001	5.0	353	1.8	15.2	27.9	-12.7	-3.2	0.7	61.5	4.0	733
2002	4.5	405	1.2	13.5	27.5	-13.9	-5.6	-0.1	56.8	2.5	697
2003	3.9	497	0.6	13.7	26.5	-12.8	-9.3	-1.8	41.4	1.5	581
2004	3.1	547	-0.1	13.3	26.1	-12.7	-7.1	0.9	39.5	0.9	528
2005	2.9	562	-0.3	13.5	26.1	-12.6	-5.3	-0.6	35.9	5.4	527
2006	4.1	602	1.0	11.4	22.7	-11.3	-4.6	0.2	13.5	3.8	523
2007	4.6	684	1.5	16.2	31.6	-15.3	-9.6		13.8	1.3	479
2008	5.1	800	2.0	15.2	28.8	-13.6	-8.0	-0.3	13.7	7.9	448
2009	3.8	766	0.8	14.0	28.5	-14.5	-9.9	-4.5	16.3	2.2	472
2010	3.0	741	0.1	14.3	28.0		-8.1	-1.0	18.6	2.3	495
2011	3.1	802	0.3	14.9	28.2	-13.3				2.7	472
Mean	**3.92**	**614**	**0.8**	**14.1**	**27.4**	**-13.3**	**-7.1**	**-0.7**	**31.1**	**3.1**	**541**

Notes: GDPR = GDP growth (annual%), PGDP = Per capita GDP, PGDPR = GDP per capita growth (annual %), EXP = Export as % of GDP, IMP = Import as % of GDP, E-I = EXP – IMP, CAB = Current account balance as % of GDP, Cash surplus/deficit as % of GDP, Ex DS = External debt stocks as % of GDP, INF = Inflation, EXR = Official exchange rate (local currency unit/US$)[2]

Source: World Bank- World Development Indicators (WDI)

According to African economic outlook (2012) both youth and adult unemployment and underemployment are a great concern in Benin. With few jobs available, employers are reluctant to employ new entrants to the labour market and also training is not adapted to the needs of the labour market. Due to inadequate funding the programme introduced in 2006 to fight against youth unemployment yielded mixed outcomes.

3.3 Burkina Faso

Burkina Faso was one of the French colonies and a member of the WAEMU with the CFA as its national currency. The country gained independence in 1960 at a time when its population was 4,881,947 with a GDP per capita of US$68. From 1960 to 2013, the country's population has grown by 247%. The land area of Burkina Faso is 273,600 sq km. It has a low manufacturing sector accounting for 11.7% of its GDP in 2006. This sector has shown no improvement over the years as indicated by the decline to only 9.3% and 5.1% in 2011 and 2014 respectively (appendices A.5 and A.6, figure 3.3). The

[2] All the variable definitions and data source in this table apply for tables 3.2 to 3.15

primary sector, which is dominated by Agriculture, forestry, fishing and hunting plays a significant role in the economy. The primary sector constitutes 40% of GDP in 2006 with an increase to 42.8% in 2014 with a three year average of 43.6%. Mining and quarrying has a very minimal contribution to this sector. Agriculture is dominated by very few products such as gold and cotton (African Economic Outlook 2012). In addition to lack of good road network for accessibility to markets the sector is also periodically hit by adverse distribution of rainfall. According to the African development outlook report the primary sector, especially mining, was badly affected by floods in 2009 and 2010. The tertiary sector, about the same size as the primary sector comprised 48.5% of GDP in 2006 with a shrink to 42.6% in 2011 and increase to 52.2% in 2014.

Table 3.2 Country economic indicators – Burkina Faso

Year	GDPR	PGDP	PGDPR	EXP	IMP	E-I	CAB	CSD	Ex DS	INF	EXR
1975	3.0	146	0.8	7.3	30.2	-22.8	-5.8			18.8	214
1985	8.5	190	5.8	9.9	31.0	-21.1	-4.1		33.0	6.9	449
2001	6.6	222	3.7	9.2	23.1	-13.9	-10.3		53.1	5.0	733
2002	4.7	253	1.7	8.8	21.2	-12.4	-9.1	-4.5	46.8	2.2	697
2003	8.0	319	5.0	8.8	21.7	-12.9	-8.6	-2.0	40.5	2.0	581
2004	4.6	370	1.6	10.7	24.3	-13.5	-10.4	-4.2	38.9	-0.4	528
2005	8.7	385	5.5	9.9	25.5	-15.5	-11.6	-5.4	36.5	6.4	527
2006	6.8	400	3.7	11.4	26.5	-15.1	-9.3	-5.9	19.2	2.3	523
2007	3.6	449	0.6				-8.3	-5.4	21.5	-0.2	479
2008	5.8	538	2.7				-11.5	-4.0	20.0	10.7	448
2009	3.0	522	-0.1				-4.6	-4.7	21.8	2.6	472
2010	7.9	536	4.7					-4.6	23.3	-0.8	495
2011	4.2	600	1.1					-2.4		2.8	472
Mean	**5.81**	**418**	**2.8**	**9.8**	**23.7**	**-13.9**	**-9.3**	**-4.3**	**32.2**	**3.0**	**541**

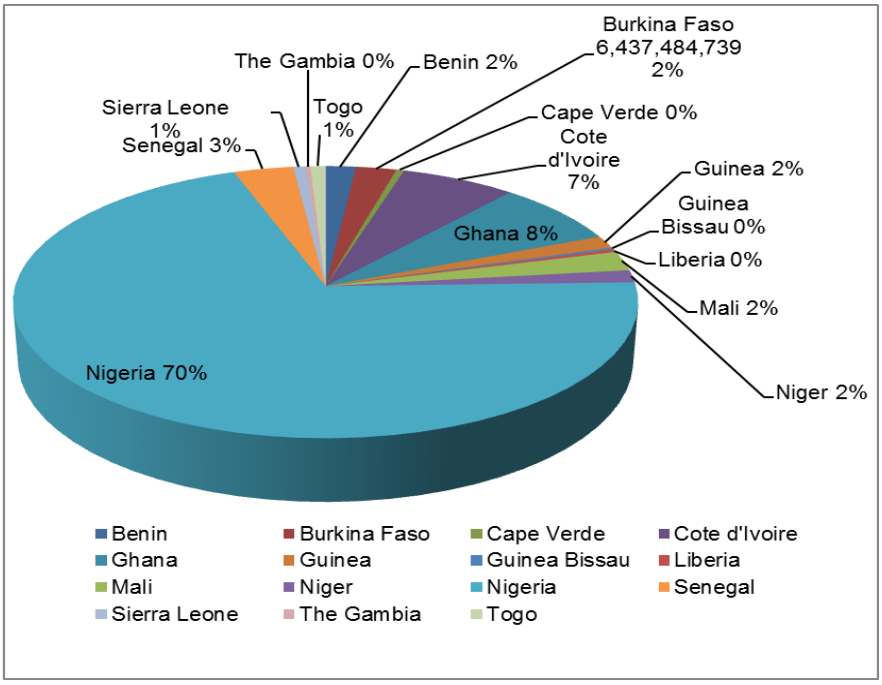
Burkina Faso is the sixth largest economy in ECOWAS constituting on average 1.95% of the region GDP (figure 3.1). Up to 2011 its GDP has gained a maximum growth of 8.7% in 2005 with the lowest of 3% in 2009. The growth rate in per capita GDP followed a similar pattern as that of the GDP growth with each having a standard deviation of 1.9%. The country's per capita GDP in almost all the years since 2001 to 2011 falls short of that of ECOWAS, SSA and even WAEMU.

The country's trade position has never achieved a surplus since 1960 to 2006 as indicated by the negative net exports as a percentage of GDP for those years (table 3.2) which is an indication of dependence on imports. Similarly the current account balance has also been consistently in deficit which may also imply the performance in the capital balance is negative. The fiscal balance measured by CSD, in table 3.2, is also

persistently negative. External debt stock is on the decline and since 2001 inflation performance has been within the 5% ECOWAS convergence requirement with the exception of 2005 and 2008 where it was 6.4% and 10.7% respectively.

According to the African economic outlook Burkina Faso's labour force is made up of mainly poor people in rural areas and unskilled young people with the main constraint of low productivity. There is a gap between training and employers' needs. The main problems in the labour market are underemployment, poor skill levels, and low wages especially in the rural areas. These factors contributed to the continued poverty of the workers.

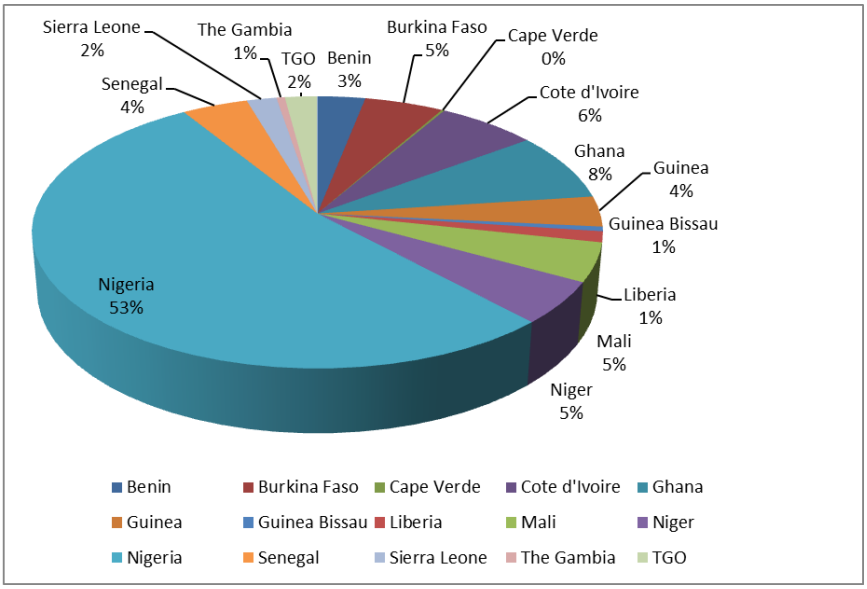
Figure 3.1 ECOWAS GDP 15 year average



Note[3]: period covered-1975, 1985, 2001-2013

[3] Data source for figures 3.1 and 3.2 is World Development Indicators. Period covered is the same for both figures

Figure 3.2 ECOWAS Population 15 year average



3.4 Cape Verde

By the fifteen years average of GDP figures, Cape Verde is the twelfth largest economy of ECOWAS. The country gained independence from Portugal in 1975. Its population has grown by 137% from 1960 (210,933) to 2013 (498,897). Cape Verde is a small and fragmented group of ten islands located in a land area of 4,030 km^2, see appendix A.4. The country's national currency is the Escudo which is pegged to the Euro. It is the only ECOWAS country so far reported to have a social protection system that covers old age, disability and deaths and also one of the few African countries likely to attain all eight Millennium Development Goals (MDGs).

The economy is dominated by the tertiary sector with 83.4% and 84.9% of GDP respectively for 2006 and 2011 with no significant change in 2014. Its lack of land, as an island, is reflected on its small primary sector (12.9%, 11.9% and 9.8% for 2006, 2011 and 2014 respectively). The secondary sector (manufacturing) is very small with only 3.7% and 3.4% of GDP for 2006 and 2011 respectively. In 2014 the figure stands at 6.5% but in all years it is limited to only light manufacturing.

Figure 3.3 ECOWAS GDP by sector (% of GDP) 2006-2014

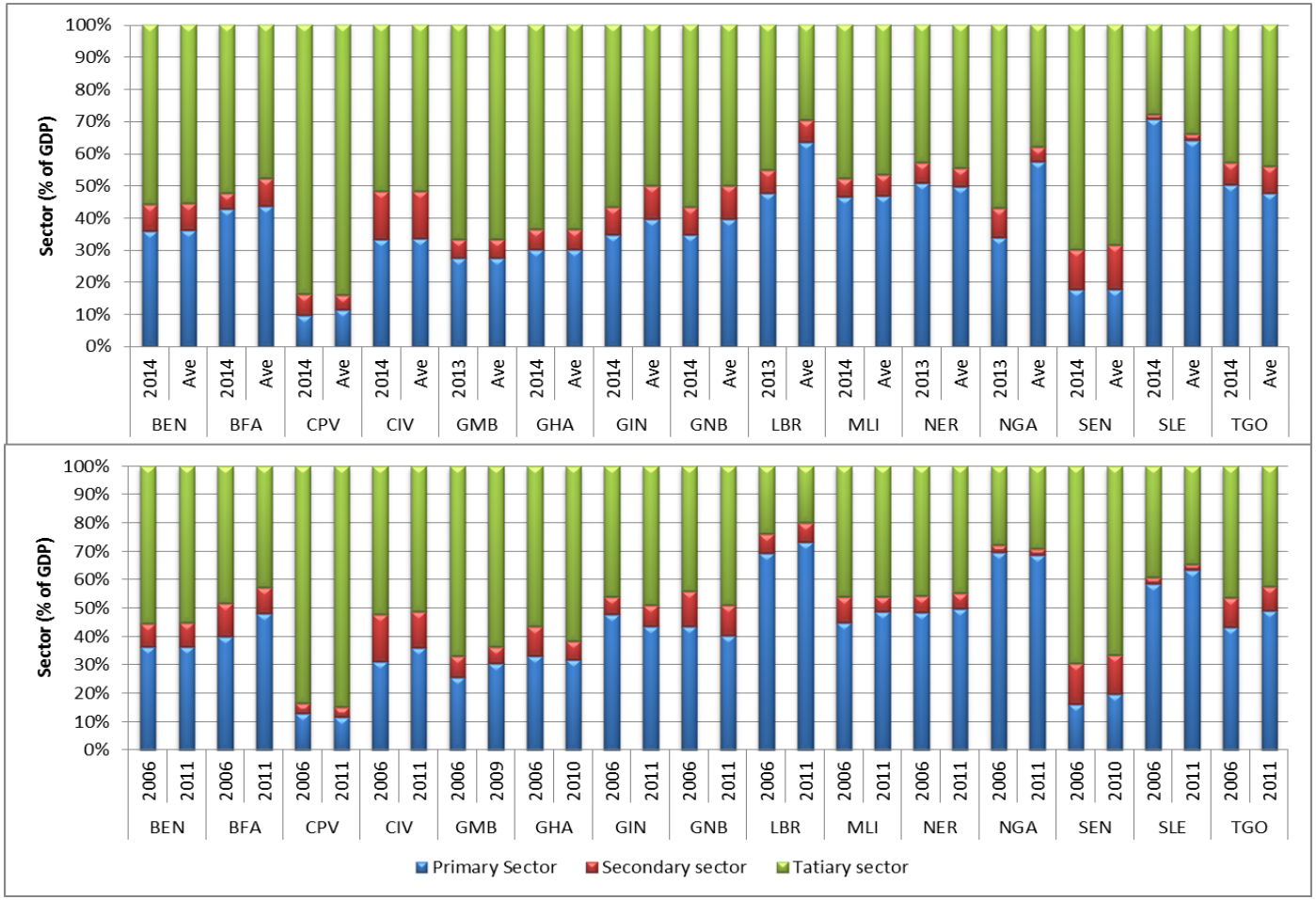


Table 3.3 Country economic indicators – Cape Verde

Year	GDPR	PGDP	PGDPR	EXP	IMP	E-I	CAB	CSD	Ex DS	INF	EXR
1975						0.0					26
1985	8.6	419	6.7	22.6	79.2	-56.5	-6.5		68.9	5.4	92
2001	6.1	1265	4.3	29.8	62.4	-32.5	-9.9		61.4	3.3	123
2002	5.3	1372	3.5	32.5	68.5	-36.0	-11.5		62.3	1.9	117
2003	4.7	1769	3.0	31.4	67.4	-36.0	-11.1		54.1	1.2	98
2004	4.3	1980	2.8	32.0	69.6	-37.6	-14.1		50.1	-1.9	89
2005	6.5	2055	5.1	37.8	66.6	-28.8	-4.2	-2.9	49.0	0.4	89
2006	10.1	2316	8.9	45.1	72.7	-27.6	-7.5	-1.9	47.2	5.4	88
2007	8.6	2756	7.6	42.8	77.8	-34.9	-14.9	2.1	43.5	4.4	81
2008	6.2	3204	5.3	45.3	78.4	-33.0	-13.2	2.5	40.0	6.8	75
2009	3.7	3256	2.8	35.6	67.9	-32.3	-15.5	-3.7	44.2	1.0	79
2010	5.2	3345	4.3	38.6	67.1	-28.5	-13.0		51.7	2.1	83
2011	5.0	3798	4.1	42.2	72.6	-30.3	-16.0			4.5	79
Mean	**5.99**	**2,465**	**4.7**	**37.6**	**70.1**	**-32.5**	**-11.9**	**-0.8**	**50.4**	**2.6**	**91**

The country experienced positive economic growth in GDP since 1985 with the highest of 10.1% in 2006 (table 3.3) Its GDP per capita has increased significantly from $419 in 1985 to $3,798 in 2011 which may be partly explained by the small size of the population relative to other ECOWAS countries. However the trade balance, measured by net export as a percentage of GDP, is significantly in deficit which shows high dependence on imports. Whilst the current balance is also always in deficit it relative small size compared to the trade balance seems to suggest that the country's capital account balance is in surplus, partly outweighing the negative trade balance. The fiscal balance (CSD) for the few years shown in table 3.3 is mainly negative except 2007 and 2008 when the economy recorded surpluses. External debt stock is high since 1985 and gradually reducing but at a very low rate. Inflation record, apart from 2008 (6.8%) and 2006 (5.4%), is always within the 5% ECOWAS target. According to the African Economic outlook, Cape Verde's development is fundamentally constrained by a number of factors such as small population size (small market), fragmentation of its territory, a dry Sahel climate, poor natural endowments and heavy reliance on the external sector, especially for financial aid and remittances. The economy faces a high level of unemployment rate, particularly among the young who made up over 50% of work force (AEO).

3.5 Cote d'Ivoire

Cote d'Ivoire is the largest economy in WAEMU but third largest in ECOWAS after Ghana with only about 7% of ECOWAS GDP (figure 3.1). The country gained

independence from France in 1960 at the time when its population was 3,638,385. Its population growth form 1960-2013 is 458%, the largest in ECOWAS. It is located in a land area of 318,000 km^2.

Table 3.4 Country economic indicators – Cote d'Ivoire

Year	GDPR	PGDP	PGDPR	EXP	IMP	E-I	CAB	CSD	Ex DS	INF	EXR
1975	8.3	575	3.4	36.7	36.6	0.1	-9.7			11.4	214
1985	4.5	665	0.5	46.8	32.4	14.4	1.0		138.4	1.9	449
2001	0.0	624	-1.9	41.8	33.5	8.4	-0.6		109.9	4.3	733
2002	-1.4	669	-3.1	50.0	33.4	16.6	6.7		102.5	3.1	697
2003	-1.6	787	-3.1	45.8	34.9	10.9	2.1	-2.5	88.6	3.3	581
2004	1.8	873	0.2	48.6	39.4	9.2	1.6	-1.7	85.3	1.4	528
2005	1.3	908	-0.4	51.1	43.6	7.5	0.2	-6.7	72.8	3.9	527
2006	0.7	948	-1.0	52.7	42.4	10.3	2.8	-1.1	73.5	2.5	523
2007	1.7	1062	0.0	47.8	41.9	5.9	-0.7	-0.7	70.0	1.9	479
2008	2.3	1233	0.5	46.5	38.8	7.7	1.9	-0.3	53.7	6.3	448
2009	3.7	1191	1.8	42.2	34.1	8.1	7.0	0.9	50.8	1.0	472
2010	2.4	1161	0.4	40.6	36.1	4.6	2.0	-1.6	49.9	1.7	495
2011	-4.7	1195	-6.7	43.7	40.6	3.2				4.9	472
Mean	**0.56**	**968**	**-1.2**	**46.4**	**38.1**	**8.4**	**2.3**	**-1.7**	**75.7**	**3.1**	

Cote d'Ivoire economy is a service dominated sector. As seen in appendices A.5 and A.6 the tertiary sector contributes 52.3 and 51.2% of GDP for 2006 and 2011 respectively and no major difference in 2014. The industrial sector (secondary) contributes 16.4% to the GDP in 2006 but declined to 12.8% in 2011 and increased to 15% in 2014. According to the AEO (2012) the declined in the manufacturing sector was due to the instability caused by the post-election crisis that resulted to stoppage in production, the looting of production plants, especially food processing, and the input supply problems due to embargo imposed by the EU. The primary sector is the second largest contributor to GDP with 31.3% in 2006 which has increased to 35.9% in 2011 and down to 33.3 in 2014. Although this sector increased in 2011 the exportable agricultural products were adversely affected due to the abandonment of plantations as a result of insecurity, difficulties to transport produce, lack of storage facilities resulting to damage to produce. Overall, the wait-and-see approach adopted by all economic agents during the crisis inflicts damages to the economy. Unemployment is also a problem in Cote d'Ivoire especially the youth. The problems of employment include the lack of skills needed by employers and poor employment prospecting system (AEO 2012).

Cote d'Ivoire's GDP growth in 1975 was 8.3% and 4.5% in 1985. However, since 2000 the country's economic performance has been disappointing with even negative growth in 2002 and 2003 (table 3.4). This could be a clear negative impact of the 1999 civil

conflict. GDP growth picks up slightly in 2008-10 and lost in 2011, a year with negative growth of 4.7%. The impact of the 1999 and 2011 crises are even worse in the per capita GDP as shown by the negative growth most of the years since 2000. Despite these problems the country consistently reported a surplus in its trade balance showing a stronger export sector. The peak of the surplus was in 2002 with net export as percentage of GDP of 16.6%, though it has been on the decline since 2001. In 2011 the surplus stood at 3.2% (the lowest since 2001). The country has favourable current account balances for all the years since 2001 with the exception of 2001 and 2007. Fiscal balance is negative from 2003-2010 though not at a significant level. There is a significant reduction in the external debts stock from the high of 138.4% of GDP in 1985 to the lowest of 49.9% in 2010. Inflation performance has been within the ECOWAS 5% convergence criterion with the exception of 2008 (6.3%). However the 2011 inflation rate of 4.9% is a threat to the threshold.

3.6 The Gambia

Gambia, with a land area of 10,000 km^2, became independent from Britain in 1965 (appendix A.4). In 1960 the country's population was 372,625. This has grown to 1,849,285 in 2013 which is 396%. From the British pound the country now has the Dalasi as its national currency. It is the fourteenth largest economy in ECOWAS with a very small share of ECOWAS GDP (0.25%) and 0.54% of the total population.

Table 3.5 Country economic indicators – Gambia

Year	GDPR	PGDP	PGDPR	EXP	IMP	E-I	CAB	CSD	Ex DS	INF	EXR
1975	12.4	214	8.9	44.7	43.6	1.1				25.9	2
1985	-0.8	294	-5.1	43.9	53.9	-10.1	3.4		108.6	18.3	4
2001	5.8	515	2.7	21.8	25.1	-3.3			71.0	4.5	16
2002	-3.3	420	-6.1	27.2	32.5	-5.3			99.7	8.6	20
2003	6.9	344	3.7	31.1	37.8	-6.7	0.5		130.5	17.0	29
2004	7.1	396	3.9	34.2	48.8	-14.5	-5.2		116.3	14.2	30
2005	-0.9	415	-3.8	32.8	49.6	-16.8	-7.0		105.7	4.8	29
2006	1.1	423	-1.7	33.8	47.2	-13.4	-10.0		108.4	2.1	28
2007	3.6	502	0.8	28.9	42.1	-13.2	-7.3		86.6	5.4	25
2008	5.7	590	2.8	23.5	39.9	-16.4	1.1		37.8	4.5	22
2009	6.4	536	3.6	25.3	41.7	-16.4	7.0		51.0	4.6	27
2010	6.5	551	3.7	23.5	42.1	-18.6	5.9		49.4	5.0	28
2011	-4.3	506	-6.9	28.9	47.2	-18.3	7.5			4.8	29
Mean	**3.15**	**472**	**0.2**	**28.3**	**41.3**	**-13.0**	**-0.8**		**85.7**	**6.9**	**26**

The tertiary sector dominates the economy with a contribution to GDP of 67.1 and 66.6% in 2006 and 2013 respectively. Tourism, re-export and transit trade are the key

growth drivers of the Gambia economy and these are supported by bilateral preferential trade policies and a relatively efficient port infrastructure (AEO 2012). However the building of better infrastructures by other countries and the harmonisation of trade policies in the ECOWAS region are gradually eroding Gambia's comparative advantage in re-exporting and transit trade. The industrial sector is very small and uncompetitive, accounting for 7.5% of the GDP in 2006 with a decline to 6.0% in 2013. This sector focuses mainly on the domestic market and is constrained by limited skills and technology that can add value. The industrial sector also suffers from lack of investment in physical infrastructure such as roads and soft infrastructure such as trade facilitation, lack of coordination and support from government (AEO 2012). The primary sector, the second largest sector of the Gambian economy is not without problems. This sector is agriculturally dominated and relied heavily on a single product, groundnut, which accounts for 60% of domestically produced exports. Out of the 30.6% contribution to GDP by the primary sector in 2011, only 1.8% came from mining and quarrying and the rest from Agriculture. According to AEO 2012, over 70% of the country's labour force is employed in the agricultural sector and produces about 50% of the country's food supplies. The small mining component of the primary sector is confined to carrying out geological surveys, investigations and explorations in order to establish the potential for mineral resources and plan for their exploitation.

The country's economic growth, measured by the GDP (table 3.5) is very volatile, exhibiting a steady growth only in 2006-2010 and slides into a negative growth of

-4.3% in 2011. The annual growth in per capita GDP mirrored the GDP growth rate. With the exception of 1975, which shows a small surplus of 1.1% of GDP, the trade balance is on the deficit all the years and on the rise indicating increasing dependence on imports with a weak export base. The current account balance shows a surplus from 2008-2011 despite the negative trade balance which may imply that the capital account balance is favourable for those years and outweigh the negative trade balance. No data on the fiscal balance but the external debts stock indicator shows a decline from year to year with an outstanding balance of 49.4% in 2010. Inflation rate was high in the early 2000s but since 2005 the rate converged to the ECOWAS 5% target with a narrow miss only in 2007, the start of the global financial crisis. The currency has been weakening. In 2001 the exchange rate was 16 dalasi to US$1 and in 2011 it has depreciated to

D29/US$1. Like other ECOWAS countries, youth unemployment is a problem in the Gambia and is estimated to be over 40%, according to AEO (2012).

3.7 Ghana

Ghana is the second largest economy, after Nigeria, in both WAMZ and ECOWAS with a share of 7.5% of ECOWAS GDP. The country gained independence from Britain in 1957 and Located in a land area of 227,540 km^2. The country's population has grown by 284% from 6,742,107 in 1960 to 25,904,598 in 2013.

Table 3.6 Country economic indicators – Ghana

Year	GDPR	PGDP	PGDPR	EXP	IMP	E-I	CAB	CSD	Ex DS	INF	EXR
1975	-12.4	283	-14.5	19.4	18.4	0.9	0.6			29.8	0
1985	5.1	350	1.7	10.7	13.6	-2.9	-3.0		49.8	10.3	0
2001	4.0	271	1.5	45.2	64.8	-19.6	-8.0	-6.5	119.3	32.9	1
2002	4.5	307	2.0	42.6	54.9	-12.3	-1.7	-5.0	112.9	14.8	1
2003	5.2	370	2.7	40.7	56.6	-15.9	1.3	-3.6	99.2	26.7	1
2004	5.6	421	3.1	39.3	60.4	-21.1	-6.6	-1.4	79.5	12.6	1
2005	5.9	496	3.4	36.4	61.7	-25.3	-10.3	-1.4	63.2	15.1	1
2006	6.4	921	3.9	25.2	40.7	-15.5	-5.2	-4.2	16.3	10.9	1
2007	6.5	1090	3.9	24.5	40.8	-16.3	-9.6	-4.7	19.6	10.7	1
2008	8.4	1226	5.9	25.0	44.5	-19.5	-11.7	-5.9	18.9	16.5	1
2009	4.0	1090	1.5	29.3	42.3	-13.0	-7.3	-5.6	24.4	19.3	1
2010	8.0	1319	5.5	29.4	41.2	-11.8	-8.5	-7.2	26.0	10.7	1
2011	14.4	1570	11.8	38.0	51.1	-13.1	-8.9			8.7	2
Mean	**6.63**	**826**	**4.1**	**34.2**	**50.8**	**-16.7**	**-7.0**	**-4.6**	**57.9**	**16.3**	**1**

Ghana Economy is tertiary sector driven followed by the primary sector. The tertiary sector contributes 56.5% and 63.7% to GDP in 2006 and 2014 respectively. The primary sector accounted for 33.2% (Agriculture 30.4%) and 30.2% (Agriculture 20.7%) of GDP in 2006 and 2014 respectively. The decline in the agricultural sector between 2006 and 2014 is due to a sharp decline in reforestation activities, which led to a contraction of the forestry and logging subsector (AEO 2012) and also a gradual shift to mining. Agriculture locally produced less than 30% of raw material demand for agro-based industries and the major agricultural produce include: industrial crops, starchy staples, cereals, legumes, fruits and vegetables, livestock and fish (AFDB web site). Cocoa is the largest agricultural export earner for the country. The mining sector in Ghana is only 2.8% in 2006 but has increased to 9.5% of GDP in 2014. Ghana is a major gold producer and exporter constituting over 90% of the country's mineral exports (strategy paper 2012). The country's other natural resources include diamonds, manganese ore, limestone, silica and bauxite. This sector employs a very small proportion (0.69%) of the labour force and it is dominated by foreign investors. With

the commencement of oil production in 2010, crude oil exports is now Ghana's second largest export earner after gold. It is predicted that oil export income will soon overtake gold export. Due to lack of local skills most of the highly specialised and high paying jobs are undertaken by non-Ghanaians, a gap that the government is trying to address. The challenges faced by the mining sector include illegal mining operations known as 'galamsey', artisan mining on company concession, irregular and increasing cost of electricity supply and most recently high tax rates (AFDB websit). The secondary sector (industry) contributes 10.2% of GDP in 2006 and this declined to 6.2% in 2014. This decline in the manufacturing sector is explained by intensified import competition, which eroded the competitiveness of local manufacturing companies, high utility prices, low research and development expenditure, high cost of inputs and raw materials, increases in tax rates and removal of tax holidays (AFDB). Unemployment is still a problem in Ghana especially for the youth (15-24 years). For this age group unemployment is reported to be 25.6% which is twice for the age group 25-44 years.

Ghana exhibited a steady economic growth since 2001 with the exception of 2009 when it plummeted from 8.4% (2008) to 4.0% which may be linked to the global economic crisis (table 3.6). The lost growth was quickly regained in 2010 (8.0%) and even a much stronger growth of 14.4 in 2011. The crude oil production may have contributed to this strong growth. The country's per capita GDP in 1975 was US$283 which has grown to US$1,319 in 2010. This represents a 366% growth which is above the sub-Saharan African growth of 226.9% for the same period. The trade balance as shown by the net export as percentage of GDP, table 3.6, has been consistently in deficit with no surplus recorded except for 1975 (0.9%). Fiscal balance is also in deficit for all years shown. The external debt stock is slowing down from its 2001 high of 119.3% of GDP to its lowest in 2006 (16.3%) with a gradual increase after that year. Prior to 2007 the country's national currency, the Cedi, was one of the fasted depreciating currencies in Africa but the central bank of Ghana mechanically fixed this problem. On the 25/11/06, the Governor of the Bank of Ghana, in an annual bankers' dinner, announced the redenomination of the Cedi. The move was said to address the imposed burden and cost of high note regime on the economy and relieve Ghanians from the burden of carrying large amount of notes in black polythene bags for everyday transactions (Bawumia, 2010). The new currency, named the 'Ghana Cedi and Ghana Pesiwa), was introduced on 01/07/07. The whole exercise was the elimination of four zeros and the printing and

circulation of the new currency. Ghana has a high inflation record with a peak of 32.9% in 2001. Since 2001 the country has only been able to achieve a single digit inflation of 8.7% in 2011 which is still well above the 5% inflation requirement for the ECOWAS single currency.

3.8 Guinea

Guinea is located in a land area of 254,720 km^2. The country gained independence from France in 1958. As former French colony, Guinea was a member of the WAEMU but left the currency union and continued with its own currency, the Guinea Franc. It is the 8^{th} largest economy in ECOWAS with 1.5% of total GDP and the third largest in WAMZ, after Ghana. In 1960 the country's population was 3,540,756 and increased to 11,745,189 in 2013 representing a growth rate of 232%. The primary and tertiary sectors dominate the economy with a contribution to GDP of 47.6 and 34.9% for 2006 and 2014 respectively by the former and 46.1 and 56.6% by the latter in the same period. In 2006 Agriculture and mining made equal contribution to GDP of 23.8% each. The primary sector declines in 2011 and 2014 with a shift from mining and quarrying (17.5%) to agriculture (26%) in 2011. This gap is narrowed in 2014. This sector employs more than 80% of the country's labour force (AEO 2012). Guinea is rich in natural resources but its economic development is constrained by infrastructural gap, especially in the energy and transport sectors (ADB 2012-16). According to the ADB, energy sector generated only 40% of the country's demand and it has the lowest road density (2.8 km/100 km^2 in 2010) in the sub-region. A further obstacle to economic development, especially agriculture, is the lack of modern road network which made it impossible for agricultural produce to reach the market. The country's natural endowment has not been utilised. For instance ADB strategy report (2012-16) mentioned that Guinea has an estimated potential of 27,000 m^3 per capital per year and is ranked as one of the countries with the most water in the world and the source of many rivers or tributaries which makes it West Africa's Water Tower. The country is also exceptionally rich in minerals. Guinea has one third of world bauxite reserves (estimated at 25 billion m^3) and also major reserves of iron ore, (4 billion tonnes), gold, diamonds, uranium and other minerals (ADB 2012-16). Due to lack of infrastructure, the country exports about 95% of its bauxite unprocessed leaving the country with the lowest alumina/bauxite ratio among the major exporters of bauxite. Another constrain to

guinea's economic development affecting all sectors is its low level of human resources. For instance the mining sector's qualified labour requirement has to be met mainly from neighbouring countries. The government planned an educational system and vocational reform. The secondary sector is relatively small with some amount of processing of bauxite to alumina but capacity building is significantly needed in this area. The tertiary sector is dominated by wholesale and retail trade and general government services. Unemployment and underemployment is high, estimated at 30% for the youth. The high unemployment is explained by the socialist winding up policy of 1985 when 50% of the civil service staffing was cutback and mass privatisation with the closure of 300 state owned enterprises. The private sector expected to fill this gap is still incapacitated due to the non-conducive business environment. As a result the informal sector continues to be the main provider of employment.

The rate of economic growth of Guinea is low and very volatile, the per capita GDP is low (table 3.7).The trade balance and current account balance are always in deficit and even increasing with high level of external stock of debts from 103.6% of GDP in 2001 and still standing at 61.7% in 2010. Inflation is at sky rocket level with a peak of 34.7% in 2006 and in 2011 21.4% far away from meeting the ECOWAS 5% requirement for single currency. The currency continuously depreciates from 21 Guinea franc in 1975 to 6,658 per US$ in 2011.

Table 3.7 Country economic indicators – Guinea

Year	GDPR	PGDP	PGDPR	EXP	IMP	E-I	CAB	CSD	Ex DS	INF	EXR
1975											21
1985											24
2001	3.7	334	2.1	28.6	30.0	-1.4	-2.1		103.6		1951
2002	5.2	343	3.5	26.5	29.0	-2.5	-6.8		105.2	6.1	1976
2003	1.2	394	-0.4	26.0	25.2	0.8	-5.4		92.3	12.9	1985
2004	2.3	412	0.7	24.6	25.8	-1.2	-4.4		85.5	27.6	2244
2005	3.0	325	1.3	34.8	35.1	-0.3	-5.5		98.7	31.4	3644
2006	2.5	307	0.7	40.6	42.6	-2.0	-7.8		108.0	34.7	5149
2007	1.8	449	-0.1	28.8	36.4	-7.7	-10.8		74.7	22.8	4198
2008	4.9	395	2.9	34.9	40.1	-5.1	-11.6		81.9	18.4	4602
2009	-0.3	427	-2.3	26.5	30.8	-4.3	-9.7		70.0	4.7	4801
2010	1.9	474	-0.3	28.4	36.5	-8.2	-6.9		61.7	15.5	5726
2011	3.9	498	1.5	30.3	48.2	-17.9	-22.8			21.4	6658
Mean	**2.74**	**396**	**0.9**	**30.0**	**34.5**	**-4.5**	**-8.5**		**88.1**	**19.5**	**3,903**

3.9 Guinea Bissau

Guinea Bissau is the smallest country in ECOWAS in GDP terms (0.23%). It is also the smallest economy in WAEMU. The country gained independence from Portugal in 1974 though it was announced in 1973 and has a land area of 28,120 km^2. The country's population in 2013 was 1,704,255 compared to 593,289 in 1960, a growth rate of 187%. Agriculture provides 65% of jobs in the country but it heavily relied on one export commodity, cashew nuts, which accounted for 90% of exports in 2011 (81% in 2008/09) due to exceptional harvest resulting from good rain fall.

Table 3.8 Country economic indicators – Guinea Bissau

Year	GDPR	PGDP	PGDPR	EXP	IMP	E-I	CAB	CSD	Ex DS	INF	EXR
1975	7.8	157	4.0	5.2	25.9	-20.8					
1985	4.2	156	2.3	9.8	57.7	-48.0	-52.7		222.0		2
2001	0.2	157	-1.7	28.6	63.0	-34.3	-5.6		453.0	3.3	733
2002	-7.1	158	-8.9	29.8	51.2	-21.4	-0.6		478.2	3.3	697
2003	-0.6	361	-2.5				-0.1		223.3	-3.5	581
2004	2.2	390	0.2				2.7		211.3	0.9	528
2005	3.5	419	1.4				-1.8		176.8	3.3	527
2006	2.1	415	0.1				-6.9		179.1	2.0	523
2007	3.2	485	1.1				-4.4		156.3	4.6	479
2008	3.2	583	1.1				-3.4		128.2	10.5	448
2009	3.0	562	0.9				-5.7		133.9	-1.7	472
2010	3.5	551	1.3				-8.5		131.0	2.5	495
2011	5.3	629	3.1							5.0	472
Mean	**1.68**	**428**	**-0.3**	**29.2**	**57.1**	**-27.9**	**-3.4**		**227.1**	**2.8**	**541**

Other agricultural activities include forestry, fishing and livestock, peanuts, cotton, fruit (mangoes, bananas, pineapple etc.), vegetables and tubers (cassava and sweet potatoes). Repeated interference by the military into politics constrained the effort to diversify the economy. It compromises part of the gains arising from the economic upturn that began in 2007. This also hinders the democratic process, contributes to political instability and could even call into question the reforms envisaged in the framework of National Poverty Reduction Strategy Paper (NPRSP) (AEO 2012). For instance a planned military reform by one of the presidential candidates in the 2012 led to the military to stage a coup d'état in between the first and the second round of elections which threw the country into turmoil. According to AEO (2012) there is no proper system of counting the unemployed in Guinea Bissau but the available statistics suggest this to be 30% for the age group under 30 years. This jobless situation is said to be as a result of political instability, fragility of the economy, and the absence of job creation in the

public sector. The tertiary sector is dominated by wholesale and retail and general government services.

The country's economic growth is stagnant from a deep decline of 7.1% in 2002 to a flat growth of around 3% although a small improvement in 2011. GDP per capita is very small and its growth rate mirrors the GDP growth. From 2003-2011 no statistics available for trade balance but prior to that the trade deficit as a percentage of GDP is high. The country has a persistent current account deficit but no figures for the fiscal balance. The country's external debt situation is bad with 478.2% of GDP in 2002 (peak) to 131% in 2010. The country appears to face inflationary pressures and seems to struggle to stay within the 3% WAEMU requirement and sometimes even the 5% ECOWAS convergence target as indicated in table 3.8.

3.10 Liberia

Liberia is the thirteenth largest economy of ECOWAS with a share of 0.33% of its GDP and 1.29% of the total population. The country gained independence from America on 26/7/1847. The land area of Liberia is 96,320 km^2. It experienced a population growth rate of 285% from 1960 (1,115,736) to 2013 (4,294,077). Liberia's economy is heavily dominated by the primary sector with a contribution to GDP of 69.4% and 73.3% in 2006 and 2011 respectively.

The figure for primary sector share fell to 47.7% in 2013. A share of agriculture, forestry, fishing and hunting for the same period is 68.6% and 72% but significantly declined to 35.3% in 2013. Despite this proportion of agricultural sector the country still imports most of its rice, the main staple food, to meet local demand which makes social conditions vulnerable to international price fluctuations (AEO 2012). Forestry and rubber production are high components of agriculture and these were supported in 2011 by international prices and new companies engaging in logging operations. Rubber, timber, palm-oil, and food production are the growth drivers of the economy. However fluctuating rainfall and poor feeder roads network to transport farm produce to the market are serious obstacles to this sector. The secondary sector is 6.7% and 7.3% of GDP for 2006 and 2013 respectively and this is expected to grow in the future due to the expansion in the mining of iron-ore. Apart from the expected future increase in this sector due to the processing of iron-ore, the current manufacturing activities are mainly in beverages, cement, and consumer goods.

Table 3.9 Country economic indicators – Liberia

Year	GDPR	PGDP	PGDPR	EXP	IMP	E-I	CAB	CSD	Ex DS	INF	EXR
1975	-3.5	348	-6.2	69.9	64.4	5.5					1
1985	-0.8	385	-2.3	54.9	47.6	7.3	6.6		146.9		1
2001	22.1	175	18.3	28.6	29.5	-0.9			581.1		49
2002	31.9	179	29.4	35.7	29.8	5.9			605.8	14.2	62
2003	-32.8	135	-33.7	91.5	38.7	52.8			875.7	10.3	59
2004	-5.1	151	-6.8	26.5	67.4	-40.9	-34.2		815.5	7.8	55
2005	9.5	170	6.4	23.8	76.3	-52.4	-33.9	0.0	719.1	10.8	57
2006	9.8	182	5.4	30.8	142.7	-111.9	-28.6	0.1	681.1	7.3	58
2007	15.7	213	10.2	32.4	121.4	-89.0	-30.2	0.1	503.6	11.4	61
2008	10.5	233	5.1	34.4	144.6	-110.3	-41.6	0.0	367.7	17.5	63
2009	13.8	301	8.5	15.3	76.4	-61.2	-24.0		143.3	7.4	68
2010	10.9	324	6.5	19.1	82.1	-63.0	-32.1		17.6	7.3	71
2011	9.4	374	5.9	27.5	93.3	-65.8	-48.9			8.5	72
Mean	**8.70**	**222**	**5.0**	**33.2**	**82.0**	**-48.8**	**-34.2**	**0.0**	**531.1**	**10.3**	**61**

The sector is constrained by insufficient public electricity supply, shortage of skilled labour, and high cost of inputs. The tertiary sector is said to be supported mainly by expatriate, including the UN mission in Liberia (UNMIL). Economic development of Liberia is constrained by several factors: political instability from the civil war and the boycott of the second round of the 2011 presidential elections, difficult business environment, poor energy infrastructure and transport, more so in rural areas, mismatch of workers' skills and employers' demand, low literacy rate, inadequate port facilities and lack of pave roads, high cost of energy, three times the West African average (AEO 2012). Donor contributions and remittances from Liberians living abroad are all boosts to the economy which creates another potential for external shock.

The country's economic growth, though improving in the recent years seems very fragile with the highest annual GDP growth of 31.9% in 2002 and lowest of -32.8% in 2003 (table 3.9). Per capita GDP is low and its growth rate has mixed results. In fact the situation in 1985 (US$385) is better than the current level of US$374 in 2011. The trade balance is largely in deficit with highest net export of -111.9% of GDP in 2006 and still standing at -65.8% in 2011. The current account balance shows no better condition although it appears to be relatively in lower deficit than the trade balance suggesting some form of cancellation from the capital account balance. The country was highly indebted up to 2009. In 2003 the external debt stock as a percentage of GDP was 875.7% and this figure now stands at only 17.6% in 2010. Inflation rate, in most times, is in double digits with the exception of 2010 and 2011 although it is still above the 5% ECOWAS target. The Liberian dollar has depreciated over the years from a 1:1 with

US$ in the sixties to the eighties to 72:1 in 2011. According to the AEO 2012 the poor inflation performance is explained by the high international food and fuel prices and limited domestic supplies due to low production and difficulty of farm produce reaching the consumers. Unemployment and underemployment are both a concern in the country especially for the youth and programmes intended to overcome this problem yielded below expectation results.

Table 3.10 Country economic indicators – Mali

Year	GDPR	PGDP	PGDPR	EXP	IMP	E-I	CAB	CSD	Ex DS	INF	EXR
1975	11.6	126	9.6	9.7	29.3	-19.6	-7.4				214
1985	-11.4	164	-12.9	16.8	44.0	-27.2	-16.0		110.8		449
2001	12.1	226	8.8	33.3	50.3	-17.0	-11.8	-4.2	108.7	5.2	733
2002	4.2	279	1.0	31.9	39.2	-7.3	-4.5	-4.2	82.9	5.0	697
2003	7.4	352	4.2	26.4	37.4	-10.9	-6.2	-1.4	70.0	-1.3	581
2004	2.2	382	-1.0	25.4	37.8	-12.4	-8.4	-3.0	67.0	-3.1	528
2005	6.1	403	2.8	25.6	37.3	-11.7	-8.3	-2.5	60.3	6.4	527
2006	5.3	432	2.1	32.1	40.2	-8.1	-3.7	32.1	27.1	1.5	523
2007	4.3	510	1.1	26.2	35.6	-9.4	-8.1	-4.7	25.5	1.4	479
2008	5.0	604	1.8				-12.2	-1.7	23.2	9.2	448
2009	4.5	601	1.3				-7.3	-2.1	23.1	2.2	472
2010	5.8	613	2.6				-12.6	-2.5	24.7	1.1	495
2011	2.7	669	-0.3							2.9	472
Mean	**5.41**	**461**	**2.2**	**28.7**	**39.7**	**-11.0**	**-8.3**	**0.6**	**51.3**	**2.8**	**541**

3.11 Mali

Mali gained independence from France in 1960 and it is the country with the second largest land area in ECOWAS (1,220,190 km^2) and the sixth largest economy in GDP terms with 2.31%. Unlike Guinea, Mali left WAEMU but returned and stayed permanently in the currency union. Since 1960 the population has grown from 5,247,877 to 15,301,650 (192%) in 2013. The primary sector is dominated by agriculture in all years (Appendices A.5 and A.6). It has a sizeable mining sector which has decreased from 8.3% in 2006 to 5.9% in 2014. The secondary sector is the smallest and has experienced the highest decline from 9% in 2006 to 5.6% in 2014. Agricultural production includes cotton, rice, and livestock farming. Livestock farming alone employs 30% of the workforce. This sector is vulnerable to shortage of rainfall and its uneven distribution in time and places. The war in Libya, the post-election crisis in Cote d'Ivoire, rising oil and food prices and the military coup that led to the outbreak of violence in the country in early 2012 are all obstacles to this sector. The manufacturing sector is mainly textile and food processing. Trade, the largest component of the service sector, is strongly supported by private consumption of households. The major source of

household income is remittances from Malians living abroad. The current political turmoil is a serious setback to Mali's economic development. The government effort to combat poverty through vocational training and job creation programmes is not yielding the desired results. The Mali economy is declining, though, at a slow rate as shown by the GDP growth rate in table 3.10. Per capita GDP is low and its growth is also on the decline. Both the trade and current account balances are in deficit for all the years shown in table 3.10. The fiscal balance is in deficit except for 2006 where it reported a large surplus of 32.1% of GDP. The external debt stock has significantly declined and stood at 24.7% in 2010. The inflation record is in most times within the WAEMU 3% requirement but many times this target is missed and sometimes even the 5% ECOWAS expected target.

3.12 Niger

Niger is a member of WAEMU and gained independence from France in 1960. The country is located in a land area of 1,266,700 km^2 and has a population of 3,249,965 and 17,831,270 in 1960 and 2013 respectively. This represents a growth rate of 449%, second to Cote d'Ivoire. Niger is the ninth largest economy in ECOWAS with a share of 1.48% of its GDP and in terms of population size it is the fifth largest with 5.08% of the total. The primary sector is the largest of the country's economic activity with a contribution to GDP of 48.5 and 50.9% for 2006 and 2013 respectively. This is closely followed by the tertiary sector which represents 45.7% and 42.8% of GDP for the same period. The secondary sector is relatively very small representing only 5.8 and 6.4% of GDP for the same period. Agriculture constitutes the largest part of the primary sector with 46.2% of GDP in 2006 although there was a small decline to 40.7% in 2013. This is due to bad weather and little rain fall which sometimes causes drought and in 2011 it created a cereal deficit of 692,000 tonnes. The sector is also affected by political crises in neighbouring countries: Cote d'Ivoire, Nigeria, and Libya. For every three years the country experiences food crisis at least once due to drought and recently to flooding that resulted to the destruction of infrastructure, arable land, and fall in production and ultimately famine (country strategy paper 2012-14).

Economic activity was also disturbed by the military coup in February 2010 until 2011 when constitutional rule was brought back. Mining activities are mainly on oil and

uranium and this sector is to expand in the future with the current development of building new oil refinery and new uranium mine.

The manufacturing sector, like other ECOWAS countries, is affected by lack of skilled labour, high cost of inputs and delay in reconstructing the electricity sector. There is little job creation in Niger due to low economic activities especially in the industrial sector and because of this the demand for jobs is not very high. According to AEO 2012, 40% of young first-time job seekers still have inadequate qualifications. Economic growth, measured by the GDP growth rate is very volatile with no clear pattern (table 3.11). The highest GDP per capita achieved is US$374 in 2011. This is very low relative to the world standard and even in SSA and ECOWAS.

Table 3.11 Country economic indicators – Niger

Year	GDPR	PGDP	PGDPR	EXP	IMP	E-I	CAB	CSD	Ex DS	INF	EXR
1975	-2.8	207	-5.6	19.2	31.0	-11.7	1.1			9.1	214
1985	7.7	214	4.8	20.7	32.8	-12.1	-4.4		84.9	-0.9	449
2001	7.1	172	3.5	16.9	24.6	-7.7	-4.7		83.2	4.0	733
2002	3. 0	185	-0.5	15.2	24.1	-8.9	-7.6		85.0	2.6	697
2003	5.3	225	1.7	16.0	25.2	-9.2	-8.0		77.8	-1.6	581
2004	0.1	243	-3.3	16.1	26.0	-10.0	-7.6		66.0	0.3	528
2005	4.5	262	0.9	15.0	24.2	-9.2	-9.1	-1.9	59.2	7.8	527
2006	5.8	271	2.1				-8.6	40.4	22.7	0.0	523
2007	3.4	308	-0.2				-8.2	-0.9	26.8	0.1	479
2008	8.7	372	4.9				-12.1		18.7	11.3	448
2009	-0.9	351	-4.4				-25.1		21.0	4.3	472
2010	8.0	349	4.2						20.8	0.8	495
2011	2.3	374	-1.2							2.9	472
Mean	**4.30**	**283**	**0.7**	**15.9**	**24.8**	**-9.0**	**-10.1**	**12.5**	**48.1**	**3.0**	**541**

The country runs a persistent deficit in trade and current account balances indicating poor performance in both the goods and capital flow sectors. There is a high external debt burden but this is slowing down continuously and now at its lowest point of 20.8% of GDP. According to the country strategy paper, Niger's improvement in debt position is due to debt relief initiative obtained under the Heavily Indebted Poor Countries (HIPC) in 2004 and the Multilateral Debt Relief Initiative (MDRI) in 2006. The possible effect of these initiatives is reflected by the significant decline in the debt ratio from 59.2% in 2005 to just 22.7% in 2006 (table 3.11). The inflation record performance is mixed. The figures show that the country struggles to maintain inflation within the 3% criterion of WAEMU and sometimes even the 5% required by the ECOWAS convergence criterion.

3.13 Nigeria

Nigeria is the largest and dominant economy in ECOWAS, the second largest in SSA and 30th largest in the world (CSP 2013-17). It is the pioneering force behind the economic integration in the region. Its share of ECOWAS GDP is 70% (figure 3.1) and 53% of the total population (figure 3.2). The country gained independence from Britain in 1960 and its land area is 910,770 km^2 with a population of 45,926,253 and 173,615,345 in 1960 and 2013 respectively. This represents a growth rate of 278%. Nigeria's long term aspiration, as embedded in its vision 20:20, is to become one of the top 20 economies in the world.

The Nigerian Economy is very largely dominated by the primary sector with a contribution to GDP of 69.8% and 68.7% for 2006 and 2011 respectively. This has fallen to only 34% in 2013. The secondary/manufacturing sector is relatively small with only 2.6% and 2.2% of GDP in 2006 and 2011 respectively with an increase to 9.0% in 2013.

Table 3.12 Country economic indicators – Nigeria

Year	GDPR	PGDP	PGDPR	EXP	IMP	E-I	CAB	CSD	Ex DS	INF	EXR
1975	-5.2	426	-7.8	18.3	22.8	-4.5				34.0	1
1985	9.7	331	7.0	16.1	12.4	3.7	9.2		65.6	7.4	1
2001	3.1	379	0.6	43.0	32.3	10.7	5.2		64.7	18.9	111
2002	1.5	455	-0.9	31.9	32.6	-0.7	1.8		51.6	12.9	121
2003	10.3	508	7.6	42.7	40.4	2.3	5.0		51.2	14.0	129
2004	10.6	644	7.9	44.0	31.1	12.9	19.2	1.5	43.0	15.0	133
2005	5.4	803	2.8	46.5	31.0	15.5	32.5	2.5	19.7	17.9	131
2006	6.2	1015	3.6	42.9	27.7	15.1	25.1	-0.8	5.3	8.2	129
2007	6.4	1129	3.8	41.0	25.9	15.1	16.7	-2.1	5.1	5.4	126
2008	6.0	1375	3.4	42.8	31.2	11.6	14.1	-1.7	5.5	11.6	119
2009	7.0	1091	4.3	35.0	29.7	5.3	8.2		4.6	11.5	149
2010	8.0	1443	5.3	35.2	29.9	5.3	5.8		3.4	13.7	150
2011	7.4	1502	4.7	39.6	35.6	4.0	3.6			10.8	155
Mean	**6.53**	**940**	**3.9**	**40.4**	**31.6**	**8.8**	**12.5**	**-0.1**	**25.4**	**12.7**	**132**

The tertiary sector represents 27.7% and 29% of GDP in 2006 and 2011 respectively with a sharp increase of 56.9% in 2013 thus explaining the fall in primary sector. The country's strong mining sector is reflecting its abundant natural resource endowment. It is gifted with many and large amount of natural resources and according to the CSP (2013-17) about 34 different minerals across the country including gold, iron ore, coal, and limestone; 37.2 billion barrels of proven oil reserves and 187 trillion cubic feet of proven natural gas with the possibility of the existence of fertilizer and liquefied gas

production. The oil sector is a major growth driver in Nigeria especially when global oil prices are high and at the same time it is a source of serious external shock when prices are slowing. The small manufacturing sector is mainly cement production and oil refining activities. This sector is underutilised and suffered a decline from 54% during the 1980s to between 30% and 40% in present time. Resource underutilisation in Nigeria is not only a problem in the industrial sector but also in the agricultural sector. For instance, although agriculture represents a large proportion of the country's GDP, productivity is however low. According to the CSP (2013-17) Nigeria's growth rate in crop yields increased marginally form 1% in 1961 to only 1.2% in 1961-2008 as compared to 0.9% to 2.3% for Indonesia in the same period. The low productivity in this sector is due to lack of modernisation and therefore its enhancement and linkage to agro based industries will generate more economic growth, employment and reduce poverty and ensure the country's food security. Despite the underperformance of Nigeria in the manufacturing sector it still produces a large portion of goods and services for the West African region and remains one of the most preferred investment destinations in Africa. In terms of GDP Nigeria achieved the highest growth of 10.6% in 2004 and since then up to 2011 the growth has been flat in single digit range. The per capita GDP growth follows similar pattern. The country has a strong export base as reflected in its persistent trade surplus (net export as a percentage of GDP in table 3.12). The trade balance is however vulnerable to international oil prices which is influenced by the pace of economic growth in its major oil importers such as US (40%) and China and also the sovereign debt crisis in the Euro-zone. The current account balance is also surplus and even stronger than the trade balance suggesting a good performance in the capital account balance. However since 2009 these surplus balances are on a continuous decline. The figures available for the fiscal balance show mixed results.

Nigeria's economic activities and its economic development are faced with several constraints including: (i) poor road condition due to low quality of construction and maintenance. It is estimated that 42% of federal roads, 70% of state roads and 90% of local government roads are in poor or failed condition (CSP 2013-17), (ii) Inadequate market support services, inadequate water management and irrigation infrastructure, (iii) Inadequate power supply to meet national demand. For instance out of the current demand of 10,000-12,000 megawatts the country only generates 4,000 megawatts resulting to heavy reliance on generators by consumers (about 90%), (iv)

mismanagement of oil resources (v) dilapidated physical infrastructure due to underinvestment, (vi) overdependence in oil and gas industry, (vii) Political instability due to persistent military coup and most recently insurgencies from fragmented groups. This point is stressed in the CSP (2013-17:1) which comment that '…the mobilisation of the populace for party politics along ethnic and religious lines poses a major challenge to electoral politics in Nigeria.'

Despite Nigeria's high economic growth, one of the highest in SSA, unemployment rate has increased from 21% in 2010 to 24% in 2011. Regional disparity in unemployment is a problem in the country: it ranges from 33% in north-east region to about 8% in Lagos State. One-third of the workforce is in the 15-35 year old group but this group accounted for almost two-thirds of the unemployed (CSP 2013-17). This is a potential source for crime and violence for survival and possible engagement in insurgence activities. The possible explanation for the Nigerian unemployment problem despite its economic development is that the major growth drivers of the economy, the oil sector and consumer demand (in the non-oil sector), are not sufficiently high job creators. The oil sector is capital intensive and its potential to create jobs is very limited. Consequently Nigeria has suffered from brain drain losing its endowed quality human capital now in different professional jobs in different parts of the world. Nigeria's inflation performance for almost all the years in table 3.12, except 2006 and 2007, are in double digits and far away from meeting the ECOWAS single currency convergence criterion of 5%.

3.14 Senegal

Senegal is the second largest economy in WAEMU after Cote d'Ivoire. It is the fourth largest economy in ECOWAS with a share of 3.46% of GDP. The country's population is 3,047,804 and 14,133,280 in 1960 and 2013 respectively and represents growth rate of 364%. Senegal gained independence from France in 1960 and has a land area of 910,770 km^2. The economy is tertiary sector dominance with a share of 69.3% and 69.7% of GDP for 2006 and 2014 respectively. The primary sector is relatively small with 16.2% (2006) and 17.8% (2014) of GDP. This sector is mainly agriculture with only a very small component of mining. The country has a relatively large manufacturing/secondary sector with a GDP share of about 14.4% in 2006 but fell to 12.5% in 2014. Agriculture is mainly groundnut, fishing and other food items. The

sector is affected by climatic conditions (drought, floods and energy). Meat and fish processing contribute significantly to the manufacturing sector. Senegal GDP growth rate exhibits a downward volatile trend as seen in table 3.13. Since the highest growth rate of 6.7% in 2003 the economy has been declining. The growth rate in per capita GDP follows the GDP growth rate but much more volatile with negative values in 2002, 2006 and 2011. The trade balance and the current account balance are persistently in deficit. The external debt stock has declined from 75.2% in 2001 to 28.6% in 2010. Inflation rate has been below the 5% ECOWAS target with the exception of 2007 and 2008.

Inflation is affected by world market prices especially those of foodstuff and petroleum products (CSP 2010-15). According to CSP (2010-15), Senegal's economic development is constrained by a number of factors: unfavourable business environment, inadequate control of corruption, malfunction of the justice system, low capital endowment and low productivity, long delays in fulfilling tax formalities and high factor costs.

Table 3.13 Country economic indicators – Senegal

Year	GDPR	PGDP	PGDPR	EXP	IMP	E-I	CAB	CSD	Ex DS	INF	EXR
1975	7.5	467	4.5	31.4	35.0	-3.6	-3.8			31.7	214
1985	3.3	475	0.3	27.8	39.2	-11.4	-12.1		86.4	13.0	449
2001	4.6	500	1.9	28.7	37.8	-9.0	-5.0	-2.1	75.2	3.1	733
2002	0.7	532	-2.0	28.5	39.0	-10.4	-5.9		76.7	2.2	697
2003	6.7	666	3.8	26.6	38.7	-12.1	-6.4		63.7	0.0	581
2004	5.9	759	3.1	26.4	39.4	-12.9	-6.4		48.6	0.5	528
2005	5.6	800	2.8	26.9	42.5	-15.6	-7.8		44.0	1.7	527
2006	2.5	839	-0.2	25.6	43.0	-17.5	-9.2		20.3	2.1	523
2007	4.9	986	2.1	25.4	47.7	-22.3	-11.6		22.6	5.9	479
2008	3.7	1136	1.0	26.1	52.4	-26.3	-14.1		21.1	5.8	448
2009	2.1	1055	-0.6	24.4	43.0	-18.6	-6.7		27.4	-1.1	472
2010	4.1	1034	1.4	24.8	43.0	-18.2	-4.7		28.6	1.3	495
2011	2.6	1119	-0.1	24.5	44.2	-19.7				3.4	472
Mean	**3.94**	**857**	**1.2**	**26.2**	**42.8**	**-16.6**	**-7.8**	**-2.1**	**42.8**	**2.3**	**541**

3.15 Sierra Leone

Sierra Leone gained independence from Britain in 1961. The country has a land area of 71,620 km^2 and a population of 2,187,240 and 6,092,075 in 1960 and 2013 respectively representing a growth rate of 179%. For both GDP and population size, Sierra Leone is the eleventh largest economy of ECOWAS. It has a large primary sector component of GDP 58.3% (2006) and 70.7% (2014). This sector is dominated by Agriculture 54.2% and 50.5% for 2006 and 2014 respectively. Agriculture employs 70% of the population.

Despite the large size of the agricultural sector its contribution to exports is minimal since it is mainly subsistence with only small scale commercial projects. The opportunities in the Agricultural sectors are not fully utilised due to several constraints: low investment, lack of institutional arrangements for agricultural credit, inadequate budgetary support, inadequate support for research, poor transportation network and facility, inadequate agro-processing facilities and high post-harvest losses (JAS 2009:5).

Table 3.14 Country economic indicators – Sierra Leone

Year	GDPR	PGDP	PGDPR	EXP	IMP	E-I	CAB	CSD	Ex DS	INF	EXR
1975	1.7	239	-0.3	25.1	34.5	-9.4					1
1985	-5.3	242	-7.7	14.8	16.6	-1.8	0.3		82.6		5
2001	18.2	187	13.8	16.0	34.3	-18.2	-12.1	-9.2	149.5		1986
2002	27.5	208	21.8	17.6	35.9	-18.3	-7.8	-8.3	144.8	-1.3	2099
2003	9.3	210	4.1	23.2	40.8	-17.6	-8.4	-5.6	153.4	11.3	2348
2004	7.5	221	2.7	22.5	33.5	-10.9	-9.0	-2.4	148.5	14.4	2701
2005	7.2	240	3.0	23.6	36.5	-12.9	-8.5	-1.7	141.3	13.1	2890
2006	7.3	267	3.8	24.9	32.5	-7.6	-6.7	-1.8	103.6	7.3	2962
2007	6.4	304	3.5	20.8	27.8	-7.0	-9.6	-1.0	31.5	11.6	2985
2008	5.5	348	3.0	16.3	29.4	-13.0	-11.5	-4.4	31.1	14.8	2982
2009	3.2	323	0.9	16.0	29.0	-13.1	-17.6	-3.2	37.8	9.3	3386
2010	4.9	325	2.7	17.1	29.5	-12.4	-25.8	-6.9	40.7	16.6	3978
2011	6.0	374	3.7	16.3	26.6	-10.3	-50.3	-6.1		16.2	4349
Mean	**9.37**	**273**	**5.7**	**19.5**	**32.3**	**-12.9**	**-15.2**	**-4.6**	**98.2**	**11.3**	

The mining sector is expected to increase in future due to new iron ore exploration following the discovery of 10.5 billion tons of high-grade iron ore deposits. The mining sector, like other sectors, is constrained by energy generation and road infrastructure. The secondary/manufacturing sector is very small and it is constrained by competition from low-cost imports. The manufacturing sector is mainly imports-substituting industries and employs only about 2% of the workforce (JAS 2009). The tertiary sector is the second largest with a contribution to GDP of 39.2% (2006) and 27.7% (2014). Most of the activities in the tertiary sector are informal. The GDP growth of Sierra Leone is on the decline with 27.5% in 2002, the period just after the war, to 4.9% in 2010 and 6% in 2011 (table 3.14). Per capita GDP is relatively very low with the highest of US$374 in 2011 and the lowest US$187 in 2001. Both trade and current account balances are persistently in deficit and the latter is even worst in 2011. Fiscal balance is also in deficit but the external debt position has improved. Inflation is always in double digits except 2009 where it was 9.3%. The country's inflation performance is way above the 5% ECOWAS convergent rule. According to the AEO (2012) the country's inflation is driven by international oil and agricultural prices on one hand and the depreciating Leone on the other. The country's national currency is very weak and

has depreciated over the years. Youth unemployment of 60% is amongst the highest in West Africa.

3.16 Togo

Togo gained independence from France in 1960. It has a land area of 54,390 km^2 and a population of 1,577,708 and 6,816,982 in 1960 and 2013 respectively. This represents a growth rate of 332%. It is the tenth largest economy in ECOWAS with 0.88% of its GDP and 2.1% of its population.

The primary sector is marginally larger than the tertiary sector. In 2006 the primary sector contributed 43.4% of GDP and 50.4% 2014. Cash crops including cotton and cocoa, form major components of exports. The secondary sector accounts for 10.2% (2006) and 6.7% (2014) of GDP. The tertiary sector- which is mainly wholesale and retail and general government services- contributed 46.5% (2006) and 42.8% (2014) of GDP.

Table 3.15 Country economic indicators – Togo

Year	GDPR	PGDP	PGDPR	EXP	IMP	E-I	CAB	CSD	Ex DS	INF	EXR
1975	2.4	259	0.3	43.4	53.7	-10.3	-12.2			18.0	214
1985	5.6	241	2.0	48.4	57.1	-8.7	-3.6		122.7	-1.8	449
2001	-1.6	270	-4.3	33.8	48.5	-14.7	-12.7		105.6	3.9	733
2002	-0.9	292	-3.4	36.5	49.1	-12.6	-9.5		107.4	3.1	697
2003	5.0	324	2.5	43.4	59.1	-15.7	-9.7		102.3	-1.0	581
2004	2.1	366	-0.2	38.6	57.9	-19.3	-10.7	-0.3	94.2	0.4	528
2005	1.2	391	-1.1	40.0	58.7	-18.6	-9.6	-5.7	79.1	6.8	527
2006	4.1	398	1.8	38.2	56.1	-17.9	-8.0	-3.5	80.7	2.2	523
2007	2.3	446	0.1	37.9	54.5	-16.6	-8.6	-0.8	77.5	1.0	479
2008	2.4	548	0.2	35.5	51.9	-16.4	-7.0	0.3	51.4	8.7	448
2009	3.4	536	1.2	36.7	52.3	-15.6	-5.6	-0.6	51.6	2.0	472
2010	4.0	530	1.9	39.9	57.0	-17.0	-6.3	0.6	54.1	1.8	495
Mean	**2.18**	**410**	**-0.1**	**38.1**	**54.5**	**-16.4**	**-8.8**	**-1.4**	**80.4**	**2.9**	**548**

The country's GDP growth is relatively volatile and GDP per capita is low with similar growth pattern to the GDP. Trade and current account balances are persistently in deficit. Inflation is within the ECOWAS 5% target except 2005 and 2008. According to the CSP (2011-15) the inflationary pressure in 2008 was caused by the food crisis and fuel price increases. According to AEO (2012) unemployment affected 21.4% of young people in towns and 5.4% in country side while under-employment was highest in rural areas with 21.7% compared to 16.15 in towns. Two challenges remained the country's employment problem: population pressure and the gap between labour market needs and job seekers' qualifications.

Chapter 4 The OCA theory and the literature on currency union

4.1 Introduction

The issue of the choice of currency regime, and in particular whether to adopt a common currency in the context of regional integration, has received much attention over the past four decades. The successful launch of the euro in 1999 even added impetus to other nations and regions to follow it example. Many academic papers have been written on monetary and economic integration revolving on the theoretical framework of the optimum currency areas (OCA) pioneered by Mundell (1961), McKinnon (1963), Kenen (1969). Another emphasis on the literature is the costs and benefits of currency union. A number of studies have been conducted on the effects of currency union and exchange rate volatility on bilateral trade. What is certain about these studies is that their findings are inconclusive.

This chapter illustrates, in section 4.3, the adjustment mechanisms when currency union members are faced with shocks and in section 4.4 we outlined and discussed the literature on the OCA which forms the basis for the analysis in subsequent chapters. We extend the OCA discussion by looking at the debate on currency union and political union in section 4.5, the endogeneity argument of OCA in section 4.6 and the criticisms of OCA in section 4.7. The chapter also discusses the benefits and costs of currency union in sections 4.8 and 4.9 respectively. Finally, we reviewed the empirical literature on currency union and exchange rate volatility on trade in sections 4.10 and 4.11 respectively.

4.2 Background

The OCA presents a systematic guide on deciding whether it makes sense for a group of countries to abandon their national currencies replacing it with a common currency shared with other countries in a monetary union. The theory develops a combination of economic and political criteria which recognise that the real economic cost of giving up the exchange rate instrument arises in the presence of asymmetric shocks (Baldwin and Wyplosz, 2015). Optimum currency areas have been defined in many ways but all shared similar and closely related ideas.

According to Mundell (1961), McKinnon (1963), Kenen (1969) an optimum currency area (OCA) is defined as

> *"an area in which factor mobility is sufficiently great, or economic shocks are sufficiently common, that there is little need for relative price adjustment between different regions within the area." (Ching and Devereux, 2003:674).*
>
> *Another definition by Frankel is*
>
> *"countries that are largely integrated with each other, with respect to trade and other economic relationships, are mostly likely to constitute an optimum currency area. An optimum currency area is a region for which it is optimal to have its own currency and its own monetary policy" (Frankel, 1999:14)*

To explain the OCA theory, Mundell used a two country model. To build the OCA framework, following Mundell, we assumed two countries called F and A with currencies CFA and ECO respectively. We illustrate how the adjustment mechanism takes place in (1) in the context of the theory of OCA when the two countries entered into a monetary union and (2) in the context of flexible exchange rate when the two countries retain their national currencies. We start with initial equilibrium for the two countries F and A of E_{F1} and E_{A1} respectively in figure 4.1. If for some reasons demand shifts from F to A, the demand curve shifts downward from D_{F1} to D_{F2} whereas in A the demand curve shifts upward from D_{A1} to D_{A2}. F's output declines with the possible effect of increase in unemployment whereas output in A increases with the possible effect of a decline in unemployment. The two countries are now out of equilibrium and faced adjustment problems. F is faced with decline in output and higher unemployment and A is faced with a boom in demand with likely effect of upward pressure on its price level. The mechanisms that bring these countries back to equilibrium are what we examined in the next section.

4.3 Adjustment mechanisms

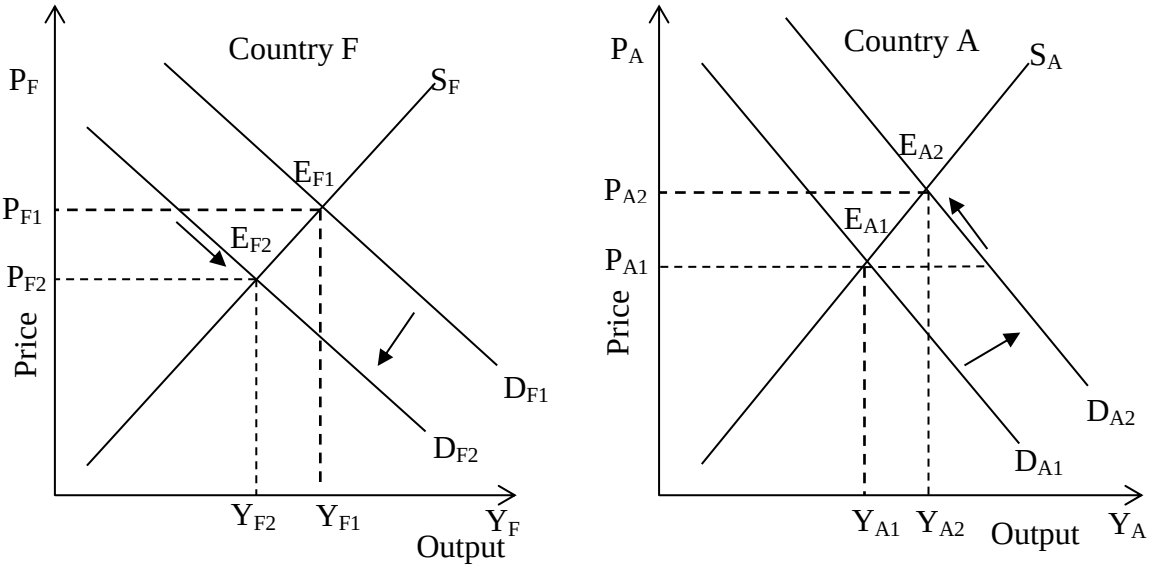
4.3.1 Adjustment mechanism without monetary union

In the case of each country having monetary autonomy they can use interest and exchange rates to stabilise their economies. If the two currencies were freely floating, in the case analysed here, F can reduce interest rate to stimulate demand where A can do the opposite. The CFA will depreciate and ECO appreciates leading to higher demand and lower demand for F and A products respectively. These adjustments alleviate the

recession and unemployment in F and reduce the boom in A with each country in new equilibrium as shown in figure 4.1.

In the case of F and A pegging their currencies to another currency the former will directly devalue the CFA and the latter revalue the ECO. The result achieved is the same as the one already discussed (figure 4.1). An implicit assumption not mentioned here is that the two countries involved trades extensively. Figures 4.1-4.3 are adapted from Baldwin and Wyplosz (2015)

Figure 4.1 Asymmetric shocks with and without MU



4.3.2 Adjustment mechanism with Monetary Union

In a monetary union the countries lose their monetary policy independence. A common central bank is now in charge of monetary policy. If prices are sticky the two countries are permanently left in unfavourable disequilibrium, excess supply in F and excess demand in A. In this case there is no short run adjustment solution because both interest and exchange rates are frozen and can only be changed by the common central bank. The long run solution is that since suppliers in F will not continue holding unsold stock for ever, the deeper recession will provide the incentive to gradually cut prices and eventually bring the economy to its new equilibrium at point E_{F2}. On the other hand A consumers will in the long run gradually accept higher prices to meet their demands. The rise in price in A will lower the quantity demanded and induce suppliers to increase

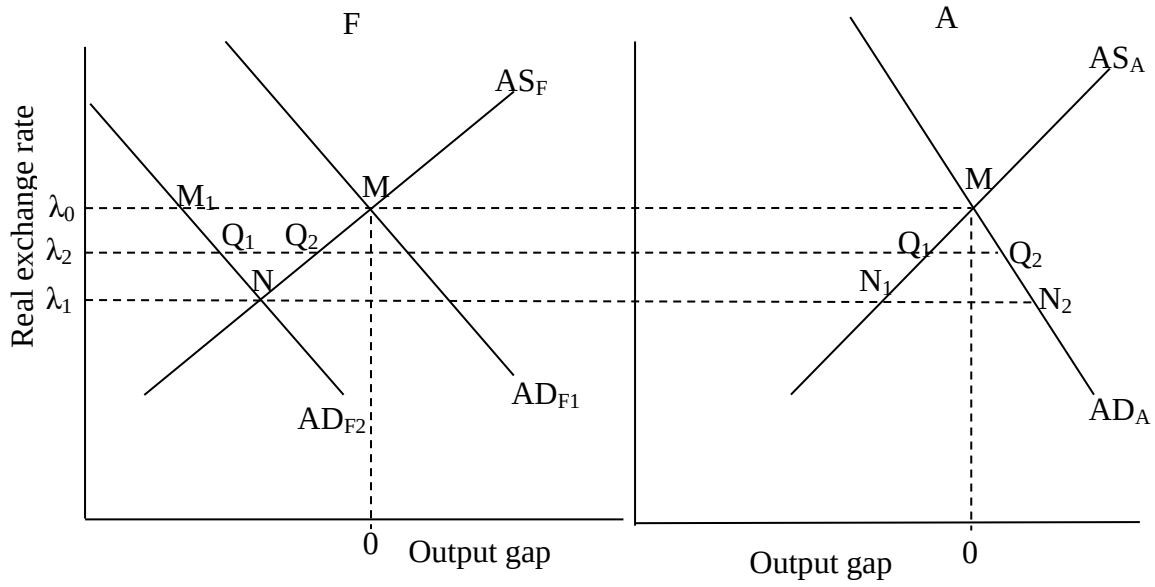
the quantity supply. This eventually brings the A economy to its new equilibrium at point E_{A2}.

With sticky prices and wages and the absence of monetary autonomy the adjustment process in the case of asymmetric shocks is painful and protracted (depending on the nature and size of shock) as residents of F will have to endure unemployment rate for a long time whereas residents of A will also have to endure inflationary pressure to an extended period of time. This is what the opponents of monetary union (Mundell and others) argued to be the main cost of countries abandoning their monetary autonomy in place of fixed exchange rate in the form of single currency.

4.3.3 Asymmetric shocks and the common central bank dilemma

To further demonstrate the cost involved in joining a monetary union we continue the two country model F and A with the assumption of sticky prices in the short run. First let us consider a case of symmetric shocks faced by both countries where they are hit by an adverse demand for their goods. In the case of these two countries being in a monetary union the central bank has a much simpler solution to the problem. A depreciation of the common currency in relation to the rest of the world will be an ideal policy that will fit the problems of both countries. Baldwin and Wyplosz (2015) even argued that if these countries are similar enough then there is no need to change their bilateral exchange rate with the rest of the world. The situation becomes complicated for the central bank when the two countries are faced with asymmetric shocks. This is shown in figure 4.2 where the vertical axis represents the real exchange rate, denoted as λ. With both countries having an initial equilibrium of M with a 0 output gap in figure 4.2 assume F is hit by an adverse demand shock leading to a shift in aggregate demand from AD_{F1} to AD_{F2}. This time F needs a depreciation of its real exchange rate in relation to both A with the rest of the world but A needs no change since it is still at the original equilibrium, point M. In the absence of a monetary union F will depreciates its nominal exchange rate, either through a devaluation or decrease in interest rate, to achieve a real exchange rate of λ_1 and new equilibrium at point N. In a monetary union the exchange rate and interest rate are no longer available to F to remedy its country's idiosyncratic problem and the action to solve this problem is in the hands of the common central bank that is there to solve the problems of all member states.

Figure 4.2 Asymmetric shocks and the common central bank dilemma



In response to the above problem the common central bank can intervene with one of three options: The first option is to adjust its monetary policy (direct devaluation of the common currency or reduce interest rate) to achieve a real exchange rate of λ_1. Since F and A are in a monetary union the central bank decision also lead to A's real exchange rate to be at λ_1. This policy is good for F since it is now in a new equilibrium at point N but it is bad for A which now faces excess demand of N_1N_2 with the potential consequence of inflation. The second option is for the central bank not to do anything and leave the exchange rate and the interest rate unchanged with the real exchange rate remaining at λ_0. This action is perfectly good for A who is not affected by the shock and still remained at the original equilibrium at point M. It is however bad for F who at λ_0 is now at a disequilibrium position with excess supply of M_1M. The third option is for the central bank to adopt an average approach to monetary policy in which case it depreciates the nominal exchange rate to achieve an average real exchange rate of λ_2, which is between λ_0 and λ_1. According to Baldwin and Wyplosz (2015) this third option is also a possibility to happen even if no action is taken by the central bank (option 2). According to them if the monetary union has a freely float currency an adverse shock in one part of the currency zone will lead to a depreciation of the union currency. The depreciation cannot go as far as λ_1 but will be between λ_0 and λ_1 and the position of the intermediate exchange rate depends on the relative size of the two countries and how

sensitive is their trade to changes in real exchange rate. An average exchange rate resulting from the third option above or an intermediate exchange rate resulting from the second option will yield very similar results. The effect is that at λ_2 (average or intermediate) F is left with excess supply Q_1Q_2 and A faces excess demand of Q_1Q_2. Thus the common central bank response has not been able to solve the problem of F. In fact what it has done is to partially solve the recession in F by moving its aggregate demand from point M_1 to Q_1 and moves the A economy from its original equilibrium, point M, to a boom disequilibrium at points Q_1 (Aggregate supply) and Q_2 (aggregate demand). In the short run both countries are in disequilibrium with unemployment in F and inflationary pressure in A. However disequilibrium will not exists forever and in the long run the unemployment in F due to the recession will exert a downward pressure on its price level and the overheating A economy will experience an opposite pressure on price level. The outcome is that F price level will decline to take the economy to its new equilibrium at point N and A price level will increase to take the economy to its original equilibrium at point M. This is however a painful and protracted process for both countries.

To summarise the points discussed in this section, when countries in a monetary union are faced with asymmetric shocks the common central bank is faced with monetary policy dilemma. None of the three possible actions produces an ideal solution for all union members. In the two extreme cases its action favours one of its members against the interest of the other and this may results to discontent and creates the possibility of political tension in the union. An average policy action is still not optimum for any of its members. In the best case it's partially decreased the excess supply in F and at worst it creates excess demand in A. The resulting outcome of a recession and disinflation in F and boom and inflation in A is what constitutes the costs of operating a monetary union, as argued by opponents, when asymmetric shock hits. Is there a solution to this problem? The theory of the optimum currency areas seeks to address this problem we discuss this later in the chapter.

4.3.4 Symmetric shocks with asymmetric effects

We mentioned in the discussion above that in a monetary union the common central bank's dilemma is only when union members are hit with asymmetric shocks. In the case of symmetric shocks with similar countries there is no need to depreciate the

currency in relation to the world exchange rate and even if it is needed such action will remedy the economic problems of the member states. This is an ideal case where there is perfect symmetry and perfect economic convergence and all member states react exactly the same way to the same shock. It is however argued that no two countries can react exactly the same way to the same shock due to differences in socio-economic structures such as labour market regulations, and traditions, the relative importance of the industrial sectors, the role of the financial and banking sectors, the country's external indebtedness, the ability to strike agreements between firms, trade unions and government and so on (Baldwin and Wyplosz, 2015:360). For instance an increase in world oil price (a symmetric shock) will positively affects oil exporting countries and negatively affects oil importing countries even if they are in the same monetary union (asymmetric effects). This has important implication for countries that are oil importers with different economic and financial structures and borrowing capabilities.

The conclusion here is that when countries that are significantly different form a monetary union the dilemma of the common central bank goes beyond asymmetric shocks because symmetric shocks with asymmetric effects equally posed the same problems as shown in figures 4.1 and 4.2 above.

According to the theory of OCA, countries proposing to form a single currency can minimise the costs of the loss of monetary autonomy provided they satisfy a number of criteria which we discuss in the next section.

4.4 Theory of optimum currency areas criteria

4.4.1 Factor mobility

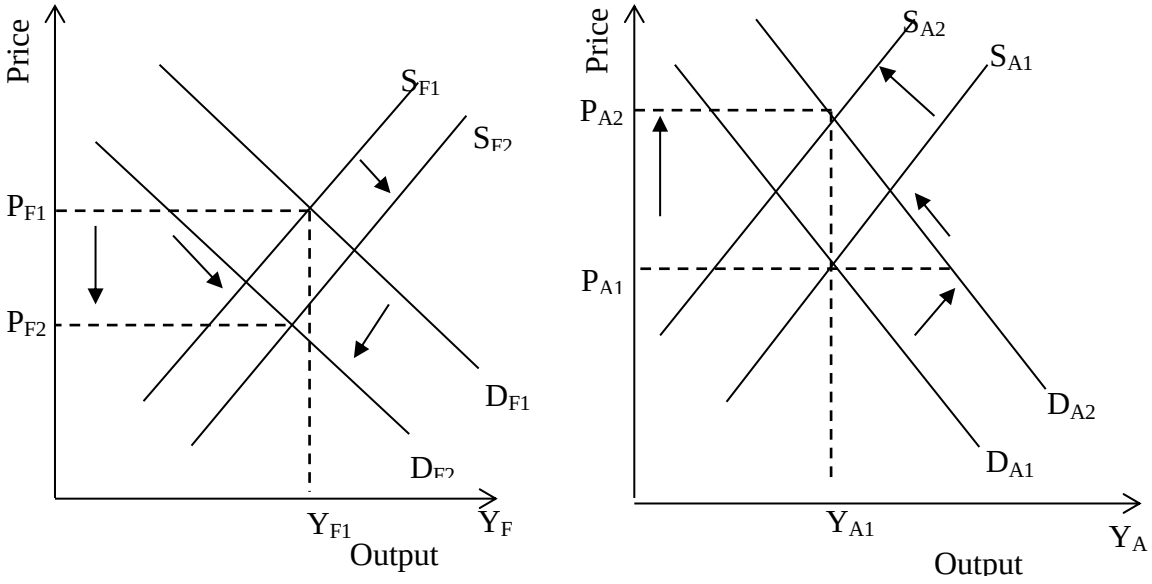
Mundell (1961) pioneered the OCA theory which was subsequently developed by McKinnon (1963) and Kenen (1969). According to Mundell there are two mechanisms that will achieve automatic equilibrium position when countries are faced with asymmetric shocks. The adjustment could be achieved through (1) Wage flexibility and (2) mobility of labour.

4.4.2 Wage flexibility

If wages are flexible unemployed workers in F will accept lower wage claim and in A excess demand for labour will push the wage rate upward. The adjustment mechanism is shown in figure 4.3. If F workers accept the reduction in their wage rate this will

increase aggregate supply and hence the supply curve shifts from SF1 to SF2 and the increase in wage rate in A will reduce aggregate supply and hence the supply curve shifts from S_{A1} to S_{A2}. The increase in aggregate supply in F will lead to a decrease in price, from P_{F1} to P_{F2}, which makes F products more competitive relative to A which will stimulate demand in F. In A the decline in aggregate supply will increase the price from P_{A1} to P_{A2} making the A products less competitive relative to F product with the corresponding effect of reducing demand in A. The adjustment mechanism overall led the two countries in new equilibrium positions as shown in figure 4.3.

Figure 4.3 Automatic adjustment in flexible factors



4.4.3 Labour mobility

Labour mobility is the second mechanism that will bring the countries back to equilibrium automatically without the need for a decline in wages in F and an increase in A. If labour is freely mobile between the two countries the F unemployed workers move to A where the demand for labour is in excess. With this movement both the unemployment in F and the inflationary wage pressures in A disappear. Apart from the labour market disequilibrium (unemployment) in F and the inflation pressure in A, there is also the problem of external trade balance in both countries. This problem is also solved by the migration of the unemployed in F to A. As workers move from F to A their purchases of F products will be transformed from home demand into extra F

exports where as their purchases of A products will be transformed from A exports into extra home demand. The effect of these changes is an increase in F exports and a corresponding decrease in A's exports with the ultimate effect of solving the deficit and surplus trade balances in F and A respectively.

The adjustment mechanism breaks down if despite the unemployment situation in F the wages in that country failed to decline and the workers do not move to A. In such a case F is stuck in the disequilibrium situation as illustrated in figure 4.1. In A there will still be an upward pressure on the wage rate due to the excess demand for labour leading to an upward shift in the supply curve as illustrated in figure 4.3. The adjustment to the disequilibrium must now come exclusively through increase prices in A making F goods more competitive again, leading to an increase in the F aggregate demand and hence an upward shift in its demand curve as shown in figure 4.3. Therefore if wages do not decline in F and labour do not move from F to A the adjustment to the disequilibrium will take the form of inflation in A (De Grauwe, 2014).

The above discussion means that for the adjustment mechanism to work the conditions of wage flexibility and/or labour mobility must be sufficiently satisfied as the two are at the root of the optimum currency area.

4.4.4 Capital mobility/Risk sharing

Capital mobility is part of what the literature describes as insurance against asymmetric shocks in monetary union. This scheme operates more successfully in a situation where the financial markets (bond and equity) and the banking sector of member states are completely integrated. On the assumption of market integration F residents hold securities of firms in A and vice versa. In the event of the negative demand shock in F (figure 4.1) firms make losses which will depress the value of securities and hence the income of the investors in that country (both F and A). The opposite happens in A. In this case since F residents held shares in A they will be able to share part of the profit of the market boom in A there by compensating themselves for the loss they sustained in F as a result of the negative demand shock. Conversely the A residents also held stocks in the depressed F market and therefore will share part of the loss caused by the negative demand shock in that country. Thus the reciprocal investments by residents of member states serve as insurance when countries are faced with asymmetric shocks. It is implicit in this analysis that a well organised and coordinated payment system is important to

facilitate a smooth and reliable transfer of income from one member state to another. This calls for the integration of the banking sector of member states as stated in the assumption above.

4.4.5 Openness (McKinnon, 1963)

McKinnon (1963) made his contribution to the optimum currency areas theory as an addition to Mundell's factor mobility criterion. He further developed the optimality idea by discussing the influence of openness of the economy. He defined openness as 'the ratio of tradable and non-tradable goods' and described optimum as 'a single currency area within which monetary-fiscal policy and flexible external exchange rates can be used to give the best resolution of three (sometimes conflicting) objectives: (1) the maintenance of full employment; (2) the maintenance of balanced international payments; (3) the maintenance of a stable internal average price level. The implicit assumption in the third objective is that any capitalist economy requires a stable valued liquid currency to insure efficient resource allocation. His definition of openness requires the assumption that all goods can be classified into two (1) tradable i.e. those that can enter into foreign trade- both imports and exports and (2) non-tradable i.e. those that do not enter into foreign trade due to infeasibility of transportation. It is also a requirement of his definition that exportables must be produced domestically and partly exported and the importables also be produced domestically and partly imported. This condition seems to bring McKinnon's openness criterion to Kenen's diversification. Adam Smith's theory of comparative advantage (specialisation) doesn't seems to apply in any of these two criteria.

$$\text{Openness} = \frac{Tradable\ goods}{Non\ tradable\ goods} = \frac{Exportables\ (X1) + Importables\ (X2)}{X3}$$

According to McKinnon in a balanced trade economy, where imports equal to exports, the value of exportables produced need not necessarily be the same as the value of importables consumed. What need to be equal in such an economy is total tradable goods produced and total tradable goods consumed which he said unambiguously equates his tradables to non tradables ratio to production or consumption. The openness argument is presented in two cases. Case 1 is open economy where there is a large proportion of tradable goods that are domestically consumed (i.e. (X1 + X2) > X3) and

case 2 is where the production of non-tradable goods is very large relative to importables and exportables (i.e. X3 > (X1 + X2).

Case 1 argument (More open economy)

McKinnon's argument in this case demonstrates how the exchange rate policy works in trying to attain external and internal balance in the economy when there are asymmetric shocks but keeping the price of non tradables, X3, constant in domestic currency terms. When the domestic currency depreciates against trading partners the money prices of X1 and X2 will increase relative to X3. The intended outcome is to increase the production of X1 and X2 and decline their consumption. This implies exports will increase and imports decline. The argument here is that this effect will be small in an economy that is already perfectly or highly opened and as a result the impact of the depreciation on the balance of payments is negligible making foreign exchange a less useful tool to stabilise the internal balance (price stability) and external balance (balance of payments). He argued that contractionary monetary-fiscal policy, for instance increase in domestic taxes, will be more effective in stabilising the economy. Any change in exchange rate will necessarily be completely off set (if economy is completely open) by internal price-level repercussions with no corresponding improvement in the trade balance. A depreciation policy in fact is more damaging to the internal price stability. The implication of this analysis is that in an economy that is already highly open the exchange rate is an ineffective policy for price stability and trade balance and therefore losing such an instrument, through a fixed exchange rate or currency union, bears no cost to the economy.

Case 2 argument (Less open economy)

In the case where the production of non tradables is larger than the tradables, McKinnon argued that the best policy is to peg the domestic currency to the body of non-tradable goods so as to fix the domestic currency price of X3 and alter the exchange rate (i.e. devalue) in order to change the price of the tradables which should subsequently improve the trade balance. The decline in prices of X1 and X2 is intended to stimulate production of these tradables as compared to the non tradables. With more exports and less imports the trade balance should improve but the problem with this policy is that due to the small size of the tradables relative to the non tradables the effect on the general domestic price index is smaller than in case 1. Any contractionary monetary-

fiscal policy attempt to reduce domestic demand in order to balance the economy is likely to result in high unemployment especially in the non tradable sector. In the worst case situation if resources are immobile (both labour and capital) the monetary-fiscal policy will not help to improve the trade balance immediately. To actually stimulate production in the tradables there is a need to reduce the domestic money prices of the non tradables. To achieve this it is necessary to reduce wage costs i.e. domestic money prices of X1 and X2, since labour constitutes a major component of X3 but the downward rigidity of wages, in a Keynesian sense, poses a difficulty here. The price of X1 and X2 is fixed by the external exchange rate system.

4.4.6 Product diversification (Kenen, 1969)

Kenen argues that if a country engages in a number of activities, it is also likely to export a wide range of products. He agreed that each of the products may be subject to disturbances due to changes in external demand or in technology but he argues that if the disturbances are independent an effect on one of the products will not necessarily lead to a large macroeconomic swings that will affect the entire export array due to the law of large numbers. Product diversification therefore provides stability on aggregate exports more than non-diversified economies. However for product diversification to create the aggregate exports stability, Kenen added that there must be sufficient occupational mobility to reabsorb the labour and capital that is made idle in the negative disturbances. This mobility is hampered if the products in different industries are not very similar and therefore needs different skills such that workers in one industry have idiosyncratic skills but the positive side is that due to the independent of the products (industries) disturbances in one sector are effectively average out thus leading to a stable export overall. On the other hand if the products produce in different industries are very similar (say substitutes to each other) with similar production skills requirements the degree of factor mobility will be high as skills of workers in the disturbed industry are transferrable to those industries with high labour demand. But the negative side of this product dependence is that the disturbances do not average out to create the stability of exports advocated in the product diversification argument thus the law of large numbers is defeated in this case. The dilemma of product diversification, occupational labour mobility and export stability is summarised in table 4.1.

Table 4.1 Products diversification and export stability

	Products are	**Occupational labour mobility**	**Aggregate export is**	**Exogenous shocks**
Diversification	Different	Low	Stable	Average out
Diversification	Similar	High	Unstable	Not average out

Source: author's summary from Kenen (1969)

Kenen ended with two implied requirements for fixed exchange rates regime. (1) For fixed exchange rate to work, countries should be well equipped with potent and sophisticated internal policies to be able to overcome the vulnerability on monetary shocks represented by a change in money wages relative to import prices as discussed in the first point of his argument. (2) Fixed exchange rate countries should also be well equipped with a wide range of budgetary policies to deal with, what he described as, stubborn pockets of unemployment that will arise from export fluctuations combined with an imperfect labour mobility.

The freezing of the exchange rate and the interest rate (in a monetary union) is likely to cause policy constraint in economic stabilisation in the event of external shocks. In his conclusion of the paper he made important point that may have serious implication for less developed countries.

> *'The principal developed countries should perhaps adhere to the Bretton Woods regime, rarely resorting to changes in exchange rates. The less developed countries, been less diversified and less well equipped with policy instruments, should make more frequent changes or perhaps resort to full flexibility' (Kenen, 1969:54).*

4.4.7 Degree of similarity of inflation rates

The ideal underlying this criterion is that if countries have similar rates of inflation then purchasing power parity (PPP) theory suggests that there is no need for exchange rate changes and hence a monetary union is more feasible. On the other hand if the countries have widely divergent propensities to inflate, then floating exchange rates becomes necessary to ensure that the relatively high inflation countries maintain their international competitiveness (Pilbeam, 2013). As stated in Pilbeam since a monetary union requires common inflation rates, countries with differing preferences with respect to any unemployment-inflation trade off will lose from monetary union. Differences in

inflation rates cause variations of terms of trade and give rise to persistent or even rising current account disequilibrium (Fleming, 1971).

4.4.8 Fiscal transfers

The economic rationale of this criterion is that if one country in the union is faced with adverse shock it is the interest of the other members to help alleviate the impact of the shock. The transfer of payments from the non-affected or positively affected country to the adversely affected country will mitigate both the recession in the adverse shock country and the boom in the positive shock country. As a result it gives time for the shock to disappear, if it is only temporal, or to work its effects through prices if it is longer lasting. These forms of fiscal transfers operate like common insurance against adverse shocks. The fiscal transfer is affected through the social security system (state payments) where tax revenue in the boom country is directed to the one in recession.

The potential moral hazard problem associated with fiscal transfers is that the authorities in the affected economy may not take the necessary steps of wage reduction to stabilise the economy as long as revenue keeps coming in from the central pot. Likewise the unemployed in the affected area may not move to seek employment to the unaffected area where labour demand is high. For fiscal transfer system to work it requires a central fiscal authority that coordinates tax collection and disbursements and also requires political will of the affected area to act appropriately and the unemployed to migrate. This calls for the need for political/fiscal union.

4.4.9 Homogeneous preferences

It is argued that apart from the economic criteria proposed by the original contributors of the OCA theory by Mundell (1961), McKinnon (1963), and Kenen (1969) member states should also possess homogeneous preferences. For instance Harberler (1970), Ingram (1969) and Tower and Willett (1970) stress that it is not so much economic characteristics, the similarity of policy attitudes of member countries that is relevant in making a group of countries a successful currency area. Policy attitude is an important criterion for countries to form an optimum currency area. Economic policies also come with trade-offs and countries may have difference preferences to those trade-offs at different points in time. When there are differences in preferences for instance some members prefer low inflation and other prefer low unemployment then it becomes

difficult for a common central bank for such countries to design a monetary policy that will satisfy all these countries at the same time. Another possible conflict of preference is between exporters, who may prefer a weaker exchange rate to boost their international trade competitiveness and importers/consumers who may wish to have a strong exchange rate to raise their purchasing power. Such differences cannot be resolved through a common central monetary policy and whatever policy stance it takes will leave either some or all countries unhappy. Baldwin and Wyplosz (2015) suggested that these diversity of preferences can only be dealt with through the respective influence of political parties, trade unions and lobbies. The implication of this is that countries with weaker economies/government and trade unions are more unlikely to receive favourable attention from the common central bank authorities as compared to the powerful member states. The possible outcome of this is that, at best there will be resentment and at worst the currency union may not survive. This criterion has also received wide support in the literature. For instance Tower and Willett state:

> *Perhaps of primary importance for a successful currency area with a less than perfect internal-adjustment mechanism is that there be a reasonable degree of compatibility between the member countries' attitudes toward growth of inflation and unemployment and their abilities to "trade off" between these objectives. A nation with a low tolerance for [unemployment], . . . and price pressures from concentrated industries, would make a poor partner for a country with a low tolerance of inflation and high productivity growth, making for a very [favourable] "Phillips Curve." (Tower and Willett, 1970:411)*

4.4.10 Solidarity Vs nationalism (S v N)

The final criterion, like the fourth and the fifth, is more of a political consideration than economic. In fact it goes deeper than the previous two. Proponents of the SvN criterion argued that the difficulty of the likely fulfilment of the previous five criteria in full means no currency area is ever optimum. In the strict sense of the above criteria one will even ask the question as to whether individual countries with their respective currencies even constitute an optimum currency area. For instance is UK, with the pound sterling, an OCA or Nigeria, with the Naira, an OCA?

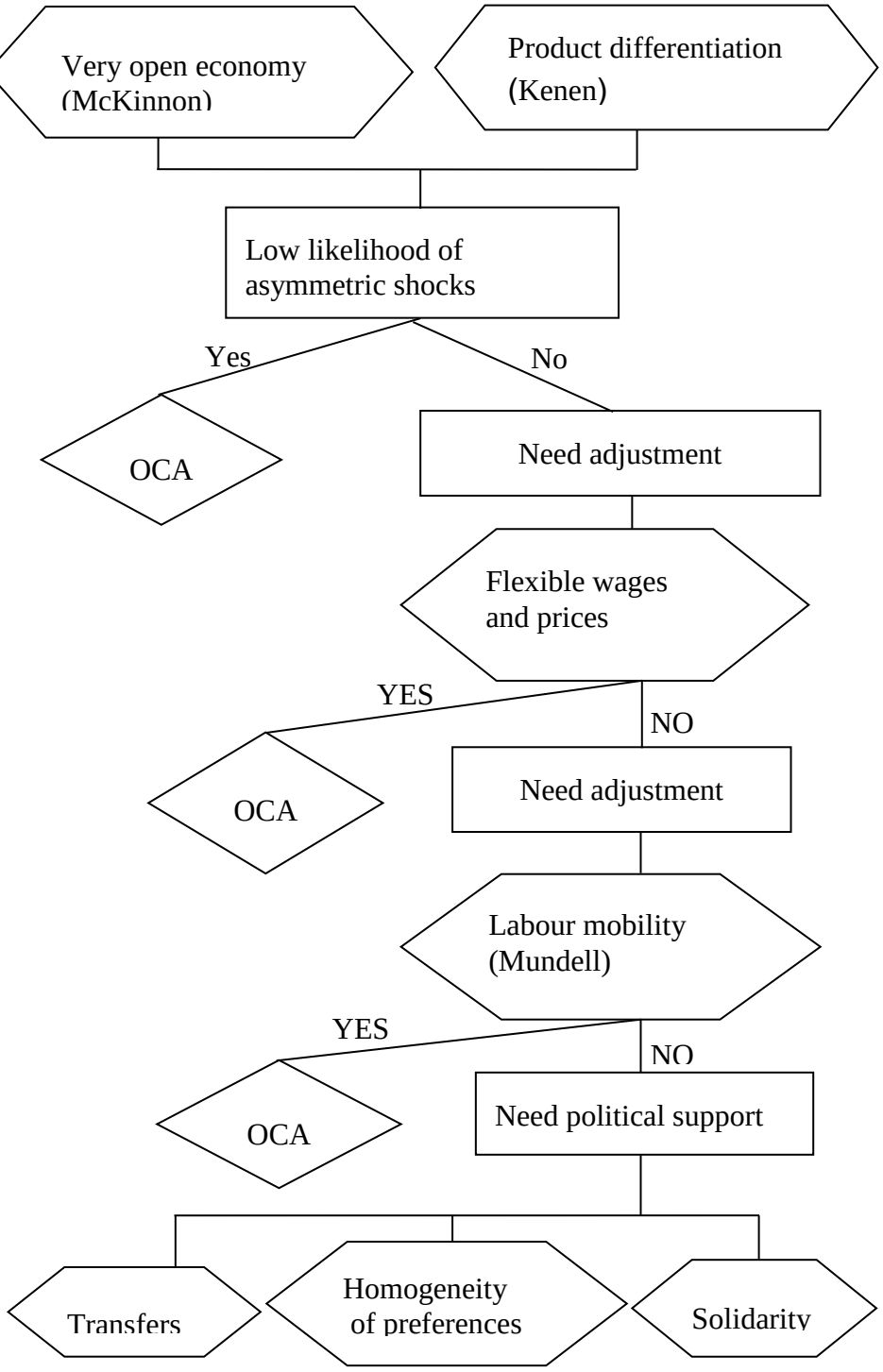
To make monetary union successful, the SvN therefore requires countries forming a monetary union must have a shared sense of common destiny that outweighs the national interest in order to accommodate the differences that will arise when a particular member state is hit with shocks. The rationale of the SvN criterion stem from

the fact that when countries are faced with shocks, even when they are symmetric, they can create political disagreements as to the best possible response to the shock. While this is also a common feature of individual countries it is more complex in a monetary union with heterogeneous preferences and the case is even worse when those countries are hit by asymmetric shocks. Baldwin and Wyplosz (2015:367) mentioned that

> *In individual countries, the eventual resolution of such debates is usually accepted as the cost of living together- the natural consequence of statehood. The outcome is ultimately seen as acceptable because citizens of the same country readily accept some degree of solidarity with one another.*

The SvN criterion appears to fail the test in the Euro zone during the current crisis where authorities in Greece, Ireland, Italy faced violence strikes against austerity packages designed to solve the Euro crisis. If solidarity is a threat at the national level, taking the Euro as a current example, will it work at multinational level? This leaves us with another question whether our sixth pillar, just discussed, made the OCA theory a complete framework to delineate countries into appropriate currency zones. This is certainly not and perhaps we need to further explore other criteria especially the proponents of political union in a monetary union. This is discussed below. A summary of the six criteria of the OCA theory already discussed is shown in the logical flow diagram in figure 4.4.

Figure 4.4 The logic of the OCA theory

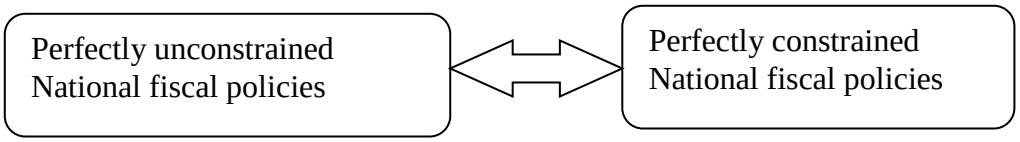


(Source: Baldwin and Wyplosz (2015:380)

4.5 Monetary Union and Political Union

There is intense academic debate about the necessity of a political union for the long term survival of a monetary union. There are different schools of thought on this subject. The first school of thought argued that monetary union cannot survive in the

long run without a strong political union among the member states. In other words, in the language of Eichengreen (1996), monetary unification necessarily entails political integration. According to De Grauwe (2006) this school of thought seems to have history on its side because no monetary union that is not embedded in a strong political union has ultimately survived. The second school of thought argued that there is no link between monetary and political union. This stance according to Eichengreen is the position of some British politicians and euro sceptics. In between these two extremes, there exist other varying opinions though not significantly different from these two arguments. The third school is that political union necessarily entails monetary union. This view is very much similar to the first one with the difference only being a matter of causation. In his paper Eichengreen (1996) added a fourth point. He argued that the relationship between monetary union and political union is contingent. The two integration processes can evolve in very different ways only under slightly different conditions. According to him if the fiscal freedom of participants is constrained, there will be pressure for monetary union to be accompanied by political union. On the other hand if the participants are free to formulate their own national fiscal policies then monetary union will generate little pressure for political integration. The two extreme conditions proposed by Eichengreen are summarised in the diagram below.



Less pressure towards political union High pressure towards political union

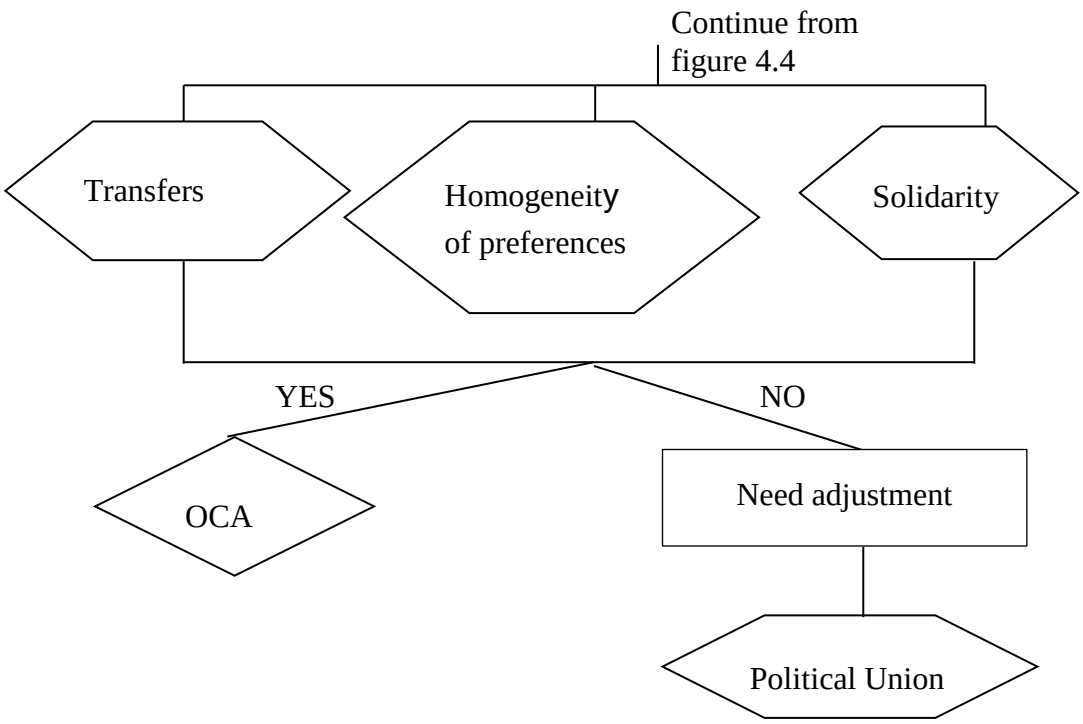
There is support in the literature that political/fiscal federalism is vital for the survival and success of any monetary union. For instance Arestis and Sawyer (2011) mentioned several advantages of fiscal federalism in their paper. First, a federal fiscal policy ensures that a region that is particularly hard hit by a recession will receive fiscal assistance rather than having to rely on its own borrowing to operate a budget deficit sufficient to contain the worst effect of the recession. The second advantage they mentioned is that in a fiscally federated monetary union the strength of the union will permit necessary borrowing at more conducive interest rates than a country left by itself. Another advantage that they argued will come out of this is that the union will borrow in its own currency which will avoid the risk of default on the debt due to the fact that the common central bank will be able to create sufficient money to pay any debts. In

fact an additional argument against fiscal decentralisation is that if borrowing is done nationally and at other currencies other than the union currency it exposes member states to foreign exchange risk which in itself is a defeat of one of the main objectives of single currency formation. Arestis and Sawyer (2013) also argued that a currency union that works coincides with a nation that has a central government and a common language but none of these exists for the Euro. This view is also supported by Feldstein (1997:60-61) in his statement

> *...the fundamental long-term effect of adopting a single currency would be the creation of a political union, A European federal state with the responsibility for a Europe-wide foreign and security policy as well as for what are now domestic economic and social policies...There is no sizable country anywhere in the world that does not have its own currency. A national currency is both a symbol of sovereignty and the key to the pursuit of an independent monetary and budgetary policy.*

On the question of the Euro and the financial crisis Jones (2009) discussed the heterogeneous difficulties faced by the euro nations and acknowledges that the closer one looks at the problem, the worse it becomes, particularly if the economic data are to be believed. The most important to the fiscal federalism argument is Jones' acknowledgement of the fact that the problem of macroeconomic policy coordination within the euro zone is unlikely to be solved. According to him fiscal politics is politics after all, and all politics is local. The implication of this statement is that as long as the euro fiscal decisions remained at national levels fiscal politics will remain local. A solution to this problem is political union where the conflicts within national fiscal politics will be resolved.

Based on the above analysis one would argued that the logic of the OCA theory illustrated in figure 4.4 above is incomplete and should be extended to include political union for a complete theoretical framework that will make currency union more optimal. This extension is illustrated in diagram below.



The exclusion of political union in the logic of OCA does not only make the economic objectives of monetary union unachievable but even the political motive, which most times overshadow the economic consideration, not achieved. For instance Tavlas (1993) in a brief discussion of the precondition or characteristics of member states to form a currency area included similarity of inflation rate, fiscal integration and the political factors. Tavlas (1993:667) cited Mintz (1970) who argued that the major and perhaps the only real condition for the institution of monetary integration is the political will to integrate on the part of the prospective members. This view was empirically supported by Cohen (1993). In his study of six currency unions, Cohen, found that the economic criteria are dominated by political factors in successful currency areas. His other finding is that compliance with commitments is greatest in the presence of either a locally dominant state, willing and able to use its influence to sustain monetary cooperation, or a broad network of institutional linkages sufficient to make the loss of monetary autonomy tolerable to each partner (Cohen, 1993:187). There is also the political union support for successful monetary union from Lanyi who argued that:

> *A currency union between two monetarily independent and viable states, neither of which is willing to be in a subservient position to the other, would be possible only in the cases of complete political unification or, where this is not possible, the creation of a supranational economic authority (Lanyi, 1969:28)*

The rationale for the European integration, as advocated by Jean Monnet and his contemporaries immediately after World War II, is that a political union of European nations is conceived of as a way of reducing the risk of another intra-European war among individual European states, (Feldstein, 1997). This means the European integration project is more political than economic. However Feldstein argued that any European monetary union that subsequently lead to political union will have the opposite effect of the European integration rationale. According to him any political union that may follow from the monetary union in Europe will be more likely to lead to increased conflicts within Europe and between Europe and the United States. The first reason for this conflict is that at the beginning member states will have important disagreements on the goals and methods of monetary policy. These disagreements will be more serious when the business cycle raised unemployment in some countries than the others. Political union resolves the disagreement only within euro members thus Feldstein second reason for conflict is that between Euro members (or European political union) and non-Euro members in Europe. The economic disagreement will lead to discontent and distrust among the European nations. This potentially will necessitate the move toward political union. At the political union stage Feldstein further pointed that there will be conflicts arising from incompatible expectations about the sharing of power and substantive disagreements over domestic and international policies. President Nicolas Sarkozy's statement in a debate with students at the University of Strasbourg appears to provide evidence for Feldstein pre-euro argument. He was cited calling for a two-speed Europe: a 'federal' core of the 17 members of the euro zone, with a looser 'confederation' outer band of the ten non-euro members (Charlemagne, 2011). Current political events in Europe seem to provide support on Feldstein's reasons for conflict in Europe. For instance the current crisis in Greece has seen conflicts between Greece and Germany. Also the referendum for the UK's in or out of EU was one of the battle grounds in the UK May, 2015 parliamentary elections. Without any waste of time the newly elected conservative government start their negotiation for EU treaty reform especially on immigration (free mobility) and welfare claim. The political tension ahead of this negotiation can be seen in the German position:

David Cameron's hopes for an overhaul of Britain's relationship with the EU suffered an early setback yesterday when Germany said the UK's partners would not be rushed into changing the bloc's treaties to meet its reform demands (Spiegel et al., 2015:1-2).

4.6 The endogeneity of optimum currency areas

We have discussed the OCA criteria that countries should satisfy before those countries can make up an optimal currency area vis-a-vis labour mobility Mundell (1961), openness McKinnon (1963) and product diversification Kenen (1969). The endogeneity literature addresses the question of whether these criteria are more likely to be satisfied ex-post rather than ex-ante. According to Frankel and Rose (1998) the OCA literature focuses on the interrelationship between four variables: (1) the extent of trade; (2) the similarity of the shocks and cycles; (3) the degree of labour mobility, and (4) the system of risk sharing, usually through fiscal transfers. Countries are more suitable for common currency if they have greater linkages in these variables.

The theory predicts that increase in trade integration through reduced trade barriers can result in increased industrial specialisation by country and therefore more synchronous business cycles resulting from industry-specific shock. On the other hand, increased integration may result in more highly correlated business cycles due to common demand shocks or intra-industry trade (Frankel and Rose, 1998:1023). It is argued that this theoretical ambiguity can be resolve empirically.

Frankel and Rose (1998) researched on this topic by considering the relationship between two of the criteria (the extent of trade and the similarity of the shocks and cycles) using a panel of bilateral trade and business cycle data over a period of thirty years for twenty industrialised countries. They found a strong positive relationship between the degree of bilateral trade intensity and the cross country bilateral correlation of business cycle activity. Their findings indicate that closer international trade links result in more closely correlated business cycles across countries although they mentioned that a number of economists have claimed the opposite. Their conclusion is that a country is more likely to satisfy the OCA criteria for entry into a currency union ex-post than ex-ante.

Another study on the endogeneity of OCA argument was conducted by Artis and Zhang (1997). They investigate the effects of the ERM on the international business cycle by looking at the linkage and synchronisation of the cyclical fluctuation between the

countries using Germany and US cycles as bench marks and pre ERM and ERM sub periods. They further divide the 15 countries into ERM and non ERM. They found that before the formation of the ERM, most countries business cycles was linked to that of the US and after it formation the ERM countries shift into the German business cycle. They considered the shift specific to the ERM group and do not happen for non ERM countries. The authors also cited Mitchell (1927) who also investigated the linkage in business cycles and the way in which economic disturbances are transmitted across countries. He found a positive correlation of business cycles across countries and this tended to rise over time due to the openness of financial markets.

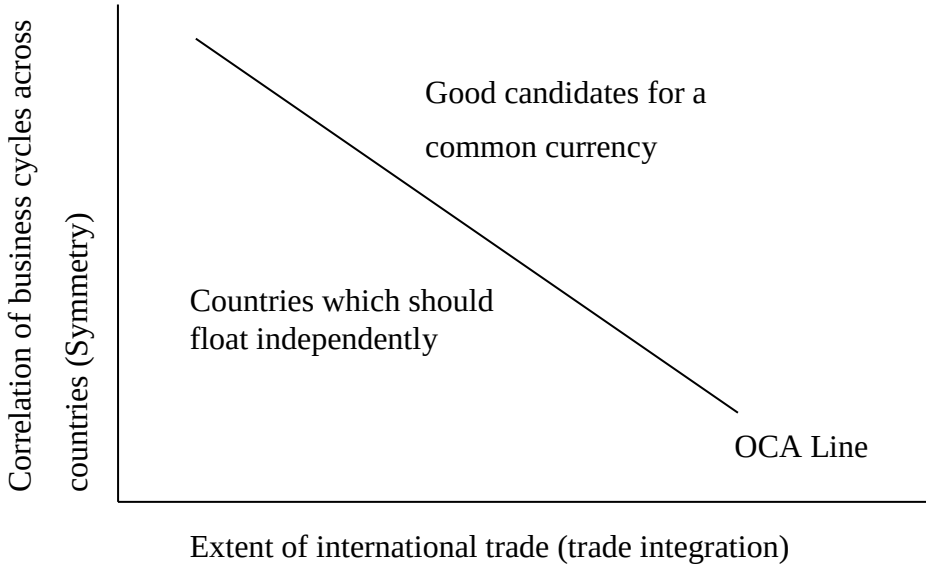
In another study by Willett et al. (2010) they evaluated the endogeneity of OCA criteria within euro zone in three areas: trade flows, business cycle synchronisation, and structural reforms to improve labour and product market flexibility. They found a post euro increase in both intra trade and business cycle synchronisation which is consistent with endogeneity argument. They commented

> *There is a danger with such analysis, however. Those who favour a currency union, dollarization, or some other form of hard fix may exaggerate the degree of endogeneity and some have gone so far as to suggest that almost any currency union can become optimal ex post... It is important to recognise that if a country is not already close to meeting the OCA criteria then it is not sufficient that endogenous responses just go in the right direction (Willett et al., 2010:851-852)*

The endogeneity literature using the methodology like that of Frankel and Rose attempts to classify countries into two categories: those that are good candidates for common currency and those that should float their currencies independently. This is shown in figure 4.5.

Despite the empirical evidence in support of the endogeneity of the OCA literature Krugman (1993) argued on the opposite. Krugman's argument is that while monetary union may intensify trade it might also intensify economic specialisation and could therefore make business cycles more heterogeneous. According to him, in the worst case, the costs of monetary union would rise faster than the benefits as trade intensifies in the post EMU period. Opponents of Krugman's view argued that his argument is rather questionable as it may be absurdly implied from his reasoning that a common currency would be most desirable for two countries that otherwise have nothing to do with each other (Basten, 2006).

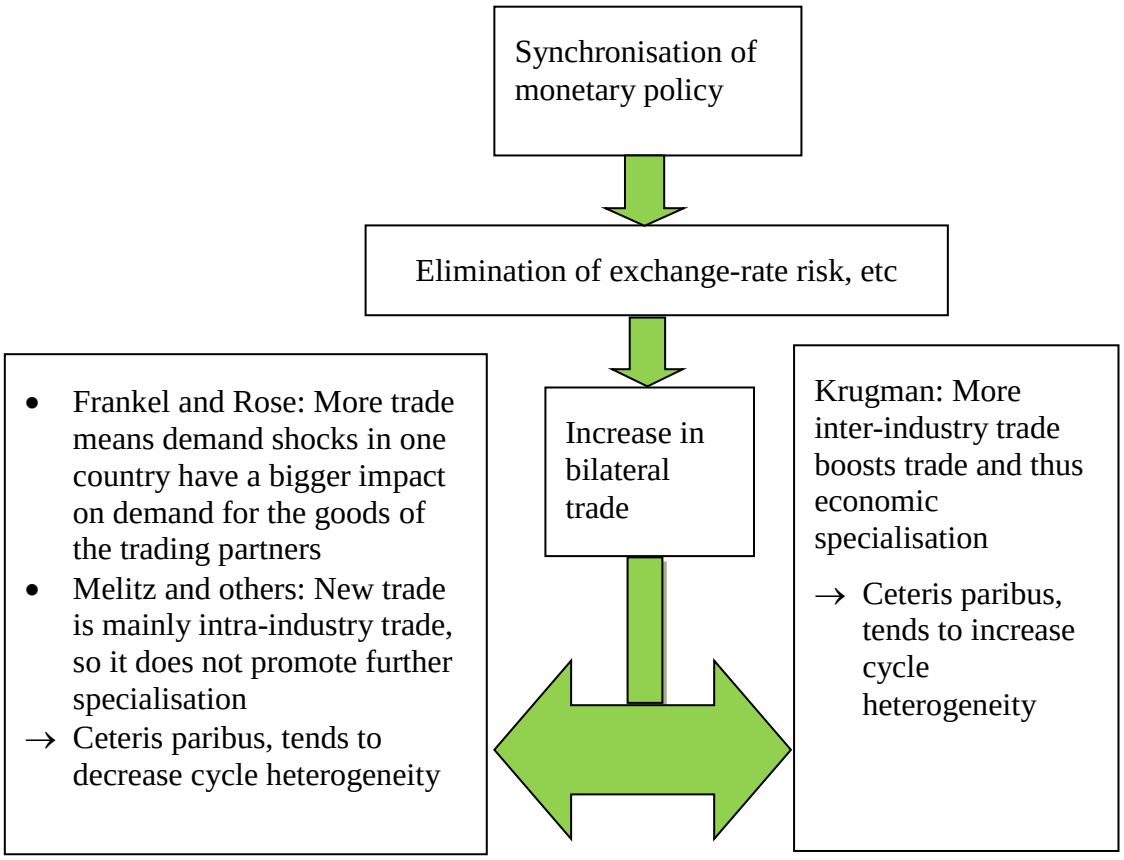
Figure 4.5 Business cycle symmetry and Trade Integration



Source: (Frankel and Rose, 1998:1012)

He argued that another possible reason why monetary union costs may rise faster than the benefits as economic integration proceeds is that it may take longer for a region to endogenously become an Optimum Currency Area. A rise in costs of monetary union faster than the benefits would not imply that monetary union becomes less desirable. But Kontolemis and Samiei (2000) seem to provide support for Krugman. They showed that greater policy homogeneity could also decrease cycle synchronisation by restricting countries' ability to offset asymmetric shocks. This view is shared by critics of the EU Stability and Growth Pact (SGP). Whilst the critics of the SGP accept the need for protecting fiscal discipline they argued that the restriction on the fiscal deficit size constrained countries' ability to offset asymmetric shocks through automatic fiscal stabilisers. The critics concern, it is argued, is confirmed by the dichotomy between strong growth in some EMU member states and slow growth in others. Basten (2006) succinctly summarise the endogeneity of the OCA argument in figure 4.6.

Figure 4.6 Endogeneity of the OCA (Frankel and Rose v Krugman)



Source: (Basten, 2006:3)

4.7 Criticisms of the theory of optimum currency area

The critiques of a common currency like Mundell and others emphasised on the differences between countries that are likely to create costs for those countries if they are to form a monetary union. In response the critiques of the OCA asked three key questions: (1) are the differences between countries important enough to cause any concern? (2) Are national monetary policies, including exchange rate, effective in correcting for the differences between countries? (3) Do monetary and exchange rate policies do more harm than good in the hands of politicians?

Critics of the OCA argued that none of the OCA criteria is free from difficulties and because of that other considerations must be introduced in order to judge the suitability of an exchange rate regime for a given country or region. We discuss these criticisms in the following sub-sections.

4.7.1 Labour mobility

The first criticism of labour mobility mentioned by Tavlas (1993), is the uncertainty of the environment in which economic agents operate. According to Bertola (1989:95)

> *'the more uncertain is the environment, the less should be the willingness of national economic agents to undertake adjustment that may ex-post be regretted'.*

Bertola applied uncertainty to Mundell's factor flexibility by modelling an economic agent faced with two choices: remaining in the current occupation or location or moving to another with income uncertainty in both locations and with fixed costs of moving. His finding is that to induce the agent to move the expected income differential must be greater than the fixed cost of moving by an amount related to the probability that the agent may want to reverse the movement in the future. He concluded that the higher the uncertainty about future earnings in different locations or sector, the more reluctant the individual will be to move. He therefore argued that in a fixed exchange rate regime, with stable exchange rates, asymmetric shocks increase income variability and therefore reduces labour mobility. On the other hand under flexible exchange rate regime factor mobility is higher than in a fixed exchange rate regime because in the latter monetary policy works to smooth out the variability in income caused by the asymmetric shocks. Branson (1989) argued that Bertola's findings are based on a restricted version of the Mundell-Fleming model which biases the result in favour of flexible exchange rate.

Ishiyama (1975) mentioned another criticism of Mundell's factor mobility assumption. He cited several authors (Lanyi 1969, Scitovsky (1967), Dun (1971 and Corden (1973)) who all support the view that in practice it is unlikely that sufficient interregional labour mobility can be relied on as a mechanism for adjustment of payments. The fact that labour is even reluctant to move within the same country means labour mobility cannot be relied on as a substitute for payment adjustment. He cited Corden (1973) on page 349 who states:

> *Can it really be imagined that a UK depressed-area problem could be solved by the large-scale migration of British workers to Germany? It is conceivable; when Britons are reluctant even to move from Scotland, or Tyneside to the south, though the language is almost the same, it takes some imagination to conceive of labour mobility solving the central problem of monetary integration.*

It means that in Mundell's labour mobility, as a payment adjustment mechanism, people will be forced to leave their homes, in an area with reduced demand, and move to far distant places with different culture, language, religion and climates with the implication of costs and resettlement in the new environment. They concluded that labour mobility is an inadequate substitute for more conventional payments adjustment instruments- demand management and exchange rate variation.

4.7.2 McKinnon openness criterion

The critics of this OCA criterion first point to its implicit assumptions that the principal need for payments adjustments arises from microeconomic changes in demand and supply and also that price stability prevails in the rest of the world, (Ishiyama, 1975:352). They argued that if the international economy is unstable, McKinnon's conclusion would have to be completely reversed since external instability will be propagated directly to the domestic economy through fixed exchange. Corden (1972) argued that the openness criterion applies only to changes in microeconomic demand that occur at home but not applicable to macroeconomic shocks that take place abroad. According to Corden even if the stability assumption of the external environment holds, there is still no guarantee that there will be any positive gain in adopting a fixed exchange regime. What is certain to say is that the more open the economy, the less costly to maintain fixed exchange rates. He therefore concluded that the openness criterion is attractive only if it can be assumed that the external environment is more stable than the small open economy in consideration and further strengthened if small open economies tend to be financially undisciplined. In such a case any self-imposition of fixed exchange rates should lead to sounder economic management.

4.7.3 Capital mobility and fiscal transfers

For capital mobility to work it requires the integration of the financial systems in terms of both banking and stock markets. Whilst it is a difficult condition to meet it is even more problematic for countries with less developed financial system. It is also argued that capital mobility without other forms of transfers favours the rich who can afford to hold diversified portfolios across nations. The poor and working class who are mostly affected by the recession cannot afford to make investment not alone to talk about diversification. This casts doubt on the pain relief nature of capital mobility. For fiscal transfers or public insurance there is the moral hazard that will make the system less

effective and the absence of a fiscal/political union makes it even worst. On the critique of the OCA theory Butler (2000) pointed two of the features of the OCA which he described as fundamental flaws. First is the failure to distinguish, in a consistent way, between short-term nominal rigidities and long-term real rigidities. This failure, he argued, led to a serious overestimation of the power of monetary policy, working through nominal interest rate, through the credit channel and through changes in the nominal exchange rate, to influence real economic behaviour (Butler, 2000:222). The second weakness he mentioned is the failure of the OCA literature to properly allow for the international mobility of financial capital. This he argued led to the overemphasis on the stabilising potential of a market determined nominal exchange rate and a failure to recognise its destabilising potential. The result of these two fundamental flaws, he commented, continue to distort the analysis and discussion of currency union and other exchange rate arrangements. According to him continuing the debate on the merits of common currency in this new millennium based on the intellectual apparatus of the 1960s is not only out of date but is also a misleading guide to policy.

4.8 The literature on the costs and benefits of currency union

In this section we consider the benefits that countries derive from the formation of a common currency as argued by its proponents which they said has always been down played by the OCA literature. The first argument in favour of a common currency originates from the purpose of money serving as a unit of account and store of value. This argument is seen in the statement:

> *...money in its role of medium of exchange is less useful if there are many currencies; although the costs of currency conversion are always present, they loom exceptionally large under inconvertibility or flexible exchange rates. (Indeed, in a hypothetical world in which the number of currencies equalled the number of commodities, the usefulness of money in its role of unit of account and medium of exchange would disappear, and trade might just as well be conducted in terms of pure barter) (Mundell, 1961:662).*

Buiter (1995) also argued that the liquidity or moneyness of a currency increases with the increase in the frequency, scale and scope of that currency's use, as a medium of exchange, by others. Such quality of currency increases the probability of economic agents being able to dispose of it when they want to at short notice and at little cost. This is a sound argument, especially for currencies that are not widely traded beyond their borders, since a common currency widens the domain within which it is used as a

legal tender and therefore the usefulness of the currency increases with little cost and less convenience.

Several other benefits of monetary union have been documented in the literature and we discuss these in the next sub-sections.

4.8.1 Elimination of transaction costs

It is argued that membership of a single currency yields benefits of lower transaction costs associated with trading goods and services between countries with different moneys. The benefit comes from the fact that currency exchange between currency union members is eliminated thus leading to cost saving. Frankel and Rose (1998) argued that countries with close international trade links would benefit from a common currency and are more likely to be members of an optimum currency area. However it is generally argued that the benefits from transaction costs savings arising from currency conversion are small or negligible. The EU Commission's study report (EU Commission, 1990) found that on average across the EMU members there would be savings in dealers' margins of 0.4% of GDP. This was said to be even lower for countries with advanced banking systems, for example UK was only 0.1% of GDP. This means that as the banking system develops with more and more use of credit cards and other forms of payment mechanisms the problem of exchange steadily diminishes in importance. According to Minford (2002) the modesty of the savings on transaction costs is due to the fact that the vast majority of the transactions go through the banking system at zero cost and they merely cancel out the costs of currency conversion and as such transaction costs are zero and should not be worried about. However the transaction costs savings is also partly offset by the one off change over costs from the old currency to the new one. These costs include change of vending machine, the accounting systems, menu cost (change of pricing), banks' high street machines. For UK these costs were estimated to be £30 billion in the 1990s (Minford, 2002).

4.8.2 Elimination of ER uncertainty and lowering interest rates

Many academic economists argued against floating exchange rate in favour of fixed exchange rate (or common currency) due to the fact that the high degree of exchange rate (ER) volatility associated with the former creates uncertainty which in turn discourages international trade and investment. In addition to the exchange rate risk,

which they consider as short term fluctuation, the exchange rate misalignment associated with floating exchange rates is likely to be real threat for the prosperity of nations, (Mulhearn and Vane, 2005). The supporters of common currency argued that the elimination of exchange rate risk is likely to remove trade barrier between union members which should promote more trade, increase foreign investment, and reduce cost of capital by merging the risky and limited home capital market with a bigger and perhaps less risky regional market. Obstfeld and Rogoff (1998) presented two arguments against flexible exchange rates from a welfare cost perspective. The first argument, which they consider as direct effect, is based on the assumption that economic agents prefer a constant value of consumption to uncertainty value that fluctuates over time. On this assumption a change in value of the domestic currency, appreciation or depreciation causes risk and uncertainty on people's consumption and leisure. This is because when the domestic currency appreciates against the currency of the trading partner the domestic goods become more expensive for the foreign buyers resulting to a fall in foreign demand. The consequence of this is a fall in output and increase in unemployment with the negative effect of lower wages and therefore low consumer spending. The second indirect welfare loss argument of exchange rate volatility is based on the risk-averse nature of firms. Risk-averse firms protect themselves from exchange rate risk through hedging in the forward and other derivative markets. Such hedge transactions put risk premium as an extra mark up to cover the costs of currency movements when firms set their prices for goods. The consequence of this is an increase in price of goods resulting to a negative effect on demand, production, and hence consumption taking them to levels that are less than optimal for the society as a whole. An additional effect is on investors holding foreign assets. A fluctuation in exchange rate causes them to spend time and resources to minimise the impact on their wealth.

Other academics argued that exchange rate risk, today, should no longer pose a serious problem on international trade and foreign investment as argued by the common currency proponents. The reason is that such risk can be eliminated through hedging using forward market and other financial instruments. Some even argued that big enough financial intermediaries can diversify foreign exchange risk by pooling a lot of independent risks in a large portfolio and in some cases such big financial institutions can even ignore moderate currency risk acting as a risk neutral insurer.

4.8.3 Provide a credible nominal anchor for monetary policy

The argument usually put forward by the supporters of single currency is that it provides discipline to domestic macroeconomic policy if such discipline is absent in the country that operates a floating exchange rate regime. Dornbusch (2001) cited Giavazzi et al (1988) as describing the credibility gain arising 'from tying one's hands'. According to Frankel (1999) when countries have full discretion to set monetary policy there is a possibility of inflation bias therefore a central bank that wants to combat inflation can commit itself more credibly by fixing the exchange rate or give up its own currency altogether. With a credible stable inflation, economic agents setting wages and prices will consider inflation to be low in the future because the currency peg or union will prevent the central bank from doing so if it wanted to due to the commitment to the currency union. Pilbeam (2006) also noted that fixing the exchange rate through a common currency prevents the authorities from pursuing reckless macroeconomic policies that may lead to devaluation, if they are in a floating regime. Such policy will necessitate intervention to defend the currency which may deplete the reserves. With a low and stable inflation it is likely to encourage further FDI. In concluding the credibility argument Dornbusch (2001:240) noted that '...a monetary regime that delivers and maintains low inflation, other things equal, will help growth.'

4.8.4 Enhance international cooperation between members

The step by step process of moving into a monetary union usually requires a great deal of cooperation by member states. For instance the need to liberalise trade through removal of barriers and the integration of the goods market and institutions of governance also call for closer cooperation. The final stage to monetary union requires national economies to relinquish their monetary policy to a common central bank which also requires the cooperation and coordination of national central banks and government authorities to work harmoniously to achieve regional common goals. For instance during the Bretton Woods and the European ERM national governments have to agree on measures to undertake when the exchange rate parity comes under pressure. A common currency also eliminates the possibility of competitive devaluation and therefore enhances regional solidarity rather than economic nationalism that may create political tension between countries.

> *The enhanced degree of international cooperation should bring benefits and lead to a more stable environment for the conduct of international trade and investment, (Pilbeam, 2006:237).*
>
> *Although it is argued that If monetary and fiscal policies have no effect on employment and output levels as some theorists argue, then there would be no benefits to be derived from international coordination of such policies, (Pilbeam, 2006:360).*

On this subject Arestis and Sawyer (2002) in their paper on whether monetary policy affects the real economy suggested that the empirical results point to a relatively weak effect on interest rate changes on inflation. It is still argued that international policy coordination reduces the uncertainty associated with policy implementation because when economies are interdependent the optimal policy of each nation depends on the policy actions of others which in turn has the potential to reduce the possibility of serious conflict and therefore a more stable environment for international trade to flourish.

4.9 The costs of monetary union

Apart from the costs associated with the loss of monetary autonomy there are other costs which participants in a monetary union have to face whether the OCA criteria are satisfied ex-ante or ex-post and this section discusses the literature on this side of the argument.

Dornbusch (2001) identified five of the arguments against currency-board arrangements which are of the same implications for currency union. His five arguments include: (1) Sovereignty, (2) Loss of seigniorage, (3) Loss of monetary policy, (4) Loss of lender of last resort, and (5) fiscal preparedness. Minford (2002) mentioned three costs of monetary union, but one of them, loss of monetary autonomy, is already mentioned above. His two additional costs include (1) harmonisation costs associated with monetary union, (2) bail-out costs associated with financial problems of member states. These costs are discussed below.

4.9.1 Loss of sovereignty and monetary autonomy

A national currency is usually taken as a symbol of statehood and therefore national sovereignty. The replacement of such currencies by a multistate currency, in a monetary union, sees the abandonment of national symbols with pictures of heroes and valuable historic memories. This may be seen as the loss of sovereignty by many and may even

be an obstacle to gaining public support for common currency in a referendum. The main point is that national economies no longer have monetary policy instrument (such as interest rate) to respond to any idiosyncratic economic disturbance facing the economy. This is considered as a serious cost especially when countries in a monetary union face with asymmetric shocks. In such a case the one cap fits all dilemma comes into play. For more on this problem see the discussion on the common central bank dilemma in the cases of asymmetric and symmetric shocks (section 4.3.3). On a more serious note the problem of the loss of sovereignty is exacerbated when the monetary union begins to drag the member states into fiscal union and gradually to political union. In a fiscal union stage where taxes are centrally collected and disbursed by a union central authority national governments will remain vocal in their parliaments but the power of sate- printing own money; levying, collecting and distributing tax revenue- is no longer with them. The implication of this is that in a highly fiscally federated monetary union the power of national governments is influenced and better coordinated and therefore a complete and final surrender of national sovereignty is likely to make more political sense if not economic sense. Therefore the transition from a strong fiscal union to political union, if the two are not even the same, is only a matter of time as we are now witnessing in the euro zone. Further on this point Friedman (1953) argued in favour of floating exchange rates that it is better to let exchange rate adjust in response to shocks to the economy than to fix it and force the adjustment onto other economic variables. He argued that a floating exchange rate is a flexible variable that can easily rise or fall whereas domestic prices tend to be sticky and therefore are more conducive to economic stability.

4.9.2 Loss of seigniorage

Countries receive revenues, within their control, from the central bank's printing and issuance of money. This is lost in a monetary union as the printing and issuing of money is no longer in the hands of national central banks but now performed by the common central bank. This loss could be a critical issue for public finance management. The loss of seigniorage revenue raises the question of fiscal preparedness of the monetary union member states if such revenue plays a significant role in economic management. The inability to pursue an optimal inflation strategy to extract maximum revenue limits public sector revenue and forces either spending cuts or recourse to possibly more

distortionary forms of taxation (Dornbusch, 2001). There are counter arguments to this point. Firstly in a non-monetary union where the central bank is independent and separates from the Treasury it is hard to see how a discretionary monetary and exchange rate policy can accommodate a bad fiscal situation better than a fixed rate. Moreover, the argument assumes that interest rates are lower under monetary union – which could only be the case if there is convergence towards the lower interest rate countries prior to the monetary union.

4.9.3 Loss of lender of last resort

One of the responsibilities of states is the handling of systemic financial Instability when it arises. The state can execute this function through the use of its prerogatives-ability to print own currency, power to tax economic agents, the power to declare certain of its liabilities as legal tender, the power to pass regulations, and so on. With these powers, the state can provide short term liquidity in unlimited amounts and also long term resources for restructuring and recapitalisation of bankrupt financial institutions in large amounts than any private agent (Butler, 2000). Quantitative easing, a language now common with many UK newspaper readers, has been applied in several occasions during the financial crisis to rescue the fragile UK financial system from outright collapse and stimulate growth in the economy. The Bank of England played the role of lender of last resort in the bank run of Northern Rock in the early stage of the 2007 financial crisis. In a monetary union this vital rescue role of nationally independent central banks is lost. Currently in the euro zone the lender of last resort role lies nowhere as the European Central Bank (ECB) has no mandate to play that role. To highlight the importance of the role of the lender of last resort and therefore its cost implication Buiter argued that

> *There is no adequate substitute, in the short run, for the ability to create your own legal tender in unlimited quantities, either to engage in lender of last resort support for individual institutions, or in 'market operations' that create liquidity for the system as a whole. If the Treasury were to create its own legal tender, it would functionally be a central bank (Butler, 2000:220).*

Buiter's point is supported by Dornbusch (2001) in his comment that the concern of the loss of lender of last resort is based on the assumption that the central bank, not the Treasury or the world capital market, is the appropriate lender.

4.9.4 Harmonisation costs associated with monetary union

To make a monetary union work effectively and avoid undue instability in the economy resulting from loss of monetary independence there is need for OCA criteria to be satisfied- greater wage flexibility, labour mobility, centralised or federal budget system. These require putting in place taxes and other institutions of governance- such as legal system, labour union, banking and financial market integration- at tremendous costs. There is also the capital investment need of establishing supranational institutions (common central bank, common parliament etc) and the recurrent expenditure of running these institutions.

4.9.5 Bail-out costs associated with financial problems

The recent developments and experiences in the euro zone debt crisis have provided a practical case of this type of cost in a monetary union. Euro zone leaders had to intervene to bail out Greece, Ireland, and Portugal during the financial crisis. The bailout problem still continues with Greece causing political division in the EU member states.

4.10 Empirical literature on monetary union and trade

Despite the costs of monetary union discussed in the optimum currency area above, empirical findings provide a lot of support for the transaction cost argument presented by proponents of single currency. Much of the literature on the benefits of monetary union is more concentrated on the international trade effects of common currency. The seminal paper of Rose (2000a) triggered the debate on the impact of currency union on bilateral trade. In his cross sectional study he found that the trade of two countries with the same currency tripled as compared to those with their individual currencies. In another study Rose and Engel (2000) also found that members of international currency unions not only tend to experience more trade but also less volatile exchange rates, and more synchronized business cycles than do countries with their own currencies. In a follow up study with a sample of 200 countries and dependencies Frankel and Rose (2002) found that belonging to a currency union/board triples trade with other currency union members which still confirms the earlier finding of Rose. Nitsch (2002) replicated Rose's study with the same data and his finding supported the positive effect of common currency on bilateral trade. Nitsch commented on Rose's results that they were

an overestimation of the trade effect of common currency. Rose and Van Wincoop (2001) conducted research on the same topic and they found that EMU will cause European trade to rise by over 50 per cent. They argued that the benefits of trade created by currency union may outweigh any costs of forgoing independent monetary policy. In a similar study using a sample of 217 countries for the period 1948-1997 with panel data methodology Glick and Rose (2002) found that a large number of countries that left currency unions during the period of their study experienced economically and statistically significant declines in bilateral trade and also a pair of countries that starts to use a common currency experiences a near doubling in bilateral trade. The effect is far much smaller in the study of Micco et al. (2003). They used a sample of 22 developed countries, including 15 of the euro members, over the period 1992-2002. They found the effect of the EMU on bilateral trade between member countries to be between 4 and 10% when compared to trade between all other pairs of countries and between 8 and 16% when compared to trade among non-EMU countries. Their results also revealed the absence of trade diversion. A study by Thierry et al. (2009) revealed mixed results. They found the prospect for further integration in Southern Africa promising though still with many challenges. The finding on the trade side was not very positive as they even mentioned that countries with similar colonial ties have not maintained strong trade links. Monetary union in West Africa have been found to be more beneficial on economic growth but less on bilateral trade within the region (Anyanwu, 2003b; Anyanwu, 2003a). In his first paper Anyanwu used the gravity model for the period 1990-2000 and concluded that trade within the CFA was less than 10% and calls for an assessment of the formation of monetary unions that are not linked to a major anchor and he suggested the second West African Monetary Zone (WAMZ). The economic growth result is supported by an earlier study by Wane et al. (1996) who found that among the sub-Saharan African countries, membership in the CFA zone has led to higher productivity and investment growth. With slightly different results Ajayi (2005) found that participation in the CFA monetary union and ECOWAS' preferential trade agreements appear to have improved intraregional trade. Other studies in West Africa found that economic growth in WAEMU countries is no superior to the non-WAEMU countries in ECOWAS.

Other studies on the impact of currency union on trade which have provided positive result but at varying levels way below the original finding of Rose and others include (Serlenga and Shin, 2007; de Souza, 2002; De Sousa, 2012; Serlenga and Shin, 2013).

A plausible explanation suggested for the positive trade effect of common currency is that monetary unions not only introduce a common currency, but also lead to an integration of payment and banking systems, and of financial markets in general which in turn reduces cost of trading and therefore facilitates trade (De Grauwe, 2014).

On the economic performance argument Devarajan and De Melo (1987) evaluating participation in African Monetary unions for the period 1960-82 found that CFA countries grew significantly faster than comparator sub-Saharan African countries. They further the analysis by comparing sub period before and after 1973 and the results show that the CFA performance as compared to the comparators improved during the 1973-82 period, which according to them cast further doubt on the claim that the monetary union is not functioning adequately.

The literature on ECOWAS bilateral trade acknowledged the low level of trade within the region but possible explanations have not been conclusive. For instance Masson and Patillo (2005) concluded that trade among WAMZ countries is much lower than among WAEMU countries as shown in table 4.2.

In an empirical study on ECOWAS Ajayi (2005) found that the CFA monetary union and ECOWAS trade liberalisation have increased intraregional trade which according to him it is supportive of the plans for continued integration.

A completely opposite finding from that of Rose and others is the research by Pakko and Wall (2001). They replicated Rose's data to investigate the impact of common currency and free trade agreement on bilateral trade. They used gravity model and panel data methodology with different perturbations (pooled cross section and fixed effects estimation) for five, ten and twenty year's interval. They found that with pooled cross section without controlling for the fixed effects the trade creating effect of currency union is very similar to that of Rose i.e. common currency members trade 3.2 times more than when they have their separate currencies and for FTA trade is 2.5 times.

Table 4.2 ECOWAS Patterns of trade (2002)

	Exports (% of total exports)	Imports (% of total imports)
ECOWAS		
ECOWAS	11.0	10.1
European Union	35.1	40.4
Rest of the world	53.9	49.5
WAEMU		
WAEMU	12.7	8.9
WAMZ	7.6	9.7
European Union	45.1	42.8
Rest of the world	34.6	38.6
WAMZ		
WAMZ	3.6	4.6
WAEMU	4.2	3.4
European Union	28.0	42.2
Rest of the world	64.2	49.8

Source: Masson and Patillo (2005:98)

With fixed effects model that accounts for individual heterogeneity, they found that currency union members trade 69% less than when they have their separate currencies (i.e. CU coefficient of -0.378) and for FTA trade is 0.08% less. These results are for the five year interval although they were statistically insignificant. The ten and twenty year interval results were still found to be trade reducing for currency union members and even significant as they increase the intervals. In the ten year intervals, trade for currency union members reduced by 45% than the separate currency trade. This led them to the conclusion that currency union reduces trade rather than increasing it when country-pair fixed effects (heterogeneity) are properly controlled for in the model.

Another replication of Rose's data that provides similar findings to that of Pakko and Wall is the study by Persson (2001). With Rose's data, Person used simple non-parametric matching estimators that allow for systematic selection into currency unions as well as non-linear effects of trading costs on trade. He found a much smaller effect of currency union on trade ranging from 13 to 65 percent and in fact the estimates are not significantly different from zero.

A study by Fountas and Aristotelous (1999) on the four largest EU economies, (Germany, France, Italy and UK) investigated whether the ERM period coincides with an increase in intra-EU exports found that the EMS dummy variable is not statistically significant for any of the four countries in the sample. They concluded that the creation of the ERM has not led to an increase in intra-EU exports either directly or indirectly.

4.11 Empirical literature on ER volatility and bilateral trade

4.11.1 Theoretical background

The collapse of the Breton Woods system in 1973 led to the demise of the fixed exchange rate regime that existed since the post-world war II era. Since then different countries adopted different exchange rate regimes ranging from free float, managed float, dollarization, pegging to other currency and other forms of currency arrangements. Many countries, especially the developed ones adopt the free float system of exchange rate. The resulting exchange rate volatility from the floating exchange rate system became a great concern to many economic agents especially on the effect of such volatility on the volume of international trade. The effect of exchange rate volatility on international trade volume is now the subjects of both theoretical and empirical investigations. Exchange rate volatility is defined as the risk associated with unexpected movements in the exchange rate (Ozturk, 2006:85).

The two extreme ends of the emerged exchange rate systems are (1) Free float/flexible and (2) fixed. One of the main arguments against the former is that exchange rate volatility could have negative effects on trade and investment. It is stated that if exchange rate movements are not fully anticipated then an increase in exchange rate volatility which increases risk will lead to risk-averse agents to reduce their import/export activity (Dell'Ariccia, 1999). This import/export reduction resulting from risk-aversion will also lead to agents re-allocating production toward domestic markets. This argument against floating exchange rate regime forms the basis for currency arrangements, example European monetary union, which will eliminate the uncertainty of exchange rate.

Traditional trade theory suggests that exchange rate volatility would have a depressing effect on trade because exporters and/or importers would view it as an increase in the uncertainty of profits on their international transactions (Fountas and Aristotelous, 1999). Empirical results investigating this theoretical proposition are not conclusively one sided. There are some empirical evidences in support of the theory, some against and others with mixed results. The next section reviews the empirical evidence.

4.11.2 Empirical evidence

The pioneering study on the effect of exchange rate volatility on international trade was made by Hooper and Kohlhagen (1978). In their paper they constructed a theoretical model for analysing the impact of exchange risk on trade prices and volumes. They tested the model empirically using U.S. and German trade flow for the period 1965-1975. They found that if traders are risk averse an increase in exchange risk will unambiguously reduce the volume of trade whether the risk is born by importers or exporters. They also found that the effect of an increase in exchange risk on price of traded goods could be in either direction, depending on who bears the risk. Since this study, there has been a proliferation of literature on exchange rate volatility and trade with no consensus.

The empirical results on the effect of exchange rate volatility on bilateral trade are mixed, ranging from negative and significant, negative but not significant, positive and significant, positive and not significant. Medhora (1990) studied the effect of exchange rate variability on trade using a similar but slightly different approach from the gravity model using the period 1976-1982 and a cross sectional approach. His study included only six countries, at that time, of the West African CFA. His finding was that nominal exchange rate variability has not measurably hurt the imports of the union and argued from this result that membership in the union has not imposed a measurable cost on the countries. Medhora left two gaps in his study. The first one he himself mentioned is that there is need for similar studies to be undertaken in the future as he observed that the higher exchange rate volatility in 1983 and 1984 was becoming an important issue for Cote d'Ivoire, Niger and Senegal. The second one not mentioned is that his study was only based on six of the WAEMU countries and the number is now 8. This thesis which incorporates those two omitted countries plus the seven none WAEMU countries in ECOWAS will contribute to closing the gap and more so using a different methodology. The second study is that of Anyanwu (2003a) on the effect of monetary union on trade and output with the use of gravity model for the period 1990-2000. His findings were positive for output but not for trade. He concluded that trade within the CFA was less than 10%. Anyanwu posed three areas for further research. First how the introduction of monetary union would affect trade and output for individual country-pairs under the hypothetical adoption of a monetary union with a specified anchor country? Second to

assess the formation of monetary unions that are not linked to a major anchor and Anyanwu's suggestion is the second West African Monetary Zone (WAMZ). The third issue suggested by Anyanwu is the use of the evidence that accumulates from the experience of the Central African Economic and Monetary Community (CEMAC). As mentioned earlier the proponents of common currency argued the positive trade effect of monetary union is from the removal of exchange rate risk arising from exchange rate volatility. If this argument holds then an inclusion of exchange rate volatility variable as one of the regressors in the gravity model in this study will hopefully answer the first question posed by Anyanwu. The second issue is also addressed as our sample includes WAMZ. The third issue falls outside the scope of this thesis. Therefore closing these gaps will contribute not only to knowledge but also to aid policy makers.

In another African study Onafowora and Owoye (2008) investigate the impact of exchange rate volatility on Nigeria's exports to the United States (its most important trading partner) using cointegration and Error Correction Model for the period 1980-2001. They made three important findings. First increase in real foreign income has a significantly positive effect on real exports demand. Second improvement in the terms of trade, which they proxy as decline in real exchange rate, improves exports. Lastly and most importantly increase in exchange rate volatility negatively affects exports demand. Another important finding of this study worthy of mentioning is that the post 1986 liberalisation and economic reform policies implemented have a significant positive impact on Nigeria's exports demand. Vergil (2002) studied the impact of exchange rate volatility on the export flows of Turkey to the United States and its three major trading partners in the European Union for the period 1990:1 to 2000:12 using cointegration and error-correction models. He found that real exchange rate volatility has a significant negative effect on real exports. A similar study was carried out by Kumar and Dhawan (1991). They examined the impact of exchange rate volatility on Pakistan's exports to the developed world for the period 1974-85. They found strong evidence that Pakistan's exports were negatively affected by the increased volatility of its bilateral exchange rate. What also emerged from their study is that, unlike the case for most evidence in developed countries, it is the volatility in nominal rather than real exchange rates that is significant.

On the impact of growth and investment Bleaney and Greenaway (2001) conducted a study on a sample of sub-Saharan African countries, with heavy reliance on export of primary commodities, to investigate the effects of terms of trade and real exchange rate volatility on investment and growth. They used a panel of 14 Sub-Saharan African countries over the period 1980-1995. They found that real exchange rate volatility has a significantly negative impact on investment and terms of trade volatility has a negative impact on growth which they said is consistent with the evidence from previous studies. They however mentioned that the latter finding was not quite convincing. They noted from their finding that both growth and investment increase when the terms of trade improve and real exchange rate overvaluation is eliminated. Frankel and Wei (1993b) conducted a study of 63 countries, using gravity model, to investigate the effect of exchange rate uncertainty (defined as standard deviation of the first difference of the logarithmic exchange rate) on trade using cross section methodology. Their finding is that real exchange rate volatility has a negative effect on trade volume. They found the effect larger in 1980 than later in the decade. They also considered the possibility of whether stabilisation of exchange rates during the course of the 1980s, under the Exchange Rate Mechanism has any significant influence on intra-regional trade. Their conclusion on this matter is that there is no indication that exchange rates stabilisation in Europe during the ERM in 1980s played any large role in the increase in intra-regional trade. They do, however, found that the standard deviation of exchange rates fell among EFTA countries by about half in the 1980s, and among EC by slightly more.

In another developed countries study Kenen and Rodrik (1986) examined the impact of short-term volatility in real effective exchange rates on the volume of international trade using a sample of industrialised nations. They came up with three important findings but the one that is most pertinent to this study is that the volatility of real exchange rates appears to depress the volume of international trade. Arize (1997) in his G-7 countries' study found that real exchange rate volatility has a significant negative effects on export demand in both the short and long-run in each of the G-7 countries. In a cross sectional study of 19 developed and 67 developing countries Bahmani-Oskooee and Ltaifa (1992) found that exchange rate uncertainty is detrimental to the exports of both developing and developed countries.

A number of other studies supported the negative impact of exchange rate volatility on trade (Arize et al., 2000; Bahmani-Oskooee and Satawatananon, 2012; Chipili, 2013; Arize, 1995). In a western European study using panel data and gravity model Dell'Ariccia (1999) analyses the effects of exchange rate volatility on bilateral trade flows. He found evidence of a small but significant negative effect of exchange rate volatility on trade.

Contrary to the generally pronounced argument that exchange rate volatility negatively affects trade Bailey et al. (1986) in their investigation of the big seven (OECD) industrial countries during the floating-rate period found that exchange rate volatility has not discouraged exports from any of the big seven nations. In a later follow up study Bailey et al. (1987) repeated their study on exchange rate volatility on 11 OECD countries over the managed-rate and flexible-rate periods. Of the 33 regression equations presented they found a positive and significant relationship between exchange rate volatility and real exports and only in three cases- one of which was marginal- where they found a significant and negative relationship. All the three regressions included real exchange rate volatility variables which made them to conclude that perhaps it is real exchange rate volatility that matters. The mixed results in their studies made them to comment that the state of the empirical evidence is troublesome and that perhaps exchange rate volatility affects bilateral trade flows. A study on the US economy by Bailey and Tavlas (1988) found no significant effects of exchange rate variations on trade and direct investment.

In an IMF study Clark et al. (2004) found a negative, but not robust, relationship between exchange rate volatility and trade which made them to conclude that if exchange rate volatility has a negative effect on trade, the effect would appear to be fairly small and is by no means a robust, universal finding. Tenreyro (2007) found nominal exchange rate variability to have no significant impact on trade flows. The results from the study of Khan et al. (2014) are mixed. Their finding revealed the effect of exchange rate volatility on Pakistan’s trade is dependent on the currency of invoice with its middle-and low-income trading partners. With the US dollar, volatility in exchange rate discourages both exports and imports whilst the use of bilateral exchange rates valued in domestic currency terms has no effect on both imports and exports. Asseery and Peel (1991) studied five developed countries- Australia, Japan, United

Kingdom, United States, and West Germany over the period 1972-1987. The author found that real exchange rate volatility has a significant impact on exports at least for all the countries considered in the sample and that for the great majority of the countries the impact is positive.

Chapter 5 Comparative Analysis of ECOWAS proposed Currency Union

5.1 Introduction

The question that member states intending to form or join a monetary union should ask themselves is what are the expected costs and benefits of giving up national currency and joining the monetary union. In an attempt to answer this question economists used the framework of the OCA theory whose literature is already discussed in chapter 4. The aim of this chapter is to apply this framework on the fifteen ECOWAS countries in order to assess their suitability for currency union. We consider seven criteria: labour mobility (Mundell, 1961); trade openness (McKinnon, 1963); product diversification (Kenen, 1969); similarity of inflation; fiscal transfers; homogeneous preferences; and solidarity v nationalism. Realising the lack of benchmarks of the OCA theory as a weakness, our approach is to use the EU12 countries[4], already in a monetary union, as a comparator and also trends over time to make a judgement on ECOWAS. We found that ECOWAS countries failed to satisfy all the seven criteria under consideration leading us to the conclusion that the countries are not an optimum currency area and therefore are not good candidates for a currency union. In the rest of the chapter we described our data and sources with the methodology in section 5.2. In all subsequent sections we analysed the seven criteria in turn.

5.2 Data description and methodology

The OCA theory that emerged in the 1960s has been extensively used in assessing the suitability of countries for monetary union especially in terms of the costs and benefits to those countries. Proponents and opponents of the Euro have used this framework pre- and post-Euro formation. However the problem with the OCA framework is that whilst it states the characteristics that candidates' countries should possessed to be appropriate for the monetary union there are no bench marks or cut off points above which a country is eligible and below that it is not. To overcome this problem the approach in this chapter is to use (1) the trend of variables over time and (2) the EU12 countries as a comparator. We do realise the fact that the ECOWAS and EU economies are far apart

[4] The EU12 countries include: Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, United Kingdom

on the development scale but the idea is that the successful launch of the Euro in 1999, despite its current problems, appears to provide the impetus for other countries, like ECOWAS, to quickly emulate the EU model. The choice of years included in the analysis for both EU 12 and ECOWAS took into consideration the occurrence of major events in the integration stages. For ECOWAS, 1980 was initially selected but replaced with 1981 due to lack of export and import data for Nigeria, the largest economy of ECOWAS. This period is considered as a starting point for the analysis because it is seven years after the formation of ECOWAS with four years of trade liberalisation. The same year for EU 12 corresponds to the three year period after the establishment of the European Monetary System (EMS) and European Currency Unit (ECU) and thirteen years after customs union completed and establishment of the common external tariff. 1993 is the period after the two phases of free movement of persons and the two phases of trade liberalisation completed. The period also account for the three years after the extended ten year period for common external tariff and one year before the CFA crash of 1994. For the Euro 1993 is the period after completion of the single market. The 2005 is the first proposed start date of the ECOWAS currency and this corresponds to 1999 for the start of the Euro. 1998 for the Euro is therefore the year preceding the introduction of the Euro. 2010 and 2011 are considered as post global financial crisis periods though still crisis periods for the Euro zone. The reason for considering these important dates is that a currency union is only the final destination of a long journey of integration that involves stages of removal of trade barriers, customs union and common markets. A promising monetary union should have already shown some positive signs on the intended economic indicators, such as bilateral trade, since theses preceding stages of single currency themselves are intended to facilitate bilateral trade among members. If after all this long period of trade liberalisation and economic integration member states has not realise positive impact then one will ask the question as to how the single currency will achieve those objectives. The next subsections describe the variables, data and methods of analysis for the individual OCA criteria.

5.2.1 Labour Mobility

Intra-ECOWAS labour mobility data is not readily available from the individual ECOWAS countries. Thanks to the new data on bilateral migration released by the

World Bank in 2011 available on their web site[5]. All migration data for this analysis are taken from this website. Prior to the Euro the EU was assessed for labour mobility using United Sates, which is already an established monetary union, as a comparator (Baldwin and Wyplosz, 2012). The result was that intra-states migration in the US was far higher than the intra-EU migration and therefore EU was considered as a failure of the labour mobility criterion (table 5.4). However the figures used were in absolute terms i.e. the number of persons moving from state to state without considering the population size of the country of origin. Since EU is already a well-established monetary union this analysis uses EU12 as a comparator to assess the ECOWAS case. To overcome the limitation mention above the intra-country migration for both ECOWAS and EU12 are expressed as percentages of the country's total population, again taken from the World Bank data base.

5.2.2 Openness

McKinnon (1963) used the tradable and non-tradable sector classification in his definition of openness as we saw in the previous chapter. It is widely accepted that, this definition suffers from the difficulty of measurement for empirical work. Most empirical work use one of equations 5.1, 5.2 and 5.3 below (Baldwin and Wyplosz, 2009; Horváth, 2005). Equation 5.1 is a general measure of openness which takes into consideration the share of economic activity devoted to international trade. Equations 5.2 and 5.3 measures openness with specific focus on trade with currency union members and more specifically 5.2 reflects on the degree of exposure of union member countries to the volatility of the common currency (Blaszkiewicz and Wozniak, 2003).

$$\frac{Exports}{GDP} \; OR \; \frac{Imports}{GDP} \; OR \; \frac{Exports+Imports}{GDP} \tag{5.1}$$

$$\frac{X_{iECOWAS}+M_{iECOWAS}}{X_i+M_i} \tag{5.2}$$

$$\frac{X_{iECOWAS}+M_{iECOWAS}}{GDP} \tag{5.3}$$

Where:

$X_{iECOWAS}$ is Exports of country i to ECOWAS countries

X_i is total exports of country i

[5] www.worldbank.org/prospects/migrationandremittances

$M_{iECOWAS}$ is imports of country i from ECOWAS countries

M_i is total imports of country i

The trade data for both ECOWAS and EU12 countries is taken from the IMF direction of trade statistics (DOTS) (IMF, 2013) and the GDP data for both regions are from the World Bank World Development Indicators.

5.3 Labour mobility (Mundell, 1961)

ECOWAS, like any other African countries, migration is affected by many factors some of which are very specific to the circumstances faced by the continent. This section applies the theory of the OCA to assess the possibility of labour mobility as an adjustment mechanism in the case of asymmetric shocks in ECOWAS. In the strict sense of the OCA theory labour mobility is required for employment seeking from negatively affected economy to the positively affected one. This means it is about the movement of the work (labour) force. The lack of available statistics specifically on this type of mobility will render analysis impossible. For this reason we use migration as a proxy for labour mobility. Before this analysis we first look at the migration rate and causes in Africa in general.

5.3.1 African migration

Statistics on labour mobility in ECOWAS and Africa in general especially intra-Africa mobility hardly exist in most of these countries. The approach here is to use migration statistics as a proxy to labour so we can benefit from the recently released World Bank data on bilateral migration. There is no specific literature on ECOWAS migration but a lot on migration is been documented on Africa, hence the reason for including a general section on migration in Africa.

Africa is documented to have a long history of migration. According to Shinn (2008) cited in Ratha et al. (2011) an estimate of 140 million of African descent live outside the continent although many of these are not emigrants but members of families that have lived in destination countries for many generations and may have few ties to Africa. The number of those that left African countries in the –recent decades is estimated to 30 million and out of this 50% lived in the African continent. The bulk of the intra-African emigration takes place across neighbouring countries. For West Africa, Ratha et al (2011) mentioned that 70% of emigration is within the same sub region as compared to

66% in Southern Africa and most of these cross-border emigrations predominantly reflect common linguistic and historical roots. The authors made important findings about African migration that are relevant for this chapter and three of these are summarised as follows:

1. Majority of international migrants from Africa move to other African countries, especially from poorer countries, due to lack of the financial resources to travel to countries far from the continent and the education and skills required to succeed in high income countries' labour markets.
2. African migration is heavily influenced by the continent's history of conflict, coups, insurgencies, dictatorships, wars and natural disasters. This led to what they described as forced migration. For instance 2.2 million Africans living in countries other than their place of birth are recognised as refugees, displaced mainly by war or drought and other natural disasters.
3. Colonial ties are an important determinant on the choice of destination countries and half of the African countries reported that the most common destination for emigrants is the former coloniser. However the colonial link appears less important for highly educated migrants. This finding has implication for ECOWAS where there are three colonial links: Francophone, Anglophone and Lusophone.

5.3.2 Intra-ECOWAS migration

Appendices A.7 and A.8 show the intra-ECOWAS and intra-EU12 migration as a percentage of total population respectively. From appendix A.8 EU12 migration ranges from the low of 1.5% in 1960 to 4.5% in 2010, an increase of 3.1 percentage points. The overall average for 1960-2010 is 3.8%. With the exception of 1960 we can say that on average the overall migration for EU12 is 4%. This rate of migration was considered as not adequate to satisfy the labour mobility as required by the OCA theory. On country basis the country with the most mobile population is Ireland with an overall average of 16.6% followed by Portugal with only 6.7% and the least mobile countries are France with average of 0.9%, Germany and UK 1% each. It appears that the largest economies of EU12 are the least mobile. The results for ECOWAS in appendix A.7 revealed on average the highest mobility of 6.9% in 1980 and the lowest of 5.6% in 2010. Since 1980 intra-ECOWAS migration has been on the decline. In fact the 1960 and 1970

migration of 6.7% and 6.8% respectively are both better than all the post 1980s migration performance. The lack of a continuous and consistent improvement in intra-ECOWAS migration provides no evidence that the ECOWAS liberalisation- rights of entry without visa, rights of residence and rights of establishment- since 1979 through the 1980s and to the 1990s is having any positive impact on migration in the sub-region.

The reason for this argument is that intra-ECOWAS migration in the years before the removal of the barriers on movement of persons, 1960 and 1970 is better than the years after the implementation of the liberalisation scheme. Whilst the EU12 shows a pattern of continuous improvement from 1960 to 2010 as shown by the two extremes in these two years, ECOWAS show no more of a declining pattern. Although on average migration in ECOWAS is slightly higher than EU12 the trend in EU12 is more promising than ECOWAS because not only a continuous increase from 1960 to 2010 the EU12 has also achieved a greater percentage increase of 3.05 points compared to a downward trend in ECOWAS with a marginal increase in percentage points of only 1.3. The most mobile country in ECOWAS is Guinea with an overall percentage of 42.8% followed by Burkina Faso with 10.8% showing a big gap similar to the EU12. The least mobile countries in ECOWAS are Gambia 0.1%, Nigeria 0.2%, Cape Verde 1.1%, Sierra Leone 1.4%, Senegal 1.8%. What is also in common between ECOWAS and EU12 is that the largest economies move very little within the sub region. Comparing the intra-ECOWAS mobility between WAEMU and WAMZ appendix A.7 shows that WAEMU countries mobility within the sub region is higher than WAMZ countries. For instance in all the years, 1960-2010, the average percentage for WAEMU (3.9, 3.9, 3.6, 3.8, 3.4 and 3.1) is consistently higher than WAMZ (2.8, 2.9, 3.3, 2.5, 2.6 and 2.5).

The cross country and time intra-ECOWAS mobility is on average 6.4% appendix A.7 and EU12 is 3.8% (appendix A.8) a difference of 2.6%. Is this difference significant enough to say that ECOWAS countries satisfy the labour mobility criterion? It is a small difference to reach that conclusion and no threshold to refute it. Perhaps the best way is to consider the peculiar circumstances of explaining the reasons for most of the migration in Africa as discussed above. If most of the ECOWAS migration is the force migration type due to wars, coups, conflicts as in section 5.3.1 above then the question remains as to whether this type of mobility serves the purpose of the OCA theory. According to the findings of research discussed above the highly educated with skills

required for labour markets in high income countries migrate outside of Africa for greener pastures leaving within the sub-region poor, uneducated/less educated, low skills within the Africa or ECOWAS borders. For instance the UNHCR Global Trend Report 2010 reported 70,089 of Liberians living in other countries are refugees. 60,925 of these refugees are in neighbouring ECOWAS countries: 24,038 in Cote d'Ivoire, 11,476 in Ghana, 11,120 in Guinea, 9,030 in Sierra Leone and 5,261 in Nigeria). This refugee's destination statistics seem to support the finding that the poor and less educated who cannot afford the cost of travelling far away only move to neighbouring countries. In the Liberia case 63% of the 2010 refugees are in three of the countries that share border with Liberia (Cote d'Ivoire, Guinea and Sierra Leone) and Ghana with similar figures to these countries shared border with Cote d'Ivoire. Force migration especially the uneducated and unskilled persons cannot serve the adjustment mechanism purpose as required by the OCA theory. We have already seen in chapter 4 that the rationale for labour mobility is to solve the high unemployment problem faced by a country hit by a negative demand shock and the inflationary pressures in the country with a boom in demand by migrants from the former taking employment in and increasing demand in the latter. This increase in demand will also stimulates exports from the low demand country and therefore helps to solve both the unemployment and low demand problem in that country and at the same time reduce the inflationary problem in the country with high demand. We argue that forced or unplanned migration due to conflicts, wars, coups etc. or migration of uneducated, unskilled and displaced persons as the case for many ECOWAS countries cannot serve the purpose of adjustment mechanisms in a monetary union. In fact refugees' migration can impose a substantial burden on host countries by requiring additional public expenditures, putting pressures on infrastructure, and contributing to environmental degradation (Ratha et al., 2011). We have also pointed out in chapter 2 how influx of refugees from Liberia and Sierra Leone caused violence with the citizens in Cote d'Ivoire in the late 1990s due to competition for the limited jobs available. In the same chapter we also noted that refugees struggling to survive became a source of recruitment of combatants causing more political instability and a recession in Nigeria in mid 1980s also evidenced the expulsion of ECOWAS citizens from the countries which is against the economic rationale of labour mobility. In the case of such adjustment failure, asymmetric shock in ECOWAS will leave the low output and high unemployment in the negatively affected

country and inflationary pressures in the boom country. A common monetary policy that can fix the problems of these two countries at the same time does not exist and therefore the common central bank is rendered incapable. A recession in the adversely affected country and the boom in the other continue to inflict pain and suffering in these countries which opponents of monetary union considered to be the costs rather than benefits of countries in a monetary union that failed to satisfy the OCA criteria.

Although the analysis shows that intra-ECOWAS migration is slightly higher, though declining, than EU12 it might not be significant enough and even the possible status and quality of migrants cannot support a conclusion that ECOWAS satisfy the labour mobility criterion.

5.4 Openness (McKinnon, 1963)

5.4.1 General openness (trade with the rest of the world)

We have already seen in the previous chapter the economic argument of openness made by McKinnon. On the one hand an economy that is open in terms of international trade can reap benefits from monetary union due to the savings in transaction costs and the risks associated with different currencies. On the other hand the degree of openness has an impact on the effectiveness of monetary policy due to the pass-through effect of changes in nominal exchange rate on domestic prices and wages (Lavrac and Zumer, 2003). When countries are faced with asymmetric shocks devaluation or appreciation of national currency has little or no role, depending on the level of openness, in the adjustment mechanism for an open economy and therefore giving up that currency for a common currency is costless otherwise it is a cost to the nation. We now examine the ECOWAS situation first by looking at appendices A.9 and A.10 which present the openness indicators for ECOWAS and EU 12 as defined by equation 5.1.

From Appendix A.9 Liberia has the highest trade to GDP ratio for all years with a maximum of 3,450.1% in 1993 and minimum of 118.9% in 1981. The magnitude of this level of openness is accounted for by the import sector which has the maximum import to GDP ratio of 3,223.5% in 1993 and the minimum of 56.4% in 1981. When the maximum ratios are computed without Liberia (Max-Lib) the maximum trade to GDP ratio for all the years considered is 151.5% which is Benin for 2011.With these statistics Liberia is therefore an extreme outlier and the analysis will consider the figures without

Liberia. Two possible reasons may be responsible for Liberia's extraordinary trade to GDP ratios (especially imports to GDP) both relate to the outbreak of the Liberian civil war in 1991. The insecurity caused by the war may have led to the country's economic activities, mainly agriculture, to fall to the extent that the country has to rely on imports even food that could be locally produced. The second reason is that the fall in economic activities may have a depressing effect on GDP. A fall in in GDP and an increase in imports both have an upward pressure on the trade to GDP ratio. What is common to all the ECOWAS countries, with the exception of Cote d'Ivoire and Nigeria, greater proportion of their Trade to GDP ratios are accounted for by the import to GDP ratio. This corresponds to the trade balance deficit shown in the economic profile of these countries presented in chapter 3. By this openness measure the least open Economy in ECOWAS is Burkina Faso which reported the minimum trade to GDP figures consistently for all the years.

The only country that shows a decline in openness is Niger whose trade to GDP ratio falls from 46% in 1981 to 36% in 2011 remaining relatively constant at 33% in between those years. Considering the comparator, EU 12 countries trade to GDP figures show Belgium with the highest figure of 180.2% in 2011 and consistently Greece has the lowest in all the years reported. With Greece being continuously the centre of the on-going Euro crisis its low degree of openness relative to the rest of the world is suggesting, according to the openness criterion, that it is very costly for Greece to abandon its national currency and join the single currency which perhaps is the price that the country is paying now. This means devaluation of the Drachma could have been a useful monetary policy tool for the Greece economy. Italy and Spain are also relatively less open as their ratios are mainly in the thirties and forties with France and UK following. However, what we can deduce from the ECOWAS and EU 12 trade to GDP figures is that, although EU 12 countries are more open than ECOWAS which may be due to their difference in economic development, ECOWAS countries are open economies and the degree of openness from 1981 to 2011 has improved. In fact some ECOWAS economies are even more open than some EU12 economies as shown in appendices A.9 and A.10.

5.4.2 Intra-ECOWAS openness (GDP measure)

In this section we assess ECOWAS countries openness in relation to each other in the community. First we use the openness measure as defined by equation 5.3 i.e. intra-ECOWAS trade to GDP ratio. This measure is very similar to the one discussed above for Equation 5.1 but the difference is that this measure focused on bilateral trade within ECOWAS members rather than total trade with the world.

The results of equation 5.3 are presented in appendices A.11 for ECOWAS and A.12 for EU12. The first thing that is striking from these statistics is that whilst there was an ECOWAS catch up in the trade to GDP measure of openness above it is not the case for intra-ECOWAS trade ratio. Most ECOWAS countries ratios in all the years are in single digit ranging from 0.6-22.5% as compared to the EU12 range of 15.8-128.4% or 15.8-94.5% without Belgium. In fact if we take Liberia out of the calculation due to its abnormal trade to GDP ratio above the highest intra-ECOWAS trade to GDP is 20.9% which is 2005 for the Gambia. This is a significant difference in terms of intra-regional trade. By this measure Nigeria, the largest economy, has the smallest imports to GDP ratio for all the five years and when the total ECOWAS trade to GDP is considered Nigeria's performance is still very marginal ranging from 0.9% in 1981 to 4.3% in 1993 and since this period Nigeria's trade with ECOWAS has been on the decline to a value of 2.2% in 2011. This means Nigeria is not an open economy when assessed by the intra-ECOWAS trade measure of openness. When we consider the comparative indicators, EU12, the least open economy is Greece with an intra-EU trade to GDP ratio ranging from 15.8% in 2010 to 20.2% in 1998. It is clear from these statistics that even the least open economy in EU12 is more open than almost all the ECOWAS economies. The data also show that the increase in openness from period to period as shown in appendix A.11 is very small for all the countries. Four of the countries- Cape Verde, Ghana, Mali and Sierra Leone- reported a decline in the ratio from 1981 to 2011, after a period of thirty years of economic cooperation. This suggests that the ECOWAS trade liberalisation effort since 1975 seems not to be yielding any positive effect. Unlike the ECOWAS countries all the EU12 countries, except Greece and Ireland, reported increase in ratio over the period 1993-2011. Ireland shows the highest ratio of 78% in 1998, the year just before the Euro launch and since then it has been on the decline.

What we can conclude in this section is that ECOWAS economies are not open to each other and this has implications for monetary union to be discussed after the next section.

5.4.3 Intra-ECOWAS openness (Total trade measure)

This section presents the statistics for our third measure of openness as defined by equation 5.2 i.e. intra-ECOWAS trade to total trade ratio. The results are shown in appendices A.13 and A.14 for ECOWAS and EU12 respectively. This measure of openness gives an indication of two things. First the degree of openness within ECOWAS and second the degree of exposure to the fluctuation of the common currency. If the countries show high ratio it means there is high trade between the monetary union countries which means that those countries will derive benefits from high savings of transaction costs and foreign exchange risk and uncertainty. A low ratio on the other hand suggests that the member countries are not good candidates to form a monetary union and any attempt for doing so yields no benefits to those countries but only costs. Starting with the EU12, the range of the ratio for the entire six years period is 38.5-88% (Spain-Luxembourg) as compared to the ECOWAS range of 0.1-33.2% (Guinea Bissau-Togo). The results present another big difference between the levels of intra-regional trade between ECOWAS and EU12. Interestingly the minimum ratio of 38.5% for the EU12 is even much better than the maximum ratio of 33.2% for ECOWAS. The results of this ratio show that UK is the least open economy with a ratio in the range of 38.5% in 1981 to 55.5% in 2003. This is not surprising as the UK is not a member of the Euro. When compared to ECOWAS the least open economy, Guinea Bissau it has a range of 0.1% in 1993 to 1.9% in 1981 indicating a decline in its trade with ECOWAS members. The ratio of the most open economy in ECOWAS, Burkina Faso, ranges from 26.5% in 2011 to 30.5% in 2005 which is another decline in intra-ECOWAS trade performance. The statistics also suggests that all EU12 countries, except Ireland, experienced an increase in intra-regional trade from 1981 to 1993 with a similar pattern repeated, except Ireland and Netherlands, from 1993 to 1998. However this trend is reversed after 1998 when most of these countries saw a decline in their ratios for 2003, 2010 and 2011 although the decreases are very minimal to be of any significant concern. This may mean that the EU trade liberalisation, common market and the EMS has yielded more positive results on the regional trade than the period after the introduction of the Euro in 1999. On the ECOWAS side the degree of openness, by

the intra-regional trade to total trade measure, is not only low for all countries and for all years under consideration but also the increase from one period to another is very minimal. Nigeria's intra-ECOWAS openness is very low ranging from 1.4% in 1981 to 4.9% in 2005 followed by declines in the last two years. Ghana and Cote d'Ivoire, the next two largest ECOWAS economy, trade more extensively with ECOWAS than Nigeria but still their degree of openness fell far short of the EU12 degree of openness to each other.

5.5 Product diversification (Kenen, 1969)

Kenen's contribution to the OCA theory following Mundell and McKinnon has already been discussed in section 4.4.6 of chapter 4. Before adding his argument he first pointed the inadequacy of Mundell's labour mobility criterion that an exodus of labour, through migration, from an adversely affected region to the favourably affected one will serve as an adjustment mechanism to solve the unemployment, inflationary pressure and trade imbalances in the two regions. According to his argument, as seen previously, the economic diversification of a country should be a very important component in defining the OCA for reasons already discussed. In addition to the aggregate exports stability facilitated by product diversification, Lavrac and Zumer (2003) further expanded on how product diversification is justifiable for the low or no cost effect of a country losing its monetary policy. For instance in a well-diversified monetary union the use of monetary policy to offset the imbalances in the segment of the economy hit by an adverse shock could have substantial negative repercussions on the rest of the economies where the same shock did not occur. This renders a weaker argument for the role of an independent monetary policy in combating adverse shocks in a monetary union with well-diversified production structure. This argument led to Lavrac and Zumer's statement that 'in economies producing and exporting only few types of goods (e.g. primary goods), changes in nominal exchange rate may temporarily compensate for adverse effects and thus help to overcome the shock.' With this brief recall of the main argument and the product diversification rationale as presented in the literature, this section will now examine the fifteen ECOWAS countries in an attempt to assess the extent to which they are fit for monetary union in accordance with the product diversification criterion. For the purpose of this analysis we use appendices A.15 and A.16.

Appendix A.15 presents each country's top three exports as a percentage of its total exports in column 3 and in column 4 the number of exports that account for 75% of the country's total exports for the period 2009. These statistics give us an indication of the export portfolio of each country and therefore the degree of diversification. We can see in column 3 that six (40%) of the ECOWAS countries- Burkina Faso (80.8%), Guinea (78.1%), Guinea Bissau (92.2%), Liberia (74.7%, Niger (94.3% and Nigeria (93.8%)- have 75% or more of their total exports dominated by the top three exports. By the average measures we used in chapter 3 these six countries constitute 76.01% of the ECOWAS GDP and more importantly Nigeria, the largest economy with 70.12% of ECOWAS GDP, is among the top least diversified economies marginally second to Niger. A disaggregation of these top three exports figures revealed a lack of good spread among the products. For instance out of Nigeria's 93.8%, a contribution of 86.3% comes from a single product, oil, as also shown in the fourth column and only 7.5% contribution comes from liquefied natural gas. The worst case is that of Guinea Bissau whose top export (92.2%) is entirely dominated by a single commodity, cashew nuts with no form of processing. For Niger its top exports is dominated by two commodities, Natural uranium (70.5%) and light oils (23.8%), also supported in the fourth column. The situation is very similar for Guinea and Burkina Faso with the top exports dominated by Aluminium ores (62.9%) and unprocessed cotton (52.1%) respectively. For all the ECOWAS countries from appendix A.15 the contribution of the top three exports to total exports ranges from the lowest of 38.3% for Senegal to the highest of 94.3% for Niger. What is very common in the export structure of these countries is that almost all of them are dominated by a single product. Sierra Leone and Senegal have shown exceptionally the highest number of exports accounting for 75% of total exports, as shown in column 4, each with 22 and 19 respectively. The question remains whether these two countries are really well diversified by this criterion. The answer depends on how many of these products and their share in the country's export mix. Senegal and Sierra Leone's break down of GDP into the three sectors as discussed in chapter three from appendices A.5 and A.6 and figure 3.3 provides no evidence supporting product diversification. For instance, from appendix A.5, Senegal is dominated by the tertiary sector with a contribution to GDP of 69.3% and 66.4% in 2006 and 2010 respectively. Most, if not all, of the components of this sector are non-tradable. The country's agricultural sector is relatively small and the manufacturing

sector has a sizable proportion of GDP but is significantly dominated by meat and fish processing as already mentioned in chapter 3. The mining sector is also small to have a large number of these products. For Sierra Leone, appendices A.5 and A.6 show that the economy is agricultural dominance with 58.3% and 63.3% of GDP for 2006 and 2011 respectively. However this sector, as already mentioned in chapter 3, is mainly subsistence and therefore having many of the products in the export mix from this sector is doubtful. The manufacturing sector is also small and is mainly import substitution industries which again cast doubt on the significance of this sector's contribution to exports. There is also nothing to support that the tertiary sector has any exportable components as services are mainly non-tradable and also this sector is mainly informal activities. Overall despite the large number of exportable items shown by Senegal and Sierra Leone, appendices A.5 and A.6, figure 3.3 provide no evidence that these two countries are significantly different from the rest of the ECOWAS countries in terms of export diversification. What these tables suggest is that no matter how large the number of exportable items in the export mix of the ECOWAS countries they come from mainly unprocessed commodities- agriculture and mining with no or little industrial activities.

Taking the argument further by considering appendix A.16 there is also no evidence to support that any of the ECOWAS country is really diversified in the context of Kenen's criterion. Food exports as a percentage of merchandise exports- which may be mainly agricultural commodities and light agro-based manufacturing- is large for most of the ECOWAS countries ranging from highest of 94.3% for Guinea Bissau and the lowest of 5.4% for Liberia. Liberia's agricultural sector is mainly cash crops such as forestry products and its low food export provides no significant diversification advantages. The low level of manufacturing activities in ECOWAS is also shown by the high dependence of imports of manufactured merchandise as shown by the manufactures exports as percentage of merchandise imports- ranging from 39.1% (Guinea) to 82.3% (Nigeria). This again corroborates the evidence on Nigeria's low level of secondary sector (2.6 and 2.2%) in appendices A.5 and A.6. Appendix A.16 also presents evidence that the ECOWAS countries add very little value to manufacturing as shown by the manufacturing value added as a percentage of GDP ranging from 2.8% (Nigeria) to 16.8% (Cote D'Ivoire).

The findings from this analysis are that none of the ECOWAS countries possess the economic structure of product diversification. The other interesting finding from this section is that all the countries' export mix is heavily dependent on commodities from the extractive industry- agriculture or mining. As a result any external demand shock on primary commodities will not only adversely affect one country but all the ECOWAS countries due to their lack of diversification. The only positive thing about this lack of diversification as mentioned by Kenen is that occupational mobility on the export dependence sector (primary) is high due to the similarity of the production structure and less complexity of the manufacturing sector although this does not provide support that these countries are good candidates for monetary union. The implications of these findings are that if these countries should abandon their national currencies and monetary policy independence it will lead to high costs due to the loss of the exchange rate and monetary policy instruments to stabilise their economies in the case of asymmetric shocks. In the language of Kenen's conclusion less product diversified countries, such as the case for ECOWAS, should not fix their exchange rate through a peg or a single currency.

5.6 Similarity of inflation rates

Similarity of inflation rates is the fourth economic criterion for the OCA theory. As the purchasing power parity theory is based on the law of one price the rationale for inflation similarity of monetary union members is that there is no need for changes in exchange rate. Also similar inflation rates means a common monetary policy can have similar and productive effect on member countries thus reducing the costs arising from the loss of autonomy.

In this analysis we continue to use EU12 as our comparator. We examine the inflation rates of the 15 ECOWAS countries and then their subdivision into the two monetary zones that exist in the sub-region- WAEMU and WAMZ. The ECOWAS and EU12 consumer price inflation for 2002-2011 are respectively shown on appendices A.17 and A.18. The graphical presentations are shown in figure 5.1 (time series) and figure 5.2 (scatter plot). The descriptive statistics for WAEMU and WAMZ computed from appendix A.17 are shown in table 5.1. These tables and figures indicate a clear disparity of inflation rates between WAEMU and WAMZ countries. WAEMU countries all have low and similar inflation rates and consistently for all the ten year period, except 2008

(global financial crisis), they maintained their rates below the 5% level which is the ECOWAS convergence target as shown in figure 5.1.

WAEMU inflation pattern for the ten year period is far away from WAMZ and follows the EU12 inflation trend closely except for the higher rate of fluctuations in WAEMU as compared with EU12 as reflected in the spread and standard deviation in table 5.1. WAMZ inflation rate is not only high for the individual countries, mostly in double digits, on average for the ten year period it is persistently far above the overall ECOWAS average and much higher than WAEMU. This is consistently indicated in the descriptive statistics on appendices A.17, table 5.1 and figures 5.1 and 5.2. The scatter plot (figure 5.2) shows that all the nine WAEMU countries inflation for the ten year average converged with the EU12 rates at the level below the 5%. On the ten year average these countries even performed better than Greece. Unlike WAEMU, all the six WAMZ countries are distinctively singled out in the scatter plot way above the 5% rate with only The Gambia closer at 7.1%.

Figure 5.1 ECOWAS and EU12 annual inflation rates

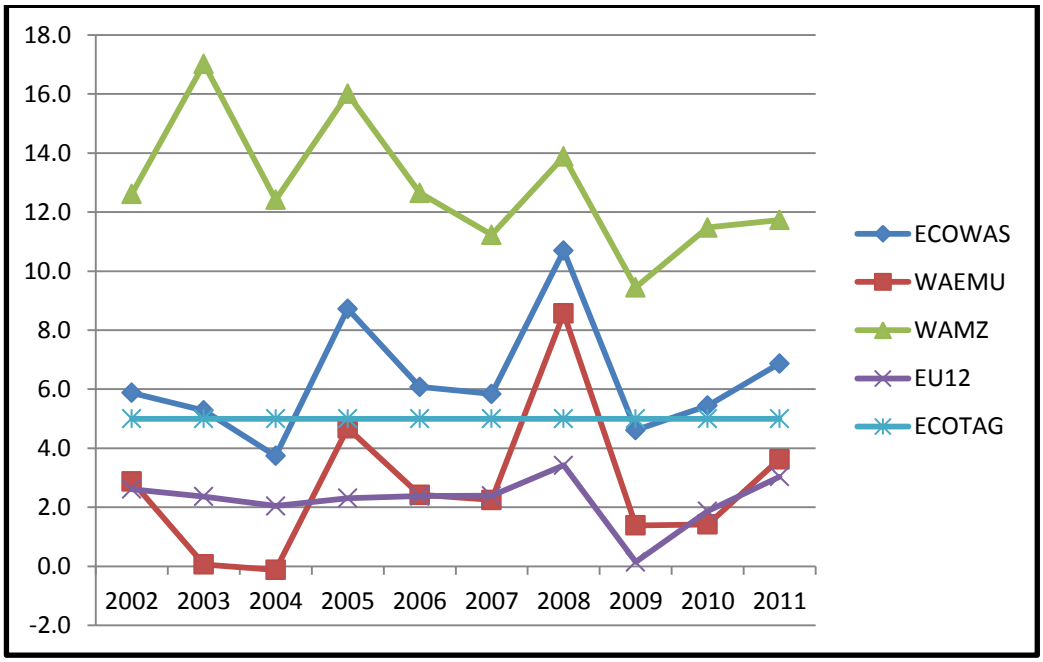
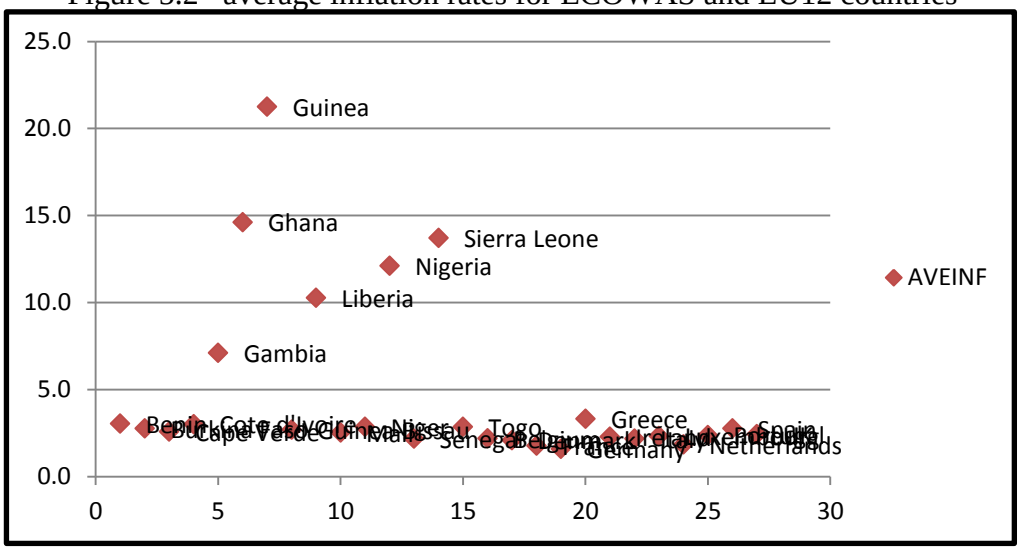


Figure 5.2 average inflation rates for ECOWAS and EU12 countries



The Gambia has the best inflation record in ECOWAS showing the minimum rate for eight of the ten years. Four of the WAMZ countries (Liberia, Nigeria, Sierra Leone and Ghana) are between the 10-15% band. Guinea has the worst inflation rate performance in WAMZ and ECOWAS with an average of 21.3% (appendix A.17 and table 5.1).

Table 5.1 WAEMU and WAMZ Inflation descriptive statistics

WAEMU	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Ave.
Min	1.9	-3.5	-3.1	0.4	0.0	-0.2	5.8	-1.7	-0.8	2.7	2.2
Max	5.0	3.3	1.4	7.8	5.4	5.9	11.3	4.3	2.5	5.0	3.0
Spread	3.1	4.3	1.0	1.0	3.1	4.9	2.6	2.4	0.7	1.5	0.3
STDEV	0.9	2.1	1.5	2.5	1.5	2.2	2.0	1.8	1.0	0.9	0.3
Average	2.9	0.1	-0.1	4.7	2.4	2.3	8.6	1.4	1.4	3.6	2.7
WAMZ											
Min	8.6	10.3	7.8	4.8	2.1	5.4	4.5	4.6	5.0	4.8	7.1
Max	14.8	26.7	15.0	31.4	34.7	22.8	18.4	19.3	16.6	21.4	21.3
Spread	6.2	16.3	7.2	26.5	32.6	17.5	13.9	14.7	11.6	16.6	14.2
STDEV	2.8	7.0	3.2	9.9	12.7	6.4	5.2	5.5	4.6	6.0	4.8
Average	12.6	17.0	12.4	16.0	12.6	11.2	13.9	9.5	11.5	11.7	13.2

A closer look at the descriptive statistics in table 5.1 also revealed that WAMZ countries not only have the higher inflation rates than WAEMU their degree of fluctuation, as measured by the standard deviation, is also higher which indicates a lack of convergence in inflation.

The findings from this analysis are that there is a high degree of inflation dissimilarity between WAEMU and WAMZ countries in ECOWAS. Secondly the WAEMU countries not only have low inflation rates but also their rates are very similar and converge at the 5% level and in most cases follow the EU12 pattern. On the other hand

the inflation rates of WAMZ countries are far higher than the WAEMU countries and also these rates are not even similar within the WAMZ countries themselves.

The conclusions from these findings are that ECOWAS countries is not an optimum currency area by the inflation similarity criterion of the OCA and an attempt to form a currency union by these fifteen countries will cost them more than the benefits they will derive from the union. The findings also suggest that WAEMU countries, by this criterion, are good candidates to be in a monetary union but WAMZ countries are not.

5.7 Fiscal transfers

We discussed, in detail, the requirements of the OCA with regard to fiscal transfers in section 4.4.8 of chapter 4. In this section we apply those requirements within the context of ECOWAS in order to assess whether these fifteen countries have the necessary pre-requisites of fiscal transfers that will make them fit, in conjunction with other criteria, to form a currency union. The key question we are attempting to address here is whether ECOWAS countries have a system of income transfers in place that will enable it to provide the adjustment mechanism to alleviate the suffering of countries in periods of shocks. We apply this criterion from the perspective of insurance which is divided into two: (1) public insurance and (2) private insurance. For this section we use the stock market information and banking sector of ECOWAS countries reported in tables 5.2 and 5.3 respectively.

5.7.1 Public insurance

This aspect of fiscal transfers as we have seen involves the transfer of income from one state to another through the system designed and implemented by member states of the currency union such as a centrally coordinated budgetary system that is responsible for tax collection and disbursement. From table 5.4 EU 12 countries were assessed as not having satisfied the criterion of fiscal transfers due to the non-existence of an EU wide centrally coordinated budgetary system for income collection and distribution. The lack of fiscal integration which usually comes in the form of fiscal union is considered a threat to the success of a currency union. However, policy harmonisation via a fiscal union may only work successfully if the members are in a form of political union. The more fiscally integrated the countries are the greater their ability to smooth asymmetric shocks through fiscal transfers from a low unemployment region to a high

unemployment region (Dellas and Tavlas, 2001; Kenen, 1969). The United States was considered to rank higher than the EU for labour mobility and in terms of fiscal transfers, the presence of the fiscal and political union in the US are said to be some of those key features that help the success of the US$ as a single currency for the 50 states.

Coming back to ECOWAS we ask the question is it better than EU and closer to US in terms of fiscal integration? The simple answer is no. The fifteen countries each with independent government and independent fiscal authority led us to conclude that ECOWAS is no different from the EU and therefore from the OCA perspective a currency union for these countries will imply greater costs due to the lack of the shock absorbing offered by the fiscal transfers criterion. Although the EU is considered as not fulfilling the fiscal transfer criterion we can still argue that it is in a better position than ECOWAS for two reasons. First, the EU countries are developed as compared to less developed ECOWAS and as such are in a better position financially. The second reason is that although there is no centrally coordinated fiscal transfer system in the EU the existence of the welfare system in these countries help to some extent to make disbursement to needy people in certain circumstances. This is not to say that the presence of a welfare system can be a substitute for a fiscal union. In ECOWAS not only there is no centrally coordinated fiscal system, there is also no welfare system that provides benefit payments to people even in normal times. This lack of welfare system in all the ECOWAS countries was also confirmed by the West African Monetary Institute (WAMI), in response to a questionnaire sent to them. On the issue of welfare system in place to help countries in difficulties the WAMI respondent said (s)he is not aware of such a system in any of the ECOWAS countries and further states

> *"WAMZ has stabilisation and cooperation fund with an initial capital of US$100 million temporal short term loans for balance of payments shocks- authorities will decide whether to expand the size of the fund and extend its membership to the rest of ECOWAS."*

This fund is only for the six WAMZ countries and not for ECOWAS as a whole. Whatever fund that is set up we still cannot say that it is in the strict sense of fiscal integration and our conclusion is that ECOWAS is short of the fiscal transfer criterion.

5.7.2 Private insurance

The private insurance operates within the framework of the financial system, banking and stock market, which facilitates the movement of capital from one region to another.

The framework of capital mobility and transfers we discussed in chapter 4 involves the selling and buying of securities (equities and bonds) across countries. For this to work the countries involved should have active stock market(s) that allow cross listing of firms. To assess this condition we report the stock exchanges and banks in ECOWAS in tables 5.2 and 5.3 respectively. From table 5.2, three of the ECOWAS countries (The Gambia, Guinea and Liberia) have no stock market at all as they are missing from the table. Sierra Leone with the most recent stock market established in 2009 is only listed with one company and the zero recorded as market capitalisation seems to be a recoding error from source. The eight WAEMU countries have one common stock market situated in Cote d'Ivoire with a market capitalisation of US$11.7 billion the third largest in the region next to Nigerian Stock Exchange (US$90.7 billion) and Ghana (US$30.5 billion). Cape Verde stock market has a market capitalisation to GDP ratio of 0.05%.

Apart from some countries not having stock exchange at all, for those with them it is very doubtful how many of each country's securities are held by firms and individuals of other ECOWAS countries. Nigerian Stock Exchange (NSE) indicated that for the first three months of trading (year to date) for 2015 60.12% of its transactions are foreign and the rest domestic. There is however no indication of how much of the foreign transactions are from other ECOWAS countries. What is clear is that there is only an ECOWAS plan for the integration of stock markets. This is evidenced by the launched of the West African Capital Market Integration Council (WACMIC) on the 18 January 2013 with the main objective of spearheading the integration of capital markets in West Africa and promotes strong relationships among member states (www.nse.com.ng). The integration process involves harmonisation of listing and trading rules, regulation and practices across the region and clearing and settlement of transactions. The WAMI road map is defined in three phases.

Table 5.2 Stock Exchanges in ECOWAS

Exchange	Country	Date formed	No of listed companies	Market capitalisation End of year (US$)	Market capitalisation (% of GDP)
BRVM1	The 8 WAEMU countries	Sept 1998	71 (as at 2014)	11,697,116,751	13%
BDVDCV2	Cape Verde	Dec 2005	4 (as at 2013)	89,364,316	0.047%
Ghana Stock Exchange	Ghana	July 1989	34 (as at 2012)	30,460,000,000	99.740%
Nigerian Stock Exchange	Nigeria	1960	189 (as at 2014)	90,677,607,206	11.650%
Sierra Leone Stock Exchange	Sierra Leone	July 2009	1 (as at 2012)	0	5.480%

1. La Bourse regionale des valeurs Mobilieres, 2. Bolsa De Valores De Cabo Verde

Source: African Securities Exchanges Association (ASEA) available on www.african-exchanges.org (accessed on 26 April 2015)

Phase 1: Trading among WACMI members via sponsored access is to commence in Q1 2014 (Physical phase)

Phase 2: Introduce 'membership' privileges, e.g. electronic membership (Logical phase)

Phase 3: Full integration, i.e. all markets accessible by qualified West African brokers.

Apart from the lack of time bound for the second and third phases, there is no indication that phase 1 has been implemented. The nature of the ECOWAS stock exchanges in table 5.2 and the documented but not implemented integration plan could only lead us to a reasonable conclusion that the ECOWAS stock markets are not integrated and therefore cannot achieve the fiscal transfer advocated in the OCA theory.

Turning to the banking sector, from table 5.3 there are 220 banks in total in the fifteen ECOWAS countries (the left hand side of the table). On the right of the table we show banks that have a presence across the ECOWAS countries. Two banks are worth

mentioning here. Ecobank which is present in all fifteen ECOWAS countries and Bank of Africa (BOA) present in nine of the countries. For banking integration, the number of banks is important but not fundamental. Perez et al. (2005) used two key indicators to measure banking integration in Europe. (1) the degree of openness to foreign banking activity of a particular country which is measured as the ratio of the amount of bank assets of a given country that are owned by foreign banks to total banking assets of the receiving country. (2) The internationalisation of the banks of a given country measured as the ratio of the assets held abroad by banks of a given country to the total banking assets of the sending country. When we analysed ECOWAS bilateral trade with the rest of the world we found all the countries to be highly open to trade but not within ECOWAS countries. It may be a possibility that if these two indicators are applied on ECOWAS banks globally we will find them highly integrated but may not be so if they are applied only within ECOWAS countries. Again we don't have the data to compute these two indicators for each of the ECOWAS banks in table 5.3. We mirror these two indicators by looking at the background of the two most common banks in ECOWAS with particular emphasis on their capital composition (liabilities).

Starting with Ecobank which is a Pan-African bank, it is now present in 36 African countries. The bank was established in 1985 and is spearheaded by the Federation of West African Chambers of Commerce and Industry with the support of ECOWAS. At the time of incorporation its initial capital of US$100 million was raised from 1,500 individuals and institutions from West African countries. The bank's largest shareholder was the ECOWAS fund for cooperation, compensation and development. The second bank, Bank of Africa (BOA), was founded in Mali in 1982 and now present in 17 African countries, 8 of which are West African countries. Since 2010 through acquisition, BMCE bank the second largest private bank in Morocco (North Africa) acquired a 55.77% ownership in BOA making it the largest owner of the bank. From the brief background of these two banks what we notice is that the two most populous ECOWAS banks are dominated each by one institutional investor. The 44.23% minority ownership in BOA may perhaps be dominated by other institutional shareholders who may be in or out of West African countries. This is a situation that is similar to Ecobank.

Table 5.3 Banks in ECOWAS

Country	No of banks	Bank	Present in (no of countries)
Benin	12	ECOBANK	15
Burkina Faso	17	Access Bank	5
Cape Verde	6	Bank of Africa	9
Cote d'Ivoire	25	Diamond Bank	5
Ghana	27	United Bank for Africa	5
Guinea	5	Guaranty Trust Bank	5
Guinea Bissau	4	Sky Bank	3
Liberia	9	CITI Bank	3
Mali	15	First bank/First International Bank	3
Niger	12	Zenith Bank	3
Nigeria	24		
Senegal	22		
Sierra Leone	13		
The Gambia	14		
Togo	15		
Total	220		

Source: West African Bankers' Association (WABA)- available on www.waba-abao.org (accessed on 26 April 2015)

If this is the case, which is likely, then we can also say that the ECOWAS banking sector cannot be said to be integrated in the strict sense of the OCA requirements. Just like the stock market case above we can also conclude that the banking sector in ECOWAS lacks the fiscal transfers required of it to be able to provide the smoothing mechanism in accordance with the OCA theory.

The overall conclusion in the fiscal transfer criterion of the OCA is that ECOWAS countries seem far from meeting this requirement. The deficiency in this criterion means that in the event of asymmetric shocks, ECOWAS countries cannot move income from the advantaged to the disadvantaged countries leaving the ECOWAS people with the pain of suffering from the shocks.

Table 5.4 ECOWAS and EU12 OCA scorecard

	Satisfied	
Criterion	ECOWAS	EU*
Labour mobility	No	No
Trade openness	No	Yes
Product diversification	No	Yes
Inflation similarity	No	No score
Fiscal transfers	No	No
Homogeneity of preferences	No	Partly
Commonality of destiny	?	?

*the source for the EU 12 information is from Baldwin and Wyplosz (2015:376). For ECOWAS it is the author's assessment in this chapter.

5.8 Other criteria

Apart from the OCA criteria already discussed above, which are more economic, there are other criteria as already discussed. These include homogenous preferences and solidarity v nationalism (SvN). The latter is more of a political consideration and is far from any quantitative measurement. A very controversial question relating to the former is whether all countries in the monetary union share similar views about the use of monetary policy. Of course the one-size-fit-all monetary policy works well when the countries share similar macroeconomic characteristics especially with respect to inflation. Our analysis in this chapter and chapter 7 has shown that there is a high degree of heterogeneity among ECOWAS countries in their inflation, debt, exchange rate volatility and current account balances. We found the WAEMU countries and Cape Verde to have very low inflation records as compared to high inflation for the non-WAEMU countries. Such disparity in economic characteristics is most unlikely to make the ECOWAS countries to share common views in monetary policy.

The political criterion SvN seeks to address the question of how deeply do citizens of a monetary union area feel a sense of solidarity. In other words are they willing to give up some elements of national sovereignty in the pursuit of common interest? The answer to this question is a matter of unfolding reality and actual experience. As a test of this criterion in Europe an opinion poll was conducted in 2006 in which respondents were asked whether they felt European. The results revealed that 16% said they often 'felt' that way; 43% said 'never'; and 38% said 'sometimes'. The European debt crisis further brought the solidarity criterion into question.

Box 5.1 The euro debt crisis row between Germany and Greece

"Greek resentment of pressure from northern creditors led by Berlin is shared in other parts of the south, where a single-minded focus on belt tightening rather than growth is seen as more likely to worsen the euro zone debt crisis than fix it.
Even if Athens secures a new 130 billion euro EU-IMF bailout to avoid a chaotic default in March, the spat between Germany and Greece appears to have raised prospects for more lasting trouble further down the road.
"I cannot accept Mr Schaeuble insulting my country," Greek President Papoulis said. "Who is Mr Schaeuble to insult Greece? Who are the Dutch? Who are the Finnish?"
"I point out that European taxpayers are showing great solidarity at the moment in stabilizing Greece economically and politically for the long term. In exchange we ask the Greek side for changes of behaviour and measures to build trust that agreements will be met," he said in a television interview." (German Deputy Finance Minister Steffen Kampeter)"[6]

For instance two of the authors on European economic integration said

> *"The initial reaction to the Greek debt crisis was to extend collective support, very explicitly in the name of solidarity. As the crisis deepened, however, nationalistic sentiments started to be expressed…the German newspaper Bild lambasted Greece as a nation of lazy cheats who should be thrown out of the euro on their ear…some Greek… responded by their statements, German politicians and German financial institutions play a leading role in a wretched game of profiteering at the expense of the Greek people" (Baldwin and Wyplosz, 2015:374-375).*

Since the Euro debt crisis there has been exchanges especially between Germany and Greece and box 5.1 shows extract of these from the Reuters news paper (online). Can we infer the euro experience to the ECOWAS proposal? Although two economic areas can be similar but not identical we can, however, judge on the basis of different scenarios. ECOWAS is not yet in a full monetary union like the Euro but certain events we mentioned in chapter 2 and section 5.3.2 of this chapter on labour mobility-expulsion of ECOWAS citizens from Nigeria in mid 1980s and clashed between Ivoirians and refugees in Cote d'Ivoire- provide us with some bases to say that what is happening in the Euro is highly likely to happen in ECOWAS if similar situation is to arise. Baldwin and Wyplosz (2015) score of EU on the SvN, known as commonality of destiny, criterion is neither a pass nor a fail as seen in table 5.4. As we have argued in this section because ECOWAS is still a proposed single currency area but the past

[6] Taken from http://www.reuters.com/article/2012/02/16/greece-germany-idUSL5E8DG4S020120216

experience of the region and the Euro area led us to conclude that ECOWAS is not likely to achieve an outright pass on this political criterion and as such we give it an uncertainty (?) score.

5.9 Endogeneity of the OCA criteria

In chapter 4 we discussed the OCA criteria and the endogeneity (section 4.6) literature. In this chapter we applied the OCA criteria to assess ECOWAS suitability for monetary union and our key finding from the analysis is that ECOWAS countries have not met any of the OCA criteria ex-ante thus making them inappropriate for a common currency. The Euro countries performed relatively better than ECOWAS as seen in the summary in table 5.4. However, the question of whether the euro was and is an optimal currency area was unsettled prior to 1999 and still debatable (Gabrisch and Buscher, 2011; Matthes, 2009). According to the endogeneity literature as argued by Frankel and Rose (1998) countries like ECOWAS need not worry about meeting the OCA criteria ex-ante but should straight away enter into the single currency and afterwards they will become optimal. Willett et al. (2010) found evidence in support of endogeneity for the euro but warned on the danger of currency union formation by countries that are far from meeting the OCA criteria ex-ante on the hope of meeting them ex-post. Krugman (1993) who opposed the endogeneity argument also argued that monetary union costs may rise faster than benefits as economic integration proceeds on the grounds of the time it will take for a region to become an OCA ex-post.

The nature of the formation and the long term existence of the CFA franc zone in Africa with low inflation record appear to provide support for the endogeneity argument. Whether this is the case it is however argued that the CFA countries constitute a puzzle from the standpoint of the OCA analysis (Couharde et al., 2013). Couharde et al. (2013) investigate the issue of sustainability rather than optimality of currency unions using the CFA zone countries and non CFA countries in Africa. Their analysis supports the view that the CFA zone is sustainable as real exchange rates tend to revert to their equilibrium paths, while in other SSA countries this adjustment process is mainly driven by movements in nominal exchange rates. However despite the low inflation rates and stable exchange rates of CFA zone relative to its non CFA African counterpart it is argued that there are costs associated with this. Devarajan and Rodrik (1991) on the trade-offs in the choice between fixed and flexible exchange rate system using SSA

sample accept the low inflation advantage of CFA countries over non CFA but their results suggest that fixed exchange rates, on the whole, is a bad bargain for the CFA member countries. Their results indicate that under output-inflation trade-offs, the output costs of maintaining a fixed exchange rate have outweighed the benefits of lower inflation. This finding is consistent with that made by Amin (2000). He investigated on the factors that have affected growth in the CFA franc countries relative to the non-CFA countries. He found the institutional rigidity (see box 5.1) imposed by the monetary and exchange rate arrangements to be the most important factor. He argued that the rigidities tended to negatively affect other aspects of the economies of the franc zone such as long-term growth prospects, poverty reduction or eradication and others.

Perhaps we can understand the puzzle of the CFA franc zone not by dismissing the OCA criteria but by looking at the constraints imposed by France, its monitoring involvement and the invisible helping hand that it provides to these countries (see box 5.1). Unless similar arrangements exist in the proposed ECOWAS currency union in order to enforce compliance by members and the economic structure of the ECOWAS countries change there is little prospects for these countries to meet the OCA criteria ex-post. If ECOWAS proposed currency is to be freely floated, then option 3 in section 2.5.2 should only be adopted after testing the sustainability of the CFA franc zone by delinking it from France/euro for a certain period of time as failing to do so could be a potential policy mistake.

Box 5.1 Monetary and exchange rates arrangements between France and the CFA zone countries

The core principles of monetary cooperation between France and the African countries of the franc zone signed in 1973 include:

1. Unlimited convertibility guarantee from the French Treasury
2. Fixed parity with the anchor currency (currently the euro)
3. free transfers within the area, in principle
4. Pooling foreign exchange reserves at two levels
    I. the states pool their reserves in each of the two central banks and
    II. in return for the unlimited convertibility guaranteed by France the union central banks are obliged to deposit a proportion of their foreign exchange reserves (currently 50%, a reduction from 65%) with the French Treasury, on the operational account held for each central bank.

In addition France imposed strict macroeconomic criteria that countries should satisfy at all times (see WAEMU column in appendix A.3). Countries not meeting one of the criteria must define a programme of corrective measures in consultation with the WAEMU Commission. Failing to comply may lead to any of the following sanctions as provided in the treaty:

1. A press release published by the Council
2. Removal of positive measures from which a member country may have been benefiting
3. Recommendation to the West African Development Bank (BOAD) to review its interventions in its favour
4. Suspension of WAEMU assistance

Source: Bank of France communication directorate (July 2010) "The franc zone" Fact Sheet no 127

Chapter 6 Application of the gravity model to Intra-ECOWAS Trade

6.1 Introduction

In this chapter we apply the gravity equation of international trade to estimate the impact of currency union and exchange rate volatility on ECOWAS intra-regional trade using panel data methodology. Since the seminal paper of Rose (2000a) the issue of currency union on trade has attracted the attention of researchers. Most of these studies are based on global samples with a large number of heterogeneous countries. Those with specific regional focus are mostly on developed countries. This study focuses specifically on the 15 West African Countries for the period 1980-2012. We augment the gravity model with a number of variables identified in the literature as determinants of trade and provide estimates for the full period of our sample. We estimate our model in triple index and double index forms before and after taking into consideration the effects of business cycle and globalisation and dynamic effect of trade over time. We also controlled for cross sectional dependence (CSD) using Driscoll and Kraay (1998). The findings from the analysis are summarised in section 6.8. These findings are robust even with different exchange rate volatility measures.

The rest of the chapter is organised as follows: the next section discusses the methodology covering the gravity model and its theoretical development, model selection and data description, endogeneity and the treatment of zero trade. These sections are then followed by the econometric estimates and analysis of the results. Section 6.7 presents the results and analysis that account for CSD.

6.2 Research Methodology

6.2.1 The gravity model and its theoretical development

The undisputable consensus in the literature is that the gravity model is one of the most successful empirical frameworks in international economics (Anderson, 1979; Anderson and Wincoop, 2003; Cheng and Wall, 2004; Micco et al., 2003; Rose, 2000a). In their survey on the empirics of international trade, Leamer and Levinsohn (1995) commended the gravity model as having provided some of the clearest and most robust empirical findings in economics. It is used in wide areas of inter-regional and international flows including labour migration, commuting customers, hospital patients and international trade. The model's development dates back to Poyhonen (1963),

Tinbergen (1962) and explains the flow of international trade between a pair of countries as being proportional to their economic mass (national income) and inversely proportional to the distance between them. It is analogy drawn from Newton's gravitational attraction between two bodies that the gravitational force (F_{ij}) between two objects i and j is directly related to the masses of the objects (M_i and M_j) and inversely proportional to the distance between them (D_{ij}), expressed in mathematical terms it is:

$$F_{ij} = \frac{M_i M_j}{D_{ij}} \qquad 6.1a$$

Translating 6.1a in the gravity model of international trade as defined above and taking log the model becomes:

$$lnY_{ij=}\ ln\left(\frac{GDP_i GDP_j}{D_{ij}}\right) \qquad 6.1b$$

$$lnY_{ij} = lnGDP_i + lnGDP_j - lnD_{ij} \qquad 6.1c$$

Y_{ij} is trade flow (exports or imports) from country i to country j, GDP_i and GDP_j is gross domestic product of countries i and j, D_{ij} is economic distance between i and j.

The concept behind the basic gravity model in 6.1c is that the larger the size of the countries i and j, as measured by their GDPs, the more trade between them and the farther apart they are, as measured by the distance between them, the less trade is between them. In other words in the context of international trade flows, the gravity model states that the size of the trade flows between two countries is determined by supply conditions at the origin, demand conditions at the destination and stimulating or restraining forces related to the trade flows between the two countries (Serlenga and Shin, 2007).

Equation 6.1c can be expressed, for empirical work, as follows:

$$lnY_{ij} = \beta_0 + \beta_1 lnGDP_i + \beta_2 lnGDP_j + \beta_3 lnD_{ij} + \mu_{ij} \qquad 6.1d$$

The celebrated success of the gravity model is not without short comings. The early criticism of the model is that it lacks a theoretical foundation (Anderson and Wincoop, 2003; Bergstrand, 1985). The implications are that the estimation results are biased due to omitted variables and also we cannot carry out a comparative statics exercise even though that is the general purpose of estimating the gravity equation. For instance if a third country, say k, enters into a bilateral trade agreement with country i, it will change

the trade costs between i and k due to lower tariffs. Basic economic theory suggests that such an agreement may affects the trade of country j, though not a party to the agreement (Shepherd, 2013) and this may be due to the effects of trade creation and trade diversion. The gravity model failed to account for these effects as is shown from equation 6.1d, $\frac{\partial lnY_{ij}}{\partial lnD_{ik}}$=0. This implies a reduction in trade costs on one bilateral route has no effect on trade on the other routes in the basic gravity model which is not consistent with standard economic theory. In another example of the theoretical failure of the gravity model Shepherd (2013) considered the case of an equal decrease in trade costs, say a fall in oil price, across all trade routes including both domestic and international trade. According to the basic gravity model this will lead to a proportional increases in trade across all bilateral routes, including domestic trade even though relative prices have not changed. With constant relative prices one would expect that consumption patterns will remain constant for a given level of total production (GDP). The bilateral trade prediction of the gravity equation in this case is also in conflict with economic theory.

6.2.2 The theoretical foundation of the gravity model

The limitations of the gravity model outlined in the above criticisms led researchers to turn to theory to provide a basis for the gravity model of trade. According to Micco et al. (2003), the prediction of the gravity equation is derived from models of trade with increasing returns to scale (IRS), and product differentiation, such as that in Helpman (1987) and Helpman and Krugman (1985). However earlier theoretical foundation of the model dates back to Linnemann (1966), Anderson (1979) and subsequently to Anderson and Wincoop (2003). In addition to adding more variables to the model Linnmann (1966) moved further to a theoretical justification based on a Walrasian general equilibrium system. However the Walrasian model is criticised as having too many explanatory variables for each trade flow to be easily reduced to the gravity equation. Anderson (1979) assumed Cobb-Douglas preferences combined with constant-elasticity of substitution (CES) to provide a theoretical explanation of the gravity equation. He also made the Armington assumption that products were differentiated by country of origin. Similarly CES preferences was also applied by Bergstrand (1985) over Armington differentiated goods to derive a reduced form equation for bilateral trade involving price indexes. A subsequent extension of the

theoretical foundation of the gravity equation by Bergstrand (1989), Bergstrand (1990), Deardorff (1998) retained the CES preference structure but added monopolistic competition or Hecksher-Ohlin structure to explain specialisation. Anderson and Wincoop (2003) manipulated the CES and introduced trade resistance into the model. They derived a model that decomposes trade resistance into three components: (i) the bilateral trade barrier between region i and region j, (ii) i's resistance to trade with all regions, and (iii) j's resistance to trade with all regions. These developments led to the designed and augmentation of the gravity model in a variety of was as discussed in the next section.

6.2.3 Panel data and the augmented gravity model

A number of panel estimation techniques such as pooled OLS (POLS), Fixed Effects Model (FEM) and Random Effects Model (REM) have been used in the literature. The REM made the assumption that the unobserved individual effects are uncorrelated with all the explanatory variables which in most studies is convincingly rejected. The absence of this assumption in the FEM has made it the most preferred estimation technique as a way of avoiding the potential bias in the results. However, the FEM has the problem of eliminating the time invariant variables such as distance border, language and landlocked/island. To overcome this problem, Cheng and Wall (2004) suggested the use of the OLS to estimate the coefficients of the time invariant variables, that are eliminated in the FEM, although this method itself ignores the potential correlation between the individual specific variables and the (unobserved) individual effects which has the potential to severely bias the results.

The recent practice in the literature is also to include a time specific variable θ_t in the model specification to account for time specific effects which is common to all cross section units. It is included to control for the impact of all the individual invariant determinants of trade such as the effects of globalisation and business cycle. These effects are incorporated by extending the benchmark model to include the fixed time dummies in the panel regression (Egger, 2002; Mátyás, 1997; Serlenga and Shin, 2007; Serlenga and Shin, 2013). Econometricians have proposed different specifications of the gravity model and we devote the rest of this section in discussing these models. First the cross section OLS specification as defined in equation 6.2:

$$Y_{ijt} = \alpha_0 + \theta_t + \beta'_{1t}X_{ijt} + \beta'_{2t}X_{it} + \beta'_{3t}X_{jt} + \beta'_{4t}Z_{ij} + \mu_{ijt} \qquad 6.2$$

For i = 1,…,N, j = 1…, N, i ≠ j, t = 1,…,T, where Y_{ijt} is the dependent variable (defined as the volume of trade from exporting country i to importer country j at time t), X_{ijt} are explanatory variables with variation in all the three dimensions (example exchange rates between the two currencies of the trading partners i and j), X_{it}, X_{jt} are explanatory variables with variation in i or j and t (say, GDP or population), Z_{ij} are explanatory variables that do not vary over time but vary in i and j (example distance, language, border, landlocked/island), and the disturbance term μ_{ijt} is assumed to be iid with zero mean and constant variance across all i, j, t.

In this cross section OLS model α_0 and θ_t cannot be separately identified. This estimation technique fails to account for heterogeneous characteristics related to bilateral trade relationship and as a result it is likely to suffer from heterogeneity bias which is addressed by the panel estimation techniques.

To deal with the heterogeneity bias we turn to the panel estimation techniques which can factor the effect of heterogeneity by including country-pair individual effects. First the pooled panel data OLS estimation model is specified as:

$$Y_{ijt} = \alpha_0 + \beta'_1 X_{ijt} + \beta'_2 X_{it} + \beta'_3 X_{jt} + \beta'_4 Z_{ij} + \mu_{ijt} \qquad 6.3$$

Equation 6.3 is derived from 6.2 by imposing the restriction that β_{jt}= β for all t and j = 1,…4, and θ_t=0. Another restriction imposed on this POLS model is that $\alpha_i = \alpha_j = \theta_t = 0$ for all i, j and t which is the source of its failure to address the heterogeneity problem. As a result although the POLS estimation improved the estimates from that of the cross section estimates it still suffers from the bias resulting from the failure to account for the heterogeneous characteristics of the trading partners.

According to Mátyás (1997) the gravity model based on the POLS as specified in equation 6.3 above is mis-specified. To address this misspecification problem he proposes what he claims to be the proper econometric specification of the gravity model which should be in a form of a three way or triple index model as shown in equation 6.4.

$$Y_{ijt} = \alpha_0 + \alpha_i + \alpha_j + \theta_t + \beta'_1 X_{ijt} + \beta'_2 X_{it} + \beta'_3 X_{jt} + \beta'_4 Z_{ij} + \mu_{ijt} \qquad 6.4$$

The three dimensions in Matyas model include: the time specific effect(θ_t), and the time invariant exports and imports country specific effects$(\alpha_i \; and \; \alpha_j)$, these two effects

are specified as fixed on the assumption that they are unobservable. However, the Mátyás (1997) model in 6.4 is also said to suffer from one problem, its failure to account for the interactive nature of the bilateral trade effects of the trading partners (Egger and Pfaffermayr, 2003). These two authors suggested an extended version of the Matyas 1997 model to include the bilateral trade interaction effect that is lacking in that model and their specification is as shown in equation 6.5:

$$Y_{ijt} = \alpha_0 + \alpha_i + \alpha_j + \theta_t + \alpha_{ij} + \beta'_1 X_{ijt} + \beta'_2 X_{it} + \beta'_3 X_{jt} + \beta'_4 Z_{ij} + \mu_{ijt} \qquad 6.5$$

Generally, in these type of models the bilateral trade effects of the trading partners account for the time invariant historical, geographical, political, cultural and other bilateral influences which may affect the partner's propensity to trade differently from the normal trading relation. Controlling for these unobserved influences by including bilateral interaction effects in econometric model estimation helps to solve the potential problem of biasness resulting from misspecification.

In addressing the same problem of heterogeneity bias Cheng and Wall (2004) proposed a fixed effects model of the form**:**

$$Y_{ijt} = \alpha_0 + \alpha_{ij} + \theta_t + \beta'_1 X_{ijt} + \beta'_2 X_{it} + \beta'_3 X_{jt} + \beta'_4 Z_{ij} + \mu_{ijt} \qquad 6.6$$

In this triple index version of the gravity model the dependent variable is the logarithm of real exports of one country to the other country. It is argued in the literature that, in practice, the variables that are responsible for the heterogeneity bias are not known which makes them difficult to observe and measure. This led to the fixed effects been described as the result of ignorance. The solution to this problem suggested by Cheng and Wall (2004) is to include a dummy variable for each pair of trading countries which may be correlated with both the bilateral trade and the other regressors. Unlike the Matyas model in 6.4, the Cheng and Wall model allows the country-pair effects to differ accordingly with the direction of trade (i.e. $\alpha_{ij} \neq \alpha_{ji}$) making 6.4 a special case of 6.6. The cross-country restrictions imposed on the country-pair effect in 6.4 is $\alpha_{ij} = \alpha_i + \alpha_j$.

Cheng and Wall consider other forms of model specification (e.g. symmetric fixed effect and difference fixed effect models) and after subjecting them to a series of tests concluded that the FEM 6.6 is the most robust econometric specification of the gravity model of international trade (Serlenga and Shin, 2007). The problem with the FEM of

eliminating the time invariant variables and the solution in the literature including Cheng and Wall suggestion are already discussed above.

It is also common in the literature to specify the gravity model in a double index form rather than the triple index expressed in equation 6.6 above. This form of the model is specified as:

$$Y_{ct} = \alpha_c + \theta_t + \beta' X_{ct} + \gamma' Z_c + \varepsilon_{ct}, \text{ i = 1,…, N, t = 1,…,N,} \quad 6.7$$

The index c represents each country-pair ij such that $\alpha_c = \alpha_{ij} = \alpha_i + \alpha_j$

In this double index model, the variables in X_{ct} , unlike the triple index model, are defined as a combination of features of the countries in each trading pair relationship i.e. the explanatory variables are expressed as a combination of characteristics of the trading partners. This method is used by Egger (2004), Glick and Rose (2002). The dependent variable is the logarithm of real total trade (exports + imports). X_{ct} includes both those variables that vary in all the three dimensions (X_{ijt}) and those that vary only with one partner of trade and time ($X_{it}\ and\ X_{jt}$), Z_c (equivalent to Z_{ij}) includes all the time invariant variables such as distance, common language, common border and land locked and/or island dummies.

6.2.3.1 Fixed effects model (FEM) v Random effects model (REM)

FEM and REM are two of the mostly use panel data estimation techniques and several advantages have been presented for the FEM estimator over REM. Firstly it avoids estimation bias that may be caused by misspecification or omitted time-invariant factors that are correlated with the dependent variable and some of the repressors. For example a country would exports different amounts of the same product to two different countries, even if their GDPs are identical and they are equidistant from the exporter. Also a stronger trade relation may exist between UK and US than US and France even though there is no currency union between UK and US. Such a difference may be due to cultural and historical relationship between the trading partners which may not be accounted for in an augmented baseline gravity model as in 6.4. Second the FE method of estimation addresses the possible problem of misspecification caused by the distance variable which is included to proxy the relative costs of trading as distance is known to be a poor measure of such costs (Pakko and Wall, 2001) for a number of reasons (i) the distance between single points within two countries, usually the capital cities, can be a

poor measure of trading distance between people spread across millions of points within the trading countries, (ii) in terms of trading costs, distance across land is not the same as distance across an ocean and (iii) distance across relatively developed countries is not the same as distance across less developed ones. For these reasons the trading costs, as proxied by distance, introduces bias into our estimates due to their misspecification and the fact that these costs may be correlated with the dependent variable and the regressors.

The alternative estimation technique to the FEM is the REM. The approach of the two methods is similar though they have different ways of allowing for different intercept. REM is able to provide estimates for the time invariant variables and hence overcome the FEM which eliminates them out in within estimation transformation. Also it overcomes the problem of loss of degrees of freedom with FEM resulting from the large number of dummies added for the individual units in the sample. The main point of departure is that the REM considers the country pair-specific effects term as a random variable and therefore are treated as part of the error term. Another difference is that unlike the FEM, REM assumes that the country-specific effects are not correlated with the regressors and/or the error term. In other words the regressors are exogenous. This approach would only be appropriate if the sampled cross-sectional units were drawn from a large population. On the null hypothesis of no correlation between the country effects and the regressors, the OLS estimator is unbiased or consistent but inefficient. It is argued in the literature that in practice it is unlikely for the regressors to be uncorrelated with the individual effects which may lead to inconsistent REM estimates. Whilst the superiority of REM over FEM is advocated in the literature in the absence of correlation between country-specific effects and other regressors there is also a justification argument in favour of FEM in addition to its advantages. For instance Egger (2000) justified the use of FEM on the grounds that most of the forces behind the exports effects, both tariff policy measures and exports driving or impeding environmental variables such as taxes, duties, bureaucratic legal requirements, access to transnational infrastructure networks etc are not random rather they are deterministically associated with certain historical, political and other factors. Another argument he put forward in favour of FEM is that it is based on the problem of sample selection. In other words researchers are not interested in estimating trade impact of integration of randomly selected sample of countries but between an ex ante predetermined selection

of countries. Despite these compelling arguments in favour of FE models, the choice between it and the RE models is to be decided based on econometric test. Empirically the choice between the two estimators is made by conducting the Hausman test. Hausman (1978) suggested a general specification test to test the null hypothesis

H_0: $x_{it}\ and\ \alpha_i\ are\ uncorrelated$ against the alternative hypothesis

H_1: $x_{it}\ and\ \alpha_i\ are\ correlated$

Therefore it tests whether the FE and RE estimators are significantly different. The test statistic is defined as:

$$h = \left(\hat{\beta}_{FE} - \hat{\beta}_{RE}\right)' \left\{\widehat{Var}\left(\hat{\beta}_{FE}\right) - \widehat{Var}\left(\hat{\beta}_{RE}\right)\right\}^{-1} \left(\hat{\beta}_{FE} - \hat{\beta}_{RE}\right) \qquad 6.8$$

Where: $\widehat{Var}\left(\hat{\beta}_{FE}\right)\ and\ \widehat{Var}\left(\hat{\beta}_{RE}\right)$ denote the estimates of $Var\left(\hat{\beta}_{FE}\right)\ and\ Var\left(\hat{\beta}_{RE}\right)$.

We base our analysis on the FEM unless the Hausman test fails to reject the null hypothesis in which case we use the REM.

6.3 Model selection and data description

The debate on the specification and estimation of the gravity equation as documented above is endless. Traditionally the approach is to log linearize the model although recent trends in the literature have suggested alternatives. It is widely accepted that the use of OLS to estimate the gravity equation can lead to bias estimates due to the possible correlation between the unobserved (fixed) effects and some of the independent variables which the OLS assumed doesn't exist. The REM also made similar assumption which made it prone to the shortcoming of the OLS. We have discussed how other estimation techniques, such as fixed effect, has attempted to overcome the problem of the OLS and RE estimators by relaxing the assumption of no correlation between the fixed effects and the regressors. Simulations carried out in the recent literature by Silva and Tenreyro (2006), Silva and Tenreyro (2011), Sukanuntathum (2012) have pointed out possible biases that may result from the traditional approach of log-linearising the gravity equation especially in the presence of heteroscedasticity and also the problem of dealing with the zero trade flows. Whilst these simulations have extensively compared the performances of the proposed new estimators and the OLS there is no mentioned of how these new estimators perform relative to the fixed effects models. Although the fixed effect model can be based on the log-linear specification,

unlike the OLS and random effect estimators, it drops the assumption of no correlation between the fixed effects and the regressors and therefore controlled for the unobservable (fixed) effects that is absence in OLS and random effect models. We have already discussed that fixed effect models can give better estimate of our parameters in the presence of unobservable effects. In the absence of simulations confirming the superiority of the new proposed estimators over fixed effect estimator our approach in this thesis is to base our analysis on the latter except a Hausman test fails to reject the hypothesis of the random effect estimator in which case we use the Random effect estimator. For this thesis we apply the Cheng and Wall (2004) gravity model specifications in the triple index form as in equation 6.6 and double index form as in equation 6.7. We augment these models with the same independent variables that are suggested in the literature as the determinants of bilateral trade. In the next section we give a description of these variables and the sources of data used in the estimation then followed by a detailed description of exchange rate volatility.

6.3.1 Sources of data and description of variables

This section explains the sources of the data and how the variables were constructed.

1. Trade

The trade variable used in the gravity literature is defined in different ways, ranging from exports, imports, exports plus imports, average of exports and imports, average of exports plus imports of i and exports and imports of j (Glick and Rose, 2002). The trade (both exports and imports) data for the analysis was downloaded from IMF Direction of trade statistics (IMF DOTs). At the time of collecting the data the IMF DOTs was not yet updated for the 2013 trade data. The trade (exports and imports) data is recorded in terms of US$ for all countries. Exports are recorded on a F.O.B. (free on board) basis and the imports are recorded on a C.I.F (cost including insurance and freight) basis. The nominal exports and imports are converted to real exports and real imports by dividing each by the US exports and imports price index, respectively then multiplied by 100, a practice followed by (Serlenga and Shin, 2007; Serlenga and Shin, 2013). Micco et al. (2003) used the US CPI to deflate nominal exports and imports in their European study. Others used the individual countries GDP deflator to deflate the nominal imports and exports to arrive at the real figures. The US exports and imports price indices for 1980-

2012 were taken from the IMF International Financial Statistics. The real figures are computed as follows:

$$Export_{ijt}^{R} = (\frac{Export_{ijt}^{N}}{Export\ price\ index_{US}}) \times 100$$

$$Import_{ijt}^{R} = (\frac{Import_{ijt}^{N}}{Import\ price\ index_{US}}) \times 100$$

For the triple index model trade is defined as the log of real exports of country i to country j where as for the double index model trade is defined as the log of total trade (exports + imports) i.e. exports of country i to country j and the imports of country i from country j.

The literature in the gravity model gave two reasons for the use of logs in the model. First it makes it possible to estimate the gravity equation in linear form. Secondly it allows the coefficients to be interpreted as elasticities. Some trade figures in the data base for both exports and imports are recorded as zero or missing. The problem with this is that data recorded as missing has a clearer message than those recorded as zero. A zero record may mean no trade at all or figure rounded down or data not available. We control for missing or zero trade as explained in section 6.5. Our sample size of N=15 countries and T= 33 years should have given us 6,930 (15x14x33) observations for the triple index model and 3,465 (15x14)/2x33 for the double index model. Alternative sources such as World Bank and Pen World table report only aggregate trade but not bilateral trade and Comtrade (UN international trade data base) is not free from missing data for the countries in our sample.

2. GDP and population

The real GDP data, GDP per capita and population were downloaded from the Pen World Table 8.0, PWT (Feenstra et al., 2013). The real GDP data reported at current purchasing power parity (PPP) in millions of 2005 US$. Similar data were downloaded from the IFS but too many gaps in the data especially for countries like Liberia, Guinea, and Guinea Bissau. To avoid the further loss of observations already created by the trade missing data the PWT data, with no missing data, was used. The real GDP per capita for each country was then calculated as the real GDP divided by population of each country. The variables are defined as follows:

For the double index model

$GDP = \ln(GDP_{it}) + \ln(GDP_{jt})$.

$POP = \ln(POP_{it}) + \ln(POP_{jt})$

GDP_{it} and POP_{it} are the real GDP and population of country i (the exporter) at time t.

GDP_{jt} and POP_{jt} are the real GDP and population for country j (the importer) at time t. For the triple index model, the model takes on the individual exporter and importer GDP and POP separately as regressors.

3. Exchange rate volatility

The nominal exchange rate data was extracted from the PWT 8.0. The figures were recorded in local currency units per unit of US$ (Direct quotation). To express these exchange rates into a common currency for all the countries and for all the years, the quotation was converted into the number of units of US$ per unit of the local currency (indirect quotation) by taking the reciprocal of the direct quote. The nominal exchange rates (NER) were then converted into real terms (RER) by the formula used in some of the studies:

$$RER_{ijt} = NER_{ijt} \times US\ Export\ price\ index$$

4. Distance:

This variable which is a proxy for international trade cost is, transportation, taken to be the distance between the capital or commercial cities of the trading countries. A common measure cited in the literature is the great circle distance calculated with information from the CIA website (www.cia.gov). However others used a more straightforward distance measure in kilometres between the capital cities. The latter is used in this study. The information was taken from port world website (www.portworld.com). The site measures the distance from port to port which is appropriate since most international trade of goods are transported by sea. However there were three countries without port because they are landlocked (according to the CIA website): Burkina Faso, Mali and Niger.

5. Free Trade Agreement (FTA)

The information for the FTA was taken from the World Trade Organisation (WTO) website (www.wto.org). As we have seen in chapter 2 there are complex sub-regional agreements, trade or otherwise, in ECOWAS. It is too complex and impracticable to

accommodate all of them. For the purpose of this variable ECOWAS customs union, which is part of the economic integration towards the road to monetary union is considered. The customs union was signed and became effective on 24 July 1993 and was registered with the WTO on 6 July 2005. To see the impact of the ECOWAS customs union agreement on trade, the FTA dummy takes the value of 1 for all bilateral trade in ECOWAS from 1993 to 2012 and zero for all bilateral trade before the customs union, 1980-1992.

6. Language (LANG) common border (BOR) and landlocked/Island dummies

The language dummy ($LANG_{ij}$) takes the value of 1 if the trading partners i and j speak the same official language and zero otherwise. There are three official languages in ECOWAS, inherited from colonial time: English, French and Portuguese. The border dummy (BOR_{ij}) takes the value of 1 if the two trading countries i and j share a common border. This is a measure of contiguity of the two countries.

The landlocked and Island dummy ($LALIS_{ij}$) takes the value of 1 if either one or both trading partners i and j are landlocked or an Island and zero otherwise. This dummy variable controls for the trade barriers that may impede on trade as a result of countries been landlocked or Island.

The information on language, border, landlocked and Island is obtained from the CIA world fact book (www.cia.gov). These three variables (language, border, LALIS) and distance are all time constant.

7. Currency union dummy (CU_{ijt}) and Trade diversion dummy (DIV_{ijt})

These two dummies takes into account of the fact that eight of the fifteen countries are already in a monetary union with the CFA as their currency while the others still have their own currencies. The CU dummy takes the value of 1 if both trading partners i and j are in a monetary union and zero otherwise.

Whilst it is argued that currency union can create trade amongst members, it is also said that it can divert trade from non-members to the members of the union. To control for this effect a trade diversion dummy variable (DIV_{ijt}) has been included. The variable takes the value of 1 if either country i or country j (but not both) is in a currency union with another country. The dummy is 0 if both i and j are in a currency union or are both not in a currency union with any other country.

Both CU and DIV dummies takes into consideration of the ins and outs of the CFA. For instance Mali left the CFA in 1962 and re-joined in 1984, Guinea Bissau joined the CFA, for the first time, in 1997. Guinea exits the CFA in 1960, (shortly after independence) and never returns. For the period of study Mali and Guinea Bissau are partly in a monetary union and partly in a non-monetary union. Guinea is a non-monetary union all through the study period.

8. Similarity Index (SIM)

This variable measures the degree of similarity in terms of relative size of the two trading partners in GDP terms. The index is bounded between zero (absolute divergence in size) and 0.5 (equal country size) i.e. $0 \leq SIM \leq 0.5$ (Serlenga and Shin, 2007). The similarity index is calculated as:

$$SIM_{ijt} = ln\left[1 - \left(\frac{GDP_{it}^{R}}{GDP_{it}^{R}+GDP_{jt}^{R}}\right)^{2} - \left(\frac{GDP_{jt}^{R}}{GDP_{jt}^{R}+GDP_{it}^{R}}\right)^{2}\right] \qquad 6.9$$

Where SIM_{ijt} is the similarity of country i and country j at time t.

9. Relative factor endowment (RLF_{ijt})

$$RLF_{ijt} = \ln\left|PGDP_{jt}^{R} - PGDP_{it}^{R}\right| \qquad 6.10$$

Where $PGDP_{jt}^{R}$ and $PGDP_{it}^{R}$ are real per capita GDP of country j and i at time t respectively and $|.|$ means absolute value

RLF takes a minimum value of 0 (equality in relative factor endowments) and also implies intra-industry trade. The higher the RLF means large difference in relative factor endowments and may also imply inter-industry trade.

6.3.2 Measures of exchange rate volatility (ERV)

Various measures of ERV exist in the literature and there is no consensus on the most appropriate method. Before discussing these measures we should first look at relevant related empirical issues. The first issue, already mentioned previously in this chapter is the decision to use nominal or real exchange rate. According to Clark et al. (2004) the choice between the two depends partly on the time dimension of the decision under consideration. In the short run the exchange rate exposure of firms is determined by the nominal exchange rate. This is explained by the fact that in the short run costs of production are known and imports and exports prices have been determined. On the

other hand production costs, imports and exports prices in foreign currency will vary in the longer term, in which case the authors reasoned that real exchange rate measure is appropriate due to the fact that international transactions spread over a longer period of time. Although, on theoretical grounds, real exchange rate is preferred to the nominal one, the authors mentioned that the two rates tend to move closely together, given the stickiness of domestic prices and for this reason the choice between them is unlikely to have any significant effect on the measure of volatility or the estimation results. Whilst their base line analysis was based on real exchange rate Clark et al also used nominal exchange rate as a robustness check. A number of other studies used the nominal exchange rate as a measure of volatility Medhora (1990), Bailey et al. (1986), Fountas and Aristotelous (1999). Medhora whose study is based entirely on LDCs argued that traders time horizon is relatively short and therefore nominal exchange rate changes is more relevant to them because they move faster and more frequently than prices. For this reason it is the movement in exchange rates that mostly affect trader on a day to day basis.

The second issue is the important question of which currency to use. In answering this question the literature point to the role of currency invoicing on the grounds that most trade between a pair of countries, especially between the developing ones, is not invoiced in the currency of either country. Bilateral transactions between most of these countries are instead invoiced in a major currency such as US dollar or the Euro. This is an important point for ECOWAS where hardly any bilateral transactions take place in local currencies. It may then tend to appear from this decision that the exchange rate volatility of the currencies of the trading partner is not the relevant volatility under consideration. However Clark et al (2004) argued that this is not the case because any fluctuation in exchange rate between the currencies of the two trading partners, holding constant the exchange rate between the currency of one of the two trading partners and the invoicing currency, must reflect the fluctuations in the exchange rate of the other trading partner and the invoicing currency through the demand for exports channel. Concluding this argument the choice of the invoicing currency does not change the impact of exchange rate volatility on trade.

6.3.2.1 Forward rate and spot rate as a measure of ERV

Exchange rate volatility/risk theoretically affects trade, although empirical results on the relationship have been mixed. However the extent to which such volatility is a source of risk, to affect trade, depends on the degree to which exchange rate movements are foreseen. With the existence of financial derivatives use to hedge this risk any foreseen part of the volatility may not affect trade since the risk can be eliminated through hedging. This means that an appropriate measure of exchange rate risk should be related to deviations between actual and predicted exchange rates. The forward rate could be used as a prediction of the future spot rate. Exchange rate volatility is then measured by taking the average absolute difference between the previous period forward rate (f_{t-1}) and the current spot rate (e_t) expressed as:

$$V_t = \frac{1}{n}\sum_{i=1}^{n} |f_{t-1} - e_t| \qquad 6.11$$

The problem with the spot-forward difference is that the forward rate is not a good predictor of future exchange rates and forward quotations are only available for major currencies that are actively traded in foreign exchange markets. This limits its usefulness to countries with well-developed financial markets.

6.3.2.2 Standard deviation and percentage change

The standard deviation of the first difference of logarithm of the exchange rate is the measure of exchange rate volatility which is most widely used in the literature (Caporale and Doroodian, 1994; Clark et al., 2004). The standard deviation measure can be expressed in level or percentage change of the exchange rate. A property of this measure is that it is likely to be zero if the exchange rate follows a constant trend and also it gives a larger weight to extreme observations. The standard deviation measure has been criticised for the skewed distribution of the exchange rate and also the exchange rate seems to be characterised by volatility clustering, meaning that successive price changes do not seem to be independent (Côté, 1994). In other words large changes tend to be followed by large changes and small changes are followed by small changes. The standard deviation measure is expressed as

$$V = \sqrt{\frac{1}{n-1}\left(\sum_{i=1}^{n}(\Delta e - \overline{\Delta e})^2\right)} \qquad 6.12$$

Where n = the number of sub-periods within the period under investigation, e is the logarithm of bilateral exchange rate change.

Bailey et al. (1986), and other studies used the absolute value of the quarter-to-quarter (or month-to-month) percentage change in the nominal effective exchange rate as a measure of volatility on the basis that they are interested in the volatility and not on the rise and fall of exchange rate. This measure is defined as:

$$V_{i,t} = \left| \frac{(E_{i,t} - E_{i,t-1})}{E_{i,t-1}} \right| \qquad 6.13$$

Where: $V_{i,t}$ is the absolute value of the percentage change in the nominal trade-weighted exchange rate, E, of country i.

6.3.2.3 Moving standard deviation

Another method is to use the percentage difference between the maximum and the minimum of the nominal spot rate over the t years preceding the observation, plus a measure of exchange rate misalignment. This measure stresses the importance of medium to long term volatility. It is defined as:

$$V_t = \frac{\max X_{t-k}^{t} - \min_{t-k}^{t}}{\min X_{t-k}^{t}} + \left(1 + \frac{|X_t - X_t^p|}{X_p}\right)^2 \qquad 6.14$$

Where: X_t is the nominal exchange rate at time t, $MaxX_{t-k}^{t}\ and\ MinX_{t-k}^{t}$ refer to maximum and minimum values of the nominal exchange rate over a given time interval of size k up to time t, and X_t^p is the equilibrium exchange rate.

As we have seen in this section there are as many measures of exchange rate variability as there are disagreements on which one is the most appropriate. Medhora (1990) argued in his case that the standard deviation of the spot rates is the most appropriate measure. In the case of LDCs Medhora ruled out deviation from trend as a measure of exchange rate uncertainty because it assumes that the trend is predictable thus leaving only the misfits as the true measure of uncertainty and as such it is inappropriate to attribute this foresight to a trader in a small LDC whose concern is on a day to day, week to week or month to month basis. He further argued that the standard deviation method is informationally less demanding, than the trend method, for these types of traders since the mean of a group of observations is easier to compute than the trend. Medhora also ruled out the difference between the previous forward rate and current

spot rate on the grounds of non-availability of derivatives market in his sample countries and the invoicing on a currency other than the CFA franc[7]. In this thesis we follow Medhora and other studies by using the standard deviation as our main exchange rate volatility measure and then use other measures to conduct a sensitivity analysis as a robustness check of our results. Therefore we define exchange rate volatility between countries i and j at time t, as the standard deviation of the first difference of the annual natural logarithm of the real exchange rate in the five years preceding period t (RERV1). This means for the 2012 exchange rate, the standard deviation of the first difference of the logarithm of the exchange rate of the trading partners from 2007-2011.

6.4 The treatment of Endogeneity

Most studies in the literature found currency union to have a positive impact on trade but the unsettled question is how large is the effect. The empirical studies on currency union makes the assumption that currency unions are randomly chosen (Alesina et al., 2003). This assumption can be challenged by standard endogeneity problem. The fact that currency union may encourage trade, and the potential for substantial trade may also stimulate the formation of a currency union may not be captured in the empirical estimation. Such simultaneity is said to have an upward bias effect on the OLS estimates. It is argued that countries with extensive trade relation may deliberately lower their exchange rate volatility in order to increase trade flows between them (Rose, 2000a). To achieve this countries can foster integration, through lowering regulatory barriers, harmonizing standards of production, and so on (Tenreyro, 2007). In other words exchange rate volatility should be bad for trade but more trade should reduce exchange rate volatility (ERV) (Rose, 2000a:29). Based on this, Rose argued that the sign of this simultaneity bias is indeterminate and therefore there is no reason why the ERV coefficient should be biased in one particular direction. Rose cited some examples from his sample that supports the irrelevancy of the reverse causality argument. His first example is that trade does not appear to have any role for two of the countries that joined the CFA franc zone during his sample period and second the decision by Ireland to abandon its sterling peg as its reorientation from the UK towards Europe was also not trade motivated. Overall he argued that even the countries that left the currency unions

[7] For a summary of the different exchange rate volatility measures see McKenzie (1999), Bahmani-Oskooee et al (2007)

before his sample period were motivated by political considerations rather than economic. With this trade irrelevancy argument Rose concluded that the issue of reverse causality should not affect OLS estimate of the currency union coefficients. Some empirical works address this problem by the use of country-pair effects as a first step although usually not considered to be adequate to resolve it completely and some resort to the use of instrumental variables. However, the choice of good and appropriate instruments for the estimation leaves a great degree of subjectivity. Rose used, as instrumental variables, the product of the two relevant inflation rates; their sum; and the absolute value of the difference between the two inflation rates. After instrumenting for ERV Rose's significant results of the positive and negative effects of currency union and ERV respectively remained unchanged. Alesina et al. (2003) used as instrument, a dummy variable that indicates whether two countries share a common base country or the probability that two countries share a common base. They found a strong positive effect of currency union on trade. In a similar study Frankel and Wei (1993a) used standard deviation of relative money supplies as instrument for ERV and found a negative and significant effect of ERV on trade although the size of the effect is smaller with IV than when using OLS. Using the two trading countries' average distance from all the countries in the gold standard as instrument, Estevadeordal et al. (2003) found that the bilateral trade estimates, of countries in the gold standard, with OLS are robust. They considered membership in the gold standard to be more likely to be endogenous than exchange rate regime choice in today's modern era. Despite the usefulness of IV to correct for endogeneity the literature acknowledged the difficulty of obtaining proper instruments that are really exogeneous which should also make us less worried about reverse causation (Estevadeordal et al., 2003). Barr et al cited in Micco et al. (2003) use correlation of cycles as an instrument for currency union on the basis that the OCA literature suggests that there should be a close association between currency unions and cycle correlations among country pairs. This instrument was considered not ideal due to the endogeneous literature which states that cycle correlation is also strongly associated to trade intensity. Despite this critique the estimates from the use of this instrument yield positive and statistically significant currency union effect on trade and much lower than the Rose's estimate. The similarity of the Barr et al estimates to that of Micco et al. (2003) is argued to give some support to their instrument.

The choice of an appropriate instrument is difficult and one strand of the literature suggests the use of instruments outside the model under consideration (Larcker and Rusticus, 2010) because, if they can be identified, they help to solve the identification problem. The problem with this approach is that outside instruments are difficult to find and as such most researchers prefer to use internal instruments since they are more readily available and may be free of some of the criticisms affecting outside instruments. With outside instruments it is difficult to prove that they are uncorrelated with the error term, and at the same time, contain enough information on those regressors in the model that are not strictly exogenous.

As an alternative to instrumental variable to account for the endogeneity problem Micco et al. (2003) use country-pair dummies although they acknowledged that this approach does not completely eliminates the problem. The country-pair dummies are also use to control for heterogeneity which actually capture the unobservable effects of country-pair effects. They argued that these dummies should also capture any trade effect caused by reverse causality. In particular in their study they observe no substantial increase in trade among EMU countries before joining the monetary union, which they said suggests that the endogeneity problem should be less serious and therefore it is sufficient for country-pair dummies to account for the problem. To make the endogeneity problem less of a concern they also choose a short period (1992-2002).

The above discussion provided us with the platform to make a decision about the relevancy or irrelevancy of reverse causality of currency union on trade in the case of the 15 ECOWAS countries in our sample. First the complexity and uncertainty involved in choosing an appropriate instrument is in itself a potential to introduce noise in our results. Second we saw from Rose's argument, above, against the relevancy of reverse causality where his first example cited was that none of the countries that joined the CFA Franc during his sample period was motivated by trade. Following this argument we looked at our sample very closely to see the ins and outs of the CFA currency union (WAEMU) since its formation. Guinea left the CFA in 1960 due to political fallout with France. In 1962, similar politically related problem led to the exit of the CFA by Mali. Mali rejoined the CFA in 1984 but there is no evidence in the data that this return was trade motivated. Guinea Bissau, one of the least trading countries within ECOWAS, decided to join the CFA in 1997 but there was nothing in the trade figures that indicate

that the reason was because of trade. Above all, the creation of the CFA currency union in 1945 by France and its membership at that time was not because of extensive trade between those countries. In fact most commentators said the CFA is a colonial legacy and if that is the case then one would say that it formation was politically motivated rather than trade. Looking at our sample of countries outside the WAEMU there is no English speaking country in ECOWAS that has ever joined WAEMU on the basis of trade or any other reason. Nigeria- English speaking- shared border with two WAEMU countries (Benin and Niger) and two CEMAC countries (Cameroon and Chad) and despite the trade between Nigeria and these four French speaking countries, Nigeria has never joined either of the two monetary unions. The Gambia (English) is engulfed by Senegal (French) and no reason has ever made the former to join WAEMU. This situation also applies to Ghana. Since its formation in 1945, WAEMU remained a French speaking countries monetary union except for Guinea Bissau (Portuguese) who joined in 1997. These evidences in our sample corresponds to the observations made by Micco et al. (2003) in their EMU sample where they said there was no substantial increase in trade before countries join the EMU just like the CFA case. The lack of trade motivation to join the monetary union in our sample according to Rose and Micco et al suggests that endogeneity problem should be less serious in our study and therefore we consider country-pair dummies to be sufficient to address the problem (see section 6.6.3.4).

6.5 The treatment of Zero trade

For the double index model, where we use total trade (exports + imports), there were 926 values that are either missing or recorded as zero out of a total of 3,465 ((15x14)/2 x 33) observations, representing 26.7% of the sample size. Trade measured as exports or imports has 2,509 and 2,362 missing values respectively out of a total of 6,930 (15x14x33) observations. In Helpman (1987) sample of 24,806 possible bilateral trading relationships there were only 11,146 (44.9%) observations that are positive with 55.1% either missing or zero (they used an exports model).

The zero trade recorded may be due to the levels of trade are too small to be recorded. Most statistics authorities may have a policy of recoding data, trade or otherwise, if they exceed a set threshold. This means it is not always possible to ascertain whether their trade is zero or is merely too small and have been rounded down to zero (Frankel et al.,

1997). The double log specification of the gravity model permits the coefficients to be interpreted as elasticities but at the same time the inability of this model to accommodate zero trade presents a challenge since we cannot take the log of zero.

Different approaches are commonly used in the literature to account for the zeros in the trade variable. The first approach is to ignore the zeros/missing observations. This approach is followed by Baier and Bergstrand (2007), Frankel (1997), Fukao et al. (2003), Wang and Winters (1992). Frankel (1997) justifies the omission of the zero trade flows on the basis that the final results are not very different from their inclusion. Soloaga and Winters (2001) made similar justification on the argument that their results are robust to either the Tobit or the more traditional OLS methods without the zero trade flows. However, the concern with this approach is that it might bias the results since the omitted observations contain information about why such low levels of trade are observed. The second method is to substitute arbitrary small numbers, usually 1, for the zeros. Papers that followed this technique found that the inclusion of the missing values made little substantive difference to the results (Linnemann, 1966). As a robustness check Baier and Bergstrand (2007) substituted 1 for the zeros and estimated the model and they found no difference in the results. However, there were only 1,818 (19.9%) zeros out of 9,120 observations in their sample. The third technique is to use a semi-log specification where the dependent variable, is expressed in levels rather than in logs and then apply Tobit to estimate the model. This method is used by Gauto (2012). Soloaga and Winters (2001) followed this approach. Linders and Henri (2006), however, questioned the appropriateness of the Tobit approach on the grounds that the model would be justified if the censored data reflected negative trade values or if the dependent variables exists but it is unobservable.

A fourth approach which is employed by Eichengreen and Irwin (1995), Boisso and Ferrantino (1997), Chen (2004) is to express the dependent variable as the log of $(1+TRADE_{ij})$. The logic behind this specification is that for large values of trade, $\ln(1+TRADE) \approx \ln(TRADE)$ and the constant elasticity relationship is preserved; for small values, $\ln(1+TRADE) \approx TRADE$, which approximates the semi-log Tobit relationship. In order to include the zeros and avoid the complication caused by taking logs Frankel et al. (1997) used a non-linear specification in multiplicative rather than log-linear. In this model both dependent and independent variables are expressed in

level. The logic of this specification is that when the sizes of the countries are close to or equal to zero the predicted level of bilateral trade will also be close to or equal to zero, exactly as it should be. He then used a log-linear specification to test the sensitivity of the results and they found no difference between the two results.

However, the traditional practice of log linearising the gravity model has received criticism on the basis of Jensen's inequality which implies that $E(\ln Y) \neq \ln E(Y)$. One of the implications of Jensen's inequality is that the normal practice of interpreting the parameters of log-linearised models estimated by ordinary least squares (OLS) as elasticities can be highly misleading in the presence of heteroscedasticity (Silva and Tenreyro, 2006). The two authors argued that the gravity equation should be estimated in their multiplicative form. They proposed a simple Pseudo-maximum-likelihood (PML) estimation technique. They further argued that the PML is not only consistent in the presence of heteroscedasticity but also provides a natural way to deal with the zero values of the dependent variable. In their Monte Carlo simulations, they compared the performance of OLS log-linearised specification and PML estimator and found that in the presence of heteroscedasticity the former is severely biased and hence distorting the interpretation of the model. In their results where the OLS estimator gives large and statistically significant impact, the PML on the contrary yield small and sometimes statistically insignificant effect. The problem of log-linearisation of the gravity equation and the use of OLS in the presence of zero trade and heteroscedasticity is also addressed by Sukanuntathum (2012). The author accept that the Poisson pseudo maximum likelihood (PPML) estimator, proposed by Silva and Tenreyro (2006) gives consistent parameters when heteroscedasticity occurs but it got a problem when there are zero trade flows and the solution to that is to use a two steps estimation method and use Negative binomial pseudo maximum likelihood (NBPML) estimator in the second step. The author argued that in the presence of both heteroscedasticity and zero trade flows the NBPML gives consistent parameter and robust to different forms of heteroscedasticity and greatly deal with zero flows. However, a further simulation by Silva and Tenreyro (2011) confirmed that their proposed PPML is well behaved in a wide range of situations and that the estimator's performance is not affected even with a large number of zeros in the dependent variable.

6.6 Empirical Application to the Intra-ECOWAS Trade

In this section we attempt to provide a comprehensive analysis of the sources of bilateral trade amongst the 15 ECOWAS countries over the 33 year period, 1980-2012 using both triple and double index models of the gravity equation as shown in equations 6.6 and 6.7 respectively. A detailed definition of all the variables and data sources is already given in section 6.3.1. In the next section we discuss the theoretical expectation of the signs of the variables in our model.

6.6.1 A priori expectations of variable signs

The expected signs of the base line gravity equation are already discussed above. Two linked variables, population and per capita GDP have ambiguous effects on trade leading to competing views on the matter. The interpretation of Bergstrand (1989) is that a positive (negative) impact of exporter population is an indication that the exports are labour (capital) intensive in nature. On the other hand a positive (negative) impact of the importer population indicates that the imports tend to be necessity (luxury) in nature. The opposing view, as noted by Baldwin (1994), is that both impacts can be negative since larger countries may sometime be regarded as self-efficient. It should be noted that the exporter and importer population are only shown as separate variables in the triple index model but not in the double index one since in the latter the two populations are shown as a combined characteristics.

In their two industries and two factors model (Bergstrand, 1989:146) states:

> *"If good A is the luxury in consumption, good A is capital intensive in production and good A's elasticity of substitution exceeds unity, the theoretical coefficients for exporter and importer incomes and per capita incomes…are all positively signed. Thus…these are feasible inferences since estimation usually involves trade flows among major industrialised countries. Of course, expected coefficient sign would change as one or more of these assumptions change. Moreover, only in this special case of two industries and two factors can the capital or labour intensity of an industry be inferred."*

The first category of variables we use to augment the basic gravity equation include important variables considered to be determinants of bilateral trade. These includes currency union (CU) membership, exchange rate volatility (ERV), free trade/customs union agreement (FTA), trade diversion (DIV) and time invariant determinants such as common language (LANG), common border (BOR), landlocked and/or island (LALIS). The key variables of interest in this analysis are the currency union (CU) dummy and

the exchange rate volatility variables. The benefits of currency union are already discussed in chapter 4. A quick recap of the main argument is that a currency union will reduce transaction costs of trading with the member countries. On the basis of this argument, the impact of currency union on bilateral trade flows is therefore expected to be positive although the empirical evidence in the literature is mixed. For the trade diversion (DIV) dummy the literature suggests that a significant negative coefficient on this variable would indicate the existence of a potentially harmful trade diversion, and could be interpreted as implying that currency unions boost trade inside the union at the expense of trade with non-members (Rose 2000a:25). Landlocked and/or island countries can experience trading difficulties due to accessibility through transportation. As these features of a countries are constraints to trade it is therefore expected that the variable LALIS should have a negative impact on trade.

The transaction cost argument also applies for the exchange rate volatility and in addition such volatility creates uncertainty for international trade and investment and therefore a disincentive to trade which may have an adverse impact on trade. It is argued that fixing the exchange rate, in our case here, through currency union will be beneficial for bilateral trade flows amongst member countries. To analyse the impact of exchange rate volatility on bilateral trade of ECOWAS we include an ERV variable which is already defined in the data definition (section 6.3.2). For reason already explained the US dollar was used as the foreign currency. In this indirect/European style quotation, an increase in the exchange rate means an appreciation of the exporter's currency and a depreciation of the importer's currency. In this case the importer will buy less since it is expensive to acquire the currency hence resulting to less exports. It is therefore expected that the ERV will have a negative impact on bilateral trade flows. It is worth noting the alternative quotation and its interpretation as failure to recognise the difference might be a source for conflicting findings in the literature. Some empirical studies Bergstrand (1989) used the direct/US style quotation where the exchange rate between the two countries is expressed as the number of units of the home currency (exporter) per unit of the foreign (importer) currency. In this style of quotation a rise in the exchange rate implies a depreciation of the exporter's currency and an appreciation of the importer's currency. This will lead to an increase in imports and a corresponding increase in exports. Therefore a positive impact of ERV will be expected on bilateral trade flows.

The free trade agreement (FTA) dummy, the common border, and common language dummies are all expected to have a positive impact on bilateral trade.

For the second category of variables we follow recent developments in the literature and include other variables measuring both similarity in relative size of trading countries (SIM) and differences in relative factor endowments (RLF) Egger (2002), Helpman (1987), Serlenga and Shin (2007), Serlenga and Shin (2013). What is common in the recent literature is that these two variables (SIM and RLF) have been included primarily to explain trends of intra-industry trade share. For instance Helpman (1987), in his study of imperfect competition and international trade, finds a negative correlation between the intra-industry trade share and RLF but the correlation between the intra-industry trade share and SIM is positive. He interpreted his findings as a supporting evidence of the theory of increasing return to scale (IRS) and imperfect competition in international trade. However, such an unambiguous correlation may not exist in a model involving total trade, which is the sum of intra- and inter-industry trades as commented by Serlenga and Shin (2007). The larger the similarity index means the two trading countries are similar which implies that the share of intra-industry trade is high.

According to Bergstrand (1989) in a typical gravity model, exporter GDP is a proxy on i's national output expressed in terms of units of capital whilst exporter per capita GDP is a proxy of i's capital-labour endowment ratio. On the other hand importer GDP is j's national income and importer per capita GDP is j's per capita income. This provides the basis for the definition of RLF for inclusion in the gravity model. RLF is a measure of the difference in terms of relative factor endowments (as proxied by the per capita GDPs) between the two trading countries and takes a minimum value of 0 (equality in relative factor endowments) and also implies intra-industry trade. The higher the RLF means large difference in relative factor endowments and may also imply high volume of inter-industry (and the total) trade and the lower the share of intra-industry trade (Serlenga and Shin, 2007).

6.6.2 Descriptive statistics and correlation matrix

This section presents the descriptive statistics and the correlation of the variables. Table 6.1 shows the descriptive statistics for the triple and double index models. The total number of observations for the TIM should be 6,930 (15x14x33) as indicated by most of the variables. The exports (trade1) variable only shows 4,421 because 2,509 (36.2%)

of the total is either missing or recorded as zero. The trade variable has a minimum of 1.3346 and maximum of 9.2636. In the DIM the trade variable (trade7) which is log(real exports + real imports) shows a minimum value of 1.2791 and maximum of 9.4206. The total observations for the DIM should be 3,465 ((15x14)/2 x 33). Only 2,539 of the 3,465 observations are greater than zero. 926 (26.7%) of the total observations are all zero/missing trade. The correlation matrix for the triple and double index models are shown in table 6.2. From this table there seems to be less problem with multicollinearity as indicated by the low correlation between most of the explanatory variables with the exception of the GDP and population variables. The correlation of the GDP and population in the double index case is 0.91 while that of the triple index case is 0.906 and 0.911 respectively for GDPi/POPi and GDPj/POPj. The high correlation between GDP and POP in both models could be a potential source for collinearity if both variables are included in the same estimation. For this reason we exclude the population variable from our estimation and this we hope will yield more reliable estimates since the problem of multicollinearity is avoided. Instead we include the GDP per capita (GDPC) variable which has low correlation, less than 0.5 in absolute term in both TIM and DIM, with the GDP. For the LDV we made a choice between first and second lags and selected the one with the higher correlation with trade. The correlation between trade1 and trade1l (first lag) is 0.895 and the correlation between trade1 and tradel2 (second lag) is 0.858. The first lag is selected and included as one of the explanatory variables. Similarly for the DIM model we select the first lag whose correlation with trade7 is 0.927 as compared to 0.924 for correlation between trade7 and trade7l2.

Table 6.1 Descriptive statistics for TIM and DIM

Triple index model						Double index model					
Var	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Var**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
trade1	4421	5.9450	1.355	1.3346	9.2636	trade7	2539	6.3340	1.376	1.2791	9.4206
gdpi	6930	3.7678	0.599	2.4776	5.6537	gdp2	3465	7.5398	0.831	5.1564	10.5737
gdpj	6930	3.7699	0.597	2.4776	5.6537	gdpc2	3465	6.0189	0.320	3.9688	7.1390
gdpci	6930	3.0100	0.231	1.9395	3.6157	pop2	3465	1.5210	0.799	-0.7236	3.6135
gdpcj	6930	3.0094	0.231	1.9395	3.6157	dist	3465	3.0699	0.330	2.0874	3.5339
popi	6930	0.7577	0.577	-0.5228	2.2168	sim	3465	-0.6241	0.356	-2.3459	-0.3010
popj	6930	0.7605	0.575	-0.5228	2.2168	rlf	3465	2.6176	0.498	-0.9358	3.6064
dist	6930	3.0662	0.325	2.0874	3.5339	rerv1	3459	0.0608	0.054	0.0081	0.9076
sim	6930	-0.6252	0.356	-2.3459	-0.3010	cu	3465	0.2141	0.410	0.0000	1.0000
rlf	6930	2.6150	0.502	-0.9358	3.6064	div	3465	0.5307	0.499	0.0000	1.0000
rerv1	6924	0.0616	0.051	0.0081	0.9076	lang	3465	0.3714	0.483	0.0000	1.0000
cu	6930	0.2198	0.414	0.0000	1.0000	fta	3465	0.6061	0.489	0.0000	1.0000
div	6930	0.5309	0.499	0.0000	1.0000	bor	3465	0.2381	0.426	0.0000	1.0000
lang	6930	0.3714	0.483	0.0000	1.0000	lalis	3465	0.4667	0.499	0.0000	1.0000
fta	6930	0.6061	0.489	0.0000	1.0000	trade7l	2451	6.3205	1.373	1.2791	9.3891
bor	6930	0.2381	0.426	0.0000	1.0000						
lalis	6930	0.4714	0.499	0.0000	1.0000						
trade1l	4266	5.9329	1.352	1.3346	9.2636						

Notes: Var is variable, Trade1 is log(real exports) of i to j., Trade7 is log(real exports + real imports), trade1l is first lag of trade1, trade7l is first lag of trade7

Source: Results from STATA

In both the triple and double index models, language appears to have a moderately high correlation with currency union, 0.600 for TIM and 0.542 for DIM. The correlation between currency union and trade diversion dummy is also -0.648 and -0.598 for TIM and DIM respectively. Other correlations that are in the middle range in both TIM and DIM are GDP and GDPC (<|0.5|) in both cases, distance and border, language and trade diversion are both slightly higher than 0.5 in absolute term. All the correlations shown in table 6.2, apart from population and GDP already mentioned don't appear to pose any serious problem of multicollinearity as they are below even |0.7|. The high positive correlation between language and currency union may be an early indication of the fact that seven of the eight currency union member countries in ECOWAS are of the same language, French speaking. Early indication from the correlation matrix for both the triple and double index models suggest that there is a weak relationship between intra-ECOWAS trade and the explanatory variables.

Table 6.2 Correlation matrix for TIM and DIM

Triple index model correlation matrix																		
	trade1	gdpi	gdpj	gdpci	gdpcj	popi	popj	dist	sim	rlf	rerv1	cu	div	lang	fta	bor	lalis	trade1l
trade1	1.000																	
gdpi	**0.453**	1.000																
gdpj	0.202	-0.069	1.000															
gdpci	0.188	**0.413**	-0.094	1.000														
gdpcj	-0.027	-0.077	0.336	-0.043	1.000													
popi	**0.410**	**0.906**	-0.032	-0.012	-0.065	1.000												
popj	0.226	-0.039	**0.911**	-0.081	-0.082	-0.005	1.000											
dist	-0.193	0.067	0.064	-0.010	0.040	0.078	0.050	1.000										
sim	0.027	-0.013	-0.096	0.022	-0.041	-0.025	-0.084	-0.071	1.000									
rlf	0.056	0.090	0.051	0.037	0.097	0.082	0.012	0.068	-0.209	1.000								
rerv1	-0.049	0.040	-0.070	-0.094	-0.058	0.088	-0.048	-0.022	0.022	0.041	1.000							
cu	0.205	-0.010	-0.017	0.005	-0.068	-0.014	0.012	0.083	0.347	-0.114	-0.042	1.000						
div	-0.023	0.109	0.082	0.058	0.045	0.093	0.068	-0.083	-0.110	0.059	-0.005	**-0.648**	1.000					
lang	0.113	-0.035	0.022	-0.044	-0.068	-0.018	0.053	0.193	0.294	-0.138	0.005	**0.600**	**-0.618**	1.000				
fta	0.030	0.090	0.086	-0.059	-0.036	0.127	0.106	0.085	-0.031	0.001	-0.030	-0.020	0.077	-0.069	1.000			
bor	0.248	-0.017	-0.005	-0.043	-0.084	0.002	0.031	-0.541	0.149	-0.094	0.034	0.145	-0.009	0.084	-0.071	1.000		
lalis	-0.036	0.043	-0.026	-0.166	-0.152	0.124	0.039	0.180	0.236	0.011	-0.028	0.375	-0.123	0.229	0.008	0.163	1.000	
trade1l	**0.895**	**0.447**	0.197	0.187	-0.026	**0.404**	0.219	-0.192	0.021	0.059	-0.044	0.202	-0.030	0.113	0.016	0.248	-0.033	1.000

	Double index model correlation matrix														
	trade7	gdp2	gdpc2	pop2	dist	sim	rlf	rerv1	cu	div	lang	fta	bor	lalis	trade7l
trade7	1.000														
gdp2	**0.563**	1.000													
gdpc2	0.115	0.288	1.000												
pop2	**0.531**	**0.907**	-0.143	1.000											
dist	-0.264	0.031	0.075	-0.001	1.000										
sim	0.034	-0.116	-0.061	-0.093	-0.154	1.000									
rlf	0.023	0.076	0.114	0.028	0.057	-0.212	1.000								
rerv1	-0.065	-0.039	-0.094	0.001	-0.058	0.064	-0.007	1.000							
cu	0.263	0.026	-0.049	0.049	0.030	0.318	-0.096	-0.041	1.000						
div	-0.022	0.095	0.074	0.066	-0.027	-0.091	0.033	-0.001	**-0.598**	1.000					
lang	0.136	0.021	-0.100	0.066	0.120	0.271	-0.111	0.050	**0.542**	**-0.605**	1.000				
fta	0.006	0.086	-0.075	0.121	0.081	-0.037	0.000	-0.038	-0.003	0.052	-0.067	1.000			
bor	0.325	0.022	-0.106	0.069	**-0.579**	0.166	-0.086	0.046	0.154	-0.029	0.101	-0.070	1.000		
lalis	-0.076	-0.031	-0.187	0.051	0.196	0.179	0.026	-0.068	0.310	-0.081	0.156	-0.006	0.126	1.000	
trade7l	**0.927**	**0.557**	0.116	**0.524**	-0.263	0.029	0.025	-0.058	0.262	-0.028	0.140	0.000	0.326	-0.078	1.000

Source: Results from STATA

For instance our key variables of interest, CU and exchange rate volatility, has a correlation with trade respectively of 0.205 and -0.049 for the triple index model and 0.263 and -0.065 for the double index model. What is important to note is that the key explanatory variables of the gravity model, GDP and distance, both have the correct signs positive and negative respectively in both the triple and double index cases of the model. The correlation statistics in both models appear to suggest that there is a greater supply force than demand in the intra-ECOWAS trade. This supply driven trade is supported by the higher correlation, in the triple index model, between trade and exporter's GDP (GDPi) of 0.453 and lower correlation between trade and the importer's GDP (GDPj) of 0.202. The former correlation is twice that of the latter. This correlation pattern is the similar for trade and population of the exporter (0.410) and trade and

population of the importer (0.226). However, since correlation is not causation we should only take these statistics as an eye opener and move on to the econometric analysis of the results.

6.6.3 Econometric estimation results

In this section we present and discuss the econometric results of alternative estimation procedures applied to estimate the triple index model (equation 6.6) and the double index model (equation 6.7). We divide the analysis into different sections. In section 6.6.3.1 we run the regressions for the full sample period (1980-2012) for different trade measures using both the triple and double index models. In section 6.6.3.2 we carry out a sensitivity analysis using the same two trade measures (trade 1 and 7) with three different exchange rate volatility measures as a robustness check of our results. Section 6.6.3.3 incorporates country pair dummies to account for endogeneity. Finally section 6.6.3.4 addresses the problem of cross sectional dependence. In each of the regressions in the four sections we used Pooled OLS and FE estimators. We also included separate estimations where the lag of the dependent variable (tradel) is included as one of the regressors. This accounts not only for the dynamic effects of trade over time but also for any possible autocorrelation in the data. Each of these estimations are made with and without time dummies so we can control for the effects of the business cycle and globalisation.

We use six different trade measures, four for TIM and two for DIM. Trade1 is defined as log(real exports), Trade2 is log(real imports). Most empirical work use either of these two but our approach here is to have a deeper interrogation of the ECOWAS data especially with a large number of missing values. Approaching our analysis from exports and imports perspectives gives stronger assurance of our results and how resilience they are under different situations. Trade3 is log(1+real exports) and trade4 is log(1+real imports). These two trade variables account for the zeros in our dependent variable (trade) following the practice in the literature as discussed in section 6.5. Trade7 and Trade8 are used to estimate the double index model where the former is defined as log(real exports + real imports) and the latter is log(1+real exports + real imports). Just as in TIM we use trade8 to account for the zero trade in the DIM.

6.6.3.1 Econometric estimation results for the full sample period

The estimation results for the full period are shown on tables **6**.3-6.6 for TIM and 6.7 and 6.8 for DIM. First we consider the exports model with and without controlling for zero trade values. From table 6.3 the exporter GDP effect is shown to have a positive and significant effect on trade by the OLS both before and after time dummies. The FE indicates that the exporter's GDP has a positive but not significant effect before time dummies while the effect is shown to be negative but not significant after time dummies. The effect of the exporter's GDP is all positive and significant in table 6.4. This result suggests that the exporter's GDP plays a significant role in ECOWAS intra-regional exports. However, the effect is less important after taking into consideration the effect of heterogeneity as shown by the FE estimator.

The importer's GDP in both tables 6.3 and 6.4 is shown to have a similar effect as that of the exporter's. The GDP per capita variable for exporter and importer in both tables 6.3 and 6.4 is shown to have a negative impact on ECOWAS trade although the effect is more significant in table 6.4 than 6.3.

Coming to our main variable of interest the currency union effect on ECOWAS intra-regional exports is shown to have a positive and significant effect by the OLS estimator but negative and significant by the FE even with the lagged dependent variable (LDV). This difference has implication for the effect of heterogeneity in countries bilateral trade. From table 6.3 the OLS in column 1 shows that the trade elasticity of currency union is 0.83 (0.20 with LDV). This means that countries in a currency union trade 129% $\left[\left(exp^{\beta}-1\right)\times 100\right]$ more than those not in a currency union. With LDV the trade effect of CU reduces to only 22%.

After controlling for the effects of business cycle and globalisation using time dummies, the OLS estimate of CU effect on exports trade remains almost the same. With FE estimator that accounts for heterogeneity the currency union trade elasticity in column 4 of table 6.3 is -0.69. This means that countries in a currency union trade 50% less than countries that are not in the union. After introducing time dummies, the currency union effect on trade remains statistically significant and the economic significant is almost the same. With LDV in column 5 the trade reducing effect of CU is 82% (β=-0.20). After controlling for the sample selection bias that may be caused by the omission of the zero trade our findings for the effect of CU on intra-ECOWAS exports trade, from table

6.4 is no different from the results in table 6.3. Both before and after time dummies the OLS shows a positive and statistically significant while the FE estimator show a negative and significant impact before time dummies and LDV but the effect after is negative but not significant. The OLS estimator from table 6.4 shows a CU elasticity of 1.81 (0.45 after LDV) before time dummies. According to the OLS, exports trade for countries in CU will increase by 511% as compared to those countries not in the union. With LDV the effect is 57% as compared to 22% before truncation. The difference between the CU impacts reported in table 6.3 and that in table 6.4 may imply that the omission of the zero trade reduces the CU effect on trade due to the sample selection bias.

Table 6.3 Regression results for real exports (TIM)- 1980-2012

VAR	(1) OLS	(2) OLS_1	(3) OLS_1t	(4) FE	(5) FE_1	(6) FE_1t
gdpi	1.11***	0.23***	0.22***	0.40	0.41	-0.52
	(0.03)	(0.03)	(0.03)	(0.78)	(0.43)	(0.81)
gdpj	0.59***	0.12***	0.11***	2.68***	1.33***	0.42
	(0.03)	(0.02)	(0.02)	(0.72)	(0.39)	(0.57)
gdpci	-0.11	-0.05	-0.04	-0.07	-0.28	0.66
	(0.08)	(0.05)	(0.05)	(0.81)	(0.44)	(0.82)
gdpcj	-0.43***	-0.09**	-0.09*	-2.50***	-1.25***	-0.34
	(0.07)	(0.05)	(0.05)	(0.76)	(0.41)	(0.59)
dist	-0.67***	-0.12***	-0.13***			
	(0.06)	(0.04)	(0.04)			
cu	0.83***	0.20***	0.19***	-0.69***	-0.20*	-0.23*
	(0.05)	(0.03)	(0.03)	(0.19)	(0.12)	(0.12)
rerv1	-1.66***	-0.43**	-0.27	-0.59	-0.42*	-0.22
	(0.25)	(0.19)	(0.22)	(0.37)	(0.23)	(0.21)
sim	-0.19***	-0.02	-0.02	0.05	0.06	0.10
	(0.06)	(0.03)	(0.03)	(0.12)	(0.07)	(0.08)
rlf	0.18***	0.03	0.04*	0.06	0.05*	0.06**
	(0.03)	(0.02)	(0.02)	(0.04)	(0.03)	(0.03)
div	0.27***	0.09***	0.09***	-0.25	0.01	-0.01
	(0.05)	(0.03)	(0.03)	(0.16)	(0.09)	(0.09)
lang	0.26***	0.05*	0.05*			
	(0.05)	(0.03)	(0.03)			
fta	-0.05	0.02	0.12	-0.12*	-0.08**	0.16
	(0.03)	(0.02)	(0.07)	(0.07)	(0.04)	(0.19)
bor	0.44***	0.07***	0.07***			
	(0.04)	(0.02)	(0.02)			
lalis	-0.46***	-0.11***	-0.11***			
	(0.04)	(0.03)	(0.03)			
trade1l		0.81***	0.82***		0.53***	0.53***
		(0.01)	(0.01)		(0.03)	(0.03)
Con	2.05***	0.39*	0.25	2.01***	0.67**	2.04**
	(0.35)	(0.22)	(0.23)	(0.62)	(0.30)	(0.84)
No of obs	4,417	3,991	3,991	4,417	3,991	3,991
R-sq	0.43	0.81	0.81	0.16	0.43	0.44
Ad R-sq	0.425	0.810	0.812			
F-test	227.1	922.6	354.9			
No of ind				198	185	185
Rho				0.856	0.690	0.701

Notes: In this table the dependent variable is the logarithm of real exports (Trade1). OLS stands for the pooled OLS estimator, _1 means first lag of trade1 included, _1t means first lag and time dummies included, FE is fixed effects estimator, VAR means variables, R-sq is R-squared, Ad R-squared is adjusted R-squared, No of ind is no of individuals, Robust standard errors in parentheses, '*' '**' '***' denote coefficient significant at the 10%, 5%, and 1% levels of significance respectively, Hausman test statistics rejects the null hypothesis of no correlation between explanatory variables and unobserved individual effects in all cases considered.

Table 6.4 Regression results for truncated real exports (TIM)-1980-2012

VAR	(1) OLS	(2) OLS_1	(3) OLS_1t	(4) FE	(5) FE_1	(6) FE_1t
gdpi	1.67***	0.46***	0.46***	3.49**	1.36**	2.18**
	(0.05)	(0.04)	(0.04)	(1.37)	(0.68)	(1.02)
gdpj	1.37***	0.33***	0.34***	1.25	0.67	1.47
	(0.05)	(0.04)	(0.04)	(1.33)	(0.63)	(1.09)
gdpci	-0.82***	-0.18**	-0.15**	-4.61***	-1.83***	-2.64**
	(0.12)	(0.08)	(0.08)	(1.43)	(0.70)	(1.05)
gdpcj	-0.26**	-0.02	0.01	-0.82	-0.49	-1.28
	(0.13)	(0.08)	(0.08)	(1.38)	(0.66)	(1.12)
dist	-1.64***	-0.37***	-0.37***			
	(0.10)	(0.07)	(0.07)			
cu	1.81***	0.45***	0.45***	-0.53*	-0.13	-0.05
	(0.09)	(0.06)	(0.06)	(0.31)	(0.17)	(0.18)
rerv1	-4.20***	-1.05**	-1.16**	-0.95	-0.40	-0.12
	(0.58)	(0.43)	(0.52)	(0.72)	(0.52)	(0.55)
sim	0.16	-0.01	-0.01	0.58	0.01	0.02
	(0.10)	(0.06)	(0.06)	(0.37)	(0.18)	(0.18)
rlf	0.39***	0.10***	0.10***	-0.10	-0.02	-0.01
	(0.05)	(0.03)	(0.03)	(0.09)	(0.05)	(0.05)
div	0.30***	0.10*	0.10*	-0.53**	-0.17	-0.11
	(0.08)	(0.05)	(0.05)	(0.25)	(0.14)	(0.14)
lang	0.67***	0.15***	0.14**			
	(0.08)	(0.06)	(0.06)			
fta	0.41***	0.08**	-0.05	0.25**	0.12**	-0.59
	(0.06)	(0.04)	(0.14)	(0.10)	(0.05)	(0.64)
bor	1.02***	0.26***	0.25***			
	(0.08)	(0.05)	(0.05)			
lalis	-1.04***	-0.29***	-0.28***			
	(0.06)	(0.04)	(0.04)			
trade3l		0.76***	0.76***		0.55***	0.55***
		(0.01)	(0.01)		(0.02)	(0.02)
Con	-0.83	-0.66*	-0.83**	3.23**	1.20*	0.21
	(0.62)	(0.36)	(0.38)	(1.38)	(0.66)	(1.16)
No of obs	6,924	6,715	6,715	6,924	6,715	6,715
R-sq	0.49	0.79	0.80	0.14	0.41	0.42
Ad R-sq	0.493	0.793	0.796			
F-test	759.5	2640	989.2			
No of ind				210	210	210
Rho				0.666	0.355	0.457

Notes: In this table the dependent variable is the log(1+ real exports)- Trade3. All other definitions are as in table 6.3

However, whilst controlling of zero trade by the truncation method (with an arbitrary 1 added) may have increased the impact of CU on trade, it is also possible that the results shown by the OLS in table 6.4 may be an overestimation. Before time dummies the FE

in column 4 of table 6.4 indicates a CU elasticity of -0.53, meaning that CU reduces trade by 41% as compared to none union members. In other words countries sharing a common currency trade 59% less than when they have their separate currencies. After LDV the CU effect on trade as shown in column 5 (-0.13) is still negative but no longer significant. While there is a high difference between the OLS estimates of CU effect on trade before and after truncation in tables 6.3 and 6.4 the FE estimates are very similar in both cases (50% before and 59% after). What is common in these FE estimators before and after truncation is that CU effect on trade is negative.

As already discussed, the literature suggests that a significant negative trade diversion dummy means that CU boosts trade for members and harmful for trade with non-members. In tables 6.3 and 6.4 all OLS estimators are positive and significant both before and after time dummies suggesting that the ECOWAS currency union (WAEMU) does not divert trade from non-members to boost trade for members. For FE estimator in table 6.3 the DIV coefficient is negative but not significant. After controlling for zero trade on table 6.4 the FE shows a negative and significant trade diversion effect but after LDV the effect is no longer significant.

Turning to our second variable of interest we see from table 6.3 that exchange rate volatility effect on ECOWAS exports has mixed effects. From table 6.4 all OLS estimates show RERV to have a significant negative effect on trade before and after time dummies while FE shows negative but not significant impact both before and after. We now consider the political and cultural variables. From both tables 6.3 and 6.4 the sharing of a common language has a significant effect on trade both before and after time dummies. Interesting results for the FTA dummy. Generally we expect free trade agreement or customs union to have a positive effect on trade. In the ECOWAS case table 6.3 and 6.4 the effects are mixed. The border dummy is consistently positive and significant, before and after time dummies, in all the estimators both in table 6.3 and 6.4. This means that sharing a common border increases trade in ECOWAS. It is also overwhelming in tables 6.3 and 6.4 that landlocked/Island dummy is negative and significant both before and after time dummies. Even with LDV the results remained unchanged. This implies that countries that share no land border with others (Island) and or have no access to the sea (landlocked) experience a decline in trade. The effects

of border and landlocked/Island shown in our results are consistent with the theoretical expectations.

The coefficients of SIM and RLF in tables 6.3 and 6.4 appear to be ambiguous when interpreted within the framework of Helpman (1987).

The second estimation is the imports model and the results before and after controlling for the zero trade are reported in tables 6.5 and 6.6 respectively. In both tables distance is negative and significant both before and after time dummies. Like the exports model above, all OLS estimators in tables 6.5 and 6.6 estimated the CU to have a positive and significant impact on ECOWAS imports trade both before and after time dummies although the effect is much smaller with LDV. Before controlling for zero imports trades in table 6.5 the OLS CU coefficient in column 1 is 0.55 (0.13 with LDV). This means that currency union increases imports trade by 73% (14% with LDV) for members. The FE estimators shows CU to have a negative but not significant impact on imports both before and after time dummies and LDV as shown in columns 4-6 of table 6.5. The FE coefficients are -0.12 (11% less trade) and -0.03 (3% less reduction) before and after LDV respectively but the figures are not significant.

After controlling for zero imports trade in table 6.6 the OLS estimates are much larger 1.44 and 0.36 before and after LDV respectively. This means countries in CU union trade 322% more than those that are not in the monetary union. The trade effect of currency union, however, shrinks to 43% after the LDV. The size of the imports trade here, after truncation, is similar to that of the exports model though much less. The fixed effect predicts a negative and significant CU effect on imports (-0.57) before LDV but negative and insignificant effect (-0.18) after LDV. This implies before LDV countries in currency union trade 43% less than those that are not in the currency union. This figure fell to 16% when we include the LDV. Based on the FE it is reasonable to conclude that the CU effect on imports is negative but not significant. The trade diversion dummy is positive in both estimators in table 6.5 but only significant in the OLS cases. This means there is no evidence of trade diversion as a result of the currency union. After truncation in table 6.6 the same variable is shown to be positive significant by the OLS estimators and negative significant by the fixed effects estimators. Similar to the exports model the results for the trade diversion effects in the imports model are mixed. The results for the RERV in tables 6.5 and 6.6 are mixed.

Table 6.5 Regression results for real imports (TIM) -1980-2012

VAR	(1) OLS	(2) OLS_1	(3) OLS_1t	(4) FE	(5) FE_1	(6) FE_1t
gdpi	0.57***	0.10***	0.10***	0.74	0.59*	0.04
	(0.03)	(0.02)	(0.02)	(0.65)	(0.35)	(0.54)
gdpj	1.22***	0.23***	0.22***	2.32***	1.13***	0.55
	(0.03)	(0.02)	(0.02)	(0.69)	(0.39)	(0.67)
gdpci	-0.61***	-0.13***	-0.13***	-0.49	-0.52	0.01
	(0.07)	(0.05)	(0.05)	(0.70)	(0.37)	(0.56)
gdpcj	-0.03	0.01	0.01	-2.08***	-0.99**	-0.42
	(0.08)	(0.05)	(0.05)	(0.70)	(0.40)	(0.68)
dist	-0.65***	-0.10***	-0.11***			
	(0.05)	(0.03)	(0.03)			
cu	0.55***	0.13***	0.13***	-0.12	-0.03	-0.02
	(0.05)	(0.03)	(0.03)	(0.17)	(0.10)	(0.09)
rerv1	-1.59***	-0.34*	-0.04	-1.09***	-0.55***	-0.22
	(0.38)	(0.20)	(0.22)	(0.41)	(0.20)	(0.23)
sim	-0.22***	-0.02	-0.02	-0.03	0.00	0.03
	(0.06)	(0.03)	(0.03)	(0.13)	(0.07)	(0.08)
rlf	0.06*	0.02	0.02	0.01	0.02	0.03
	(0.03)	(0.02)	(0.02)	(0.04)	(0.02)	(0.02)
div	0.20***	0.06**	0.07**	0.03	0.09	0.08
	(0.05)	(0.03)	(0.03)	(0.13)	(0.08)	(0.07)
lang	0.27***	0.03	0.04			
	(0.05)	(0.03)	(0.03)			
fta	-0.07**	0.01	0.01	-0.20***	-0.10**	0.01
	(0.03)	(0.02)	(0.07)	(0.06)	(0.04)	(0.15)
bor	0.45***	0.08***	0.08***			
	(0.04)	(0.02)	(0.02)			
lalis	-0.44***	-0.08***	-0.08***			
	(0.04)	(0.02)	(0.02)			
trade2l		0.82***	0.82***		0.52***	0.51***
		(0.01)	(0.01)		(0.03)	(0.03)
Con	2.33***	0.38*	0.39*	1.91***	0.74**	1.72**
	(0.35)	(0.20)	(0.22)	(0.61)	(0.31)	(0.74)
No of obs	4,561	4,109	4,109	4,561	4,109	4,109
R-sq	0.44	0.81	0.81	0.15	0.41	0.42
Ad R-sq	0.434	0.809	0.812			
F-test	250.5	1011	370.7			
No of ind				202	191	191
Rho				0.784	0.582	0.531

Notes: In this table the dependent variable is the logarithm of real imports (Trade2). All other definitions are as in table 6.3

Table 6.6 Regression results for truncated real imports (TIM) -1980-2012

	(1)	(2)	(3)	(4)	(5)	(6)
VAR	OLS	OLS_1	OLS_1t	FE	FE_1	FE_1t
gdpi	1.35***	0.36***	0.38***	1.11	0.87	3.22***
	(0.05)	(0.04)	(0.04)	(1.32)	(0.66)	(1.14)
gdpj	1.76***	0.43***	0.44***	2.94**	0.66	3.03***
	(0.05)	(0.04)	(0.04)	(1.39)	(0.73)	(1.14)
gdpci	-0.40***	-0.03	-0.02	-0.71	-0.56	-2.94**
	(0.13)	(0.08)	(0.08)	(1.38)	(0.70)	(1.17)
gdpcj	-0.38***	-0.05	-0.03	-3.61**	-0.96	-3.35***
	(0.12)	(0.08)	(0.08)	(1.44)	(0.76)	(1.19)
dist	-1.60***	-0.38***	-0.38***			
	(0.10)	(0.07)	(0.07)			
cu	1.44***	0.36***	0.37***	-0.57**	-0.18	0.04
	(0.09)	(0.06)	(0.06)	(0.28)	(0.16)	(0.17)
rerv1	-3.72***	-0.61	-0.89	-2.05***	-0.71	-0.78
	(0.63)	(0.65)	(0.78)	(0.71)	(0.47)	(0.54)
sim	0.15	-0.01	-0.01	0.72**	0.11	0.10
	(0.10)	(0.06)	(0.06)	(0.36)	(0.19)	(0.19)
rlf	0.38***	0.10***	0.10***	-0.05	0.01	0.04
	(0.05)	(0.03)	(0.03)	(0.10)	(0.05)	(0.06)
div	0.19**	0.09	0.09	-0.68***	-0.25*	-0.11
	(0.08)	(0.05)	(0.05)	(0.24)	(0.14)	(0.14)
lang	0.62***	0.15***	0.14**			
	(0.08)	(0.06)	(0.06)			
fta	0.39***	0.07	-0.62***	0.33***	0.19***	-1.13***
	(0.06)	(0.04)	(0.16)	(0.11)	(0.06)	(0.31)
bor	0.92***	0.24***	0.23***			
	(0.08)	(0.05)	(0.05)			
lalis	-1.03***	-0.28***	-0.28***			
	(0.06)	(0.04)	(0.04)			
trade4l		0.76***	0.76***		0.53***	0.53***
		(0.01)	(0.01)		(0.03)	(0.02)
Con	-1.81***	-0.94**	-0.54	2.61*	0.80	-1.46
	(0.64)	(0.39)	(0.40)	(1.43)	(0.73)	(1.22)
No of obs	6,924	6,715	6,715	6,924	6,715	6,715
R-sq	0.47	0.78	0.78	0.13	0.38	0.39
Ad R-sq	0.470	0.779	0.783			
F-test	652.2	2337	881			
No of ind				210	210	210
Rho				0.631	0.349	0.685

Notes: In this table the dependent variable is the log(1+ real imports)- Trade4. All other definitions are as in table 6.3

Finally we estimate equation 6.7 (DIM) where we define our dependent/trade variable as log(total trade) i.e. real exports + real imports. First we estimate the model without controlling for the zero trade where the dependent variable is log(real exports + real imports) and the results are shown on table 6.7. We then truncate our trade variable to

account for the zero trade by estimating the model with a dependent variable of log(1 + real exports + real imports) and we report the results on table 6.8. In both tables 6.7 and 6.8 the base line gravity equation variables have the correct signs: The GDP is positive significant and distance is negative and significant both before and after time dummies. After controlling for zero trade, sharing a common language (LANG) and common border (BOR) both have statistically significant impact on ECOWAS total trade both before and after LDV and time dummies. The results are also overwhelming for the landlocked/Island variable, it is negative and significant in all cases in tables 6.7 and 6.8 before and after LDV and time dummies meaning that countries in ECOWAS with no access to the sea and or no access to land experience a decline in trade. The FTA dummy has mixed results. In table 6.7, before truncation, it appears to be negative and significant which means the ECOWAS customs union led to less trade. On the other hand after controlling for the zero trade the FTA variable is positive and significant except that after controlling for time dummies the FE estimate is no longer significant. Perhaps a more reasonable conclusion for FTA is that its effect on ECOWAS trade is less promising than what might be expected from its creation.

The currency union dummy on tables 6.7 and 6.8 is predicted by all OLS estimators to have a positive significant effect on total trade both before and after time dummies although the effect is much higher after controlling for zero trade but before LDV. Before controlling for zero trade in table 6.7 the OLS CU elasticities are 0.99 (0.17 after LDV). This means that currency union increases trade for countries by 169% before and 19% after the inclusion of the LDV. The same coefficients after controlling for zeros in table 6.8 are 1.31 before and 0.31 after TDV for the OLS which equates to a trade increase of about 271% and 36% respectively. With the FE estimator the CU elasticity is positive but not significant (0.07) from table 6.7. After controlling for zero trade on table 6.8 the CU elasticity is negative and significant (-0.67) but with the inclusion of LDV the effect is negative but not significant (-0.23). The trade diversion dummy variable in table 6.7 and 6.8 shows mixed results. The effects of RERV from both tables 6.7 and 6.8 have mixed results.

Table 6.7 Regression results for total trade (DIM)- 1980-2012

VAR	(1) OLS	(2) OLS_1	(3) OLS_1t	(4) FE	(5) FE_1	(6) FE_1t
gdp2	0.92***	0.15***	0.15***	1.64***	0.76***	1.27**
	(0.03)	(0.02)	(0.02)	(0.17)	(0.12)	(0.57)
gdpc2	-0.16**	-0.04	-0.03	-1.54***	-0.71***	-1.27**
	(0.07)	(0.03)	(0.03)	(0.20)	(0.12)	(0.58)
dist	-0.66***	-0.10**	-0.10**			
	(0.07)	(0.04)	(0.04)			
cu	0.99***	0.17***	0.17***	0.07	0.07	0.08
	(0.06)	(0.03)	(0.03)	(0.17)	(0.09)	(0.09)
rerv1	-1.53***	-0.40	-0.29	-0.30	-0.31*	-0.15
	(0.37)	(0.39)	(0.50)	(0.29)	(0.18)	(0.22)
sim	-0.15**	-0.00	-0.00	0.16	0.08	0.10
	(0.07)	(0.03)	(0.03)	(0.16)	(0.08)	(0.09)
rlf	0.12***	0.02	0.02	-0.05	-0.01	-0.01
	(0.04)	(0.02)	(0.02)	(0.05)	(0.03)	(0.03)
div	0.44***	0.08**	0.08**	0.06	0.08	0.07
	(0.06)	(0.04)	(0.04)	(0.17)	(0.07)	(0.07)
lang	0.28***	0.02	0.02			
	(0.06)	(0.03)	(0.03)			
fta	-0.06	-0.00	0.00	-0.17**	-0.07*	-0.50
	(0.04)	(0.02)	(0.10)	(0.07)	(0.04)	(0.40)
bor	0.57***	0.08***	0.08***			
	(0.05)	(0.02)	(0.02)			
lalis	-0.48***	-0.07**	-0.07**			
	(0.05)	(0.03)	(0.03)			
trade7l		0.84***	0.84***		0.55***	0.54***
		(0.02)	(0.02)		(0.05)	(0.05)
Con	1.28***	0.27	0.23	3.24***	1.34***	1.11
	(0.42)	(0.22)	(0.24)	(0.86)	(0.37)	(0.90)
No of obs	2,533	2,333	2,333	2,533	2,333	2,333
R-sq	0.53	0.87	0.87	0.21	0.49	0.51
Ad R-sq	0.528	0.866	0.868			
F-test	228.4	754.4	283.8			
No of ind				103	99	99
Rho				0.818	0.609	0.763

Notes: In this table the dependent variable is the Log(real exports + real imports)- Trade7. All other definitions are as in table 6.3

Table 6.8 Regression results for truncated real total trade (DIM)- 1980-2012

VAR	(1) OLS	(2) OLS_1	(3) OLS_1t	(4) FE	(5) FE_1	(6) FE_1t
gdp2	1.61***	0.37***	0.37***	2.62***	1.06***	2.35**
	(0.05)	(0.04)	(0.04)	(0.41)	(0.20)	(1.12)
gdpc2	-0.32**	-0.01	0.01	-2.68***	-1.05***	-2.37**
	(0.13)	(0.08)	(0.08)	(0.54)	(0.26)	(1.16)
dist	-1.12***	-0.22***	-0.22***			
	(0.14)	(0.08)	(0.08)			
cu	1.31***	0.31***	0.32***	-0.67*	-0.23	-0.12
	(0.11)	(0.07)	(0.07)	(0.36)	(0.18)	(0.18)
rerv1	-2.82***	0.01	0.10	-0.39	0.45	0.71
	(0.76)	(0.72)	(0.82)	(0.84)	(0.58)	(0.60)
sim	-0.03	-0.10	-0.10	0.55	-0.03	-0.02
	(0.12)	(0.09)	(0.08)	(0.47)	(0.24)	(0.25)
rlf	0.42***	0.09**	0.09**	0.03	0.03	0.05
	(0.08)	(0.05)	(0.05)	(0.13)	(0.06)	(0.06)
div	0.06	0.04	0.05	-0.81**	-0.30*	-0.22
	(0.10)	(0.07)	(0.07)	(0.32)	(0.17)	(0.17)
lang	0.96***	0.24***	0.23***			
	(0.11)	(0.07)	(0.07)			
fta	0.71***	0.14***	-0.43**	0.47***	0.23***	-1.21
	(0.08)	(0.05)	(0.19)	(0.14)	(0.07)	(0.86)
bor	1.20***	0.31***	0.30***			
	(0.10)	(0.06)	(0.06)			
lalis	-1.13***	-0.31***	-0.30***			
	(0.08)	(0.06)	(0.06)			
trade8l		0.77***	0.77***		0.54***	0.55***
		(0.02)	(0.02)		(0.04)	(0.04)
Con	-3.98***	-1.47***	-1.14**	1.62	0.45	-0.61
	(0.87)	(0.53)	(0.54)	(1.83)	(0.86)	(1.46)
No of obs	3,459	3,355	3,355	3,459	3,355	3,355
R-sq	0.54	0.82	0.82	0.21	0.45	0.47
Ad R-sq	0.533	0.817	0.821			
F-test	478.2	1332	486.1			
No of ind				105	105	105
Rho				0.647	0.365	0.581

Notes: In this table the dependent variable is Log(1 + real exports + real imports) – Trade8. All other definitions are as in table 6.3

6.6.3.2 Econometric estimation results for sensitivity analysis

This section repeats the estimation of equations 6.6 (TIM) and 6.7 (DIM) substituting the real exchange rate volatility measure (RERV1) used in the main analysis with alternative exchange rate volatility measures. The aim is to provide a robustness check as to whether a change in exchange rate volatility measure affects our findings. For this purpose we use the following three alternative volatility measures:

1. the standard deviation of the first difference of the annual natural logarithm of the real exchange rate during year t (i.e. t-4 through t, rather than from t-5 through t-1). We define this volatility measure as RERV2,
2. the absolute value of the percentage change of the log of real exchange rate of the current year (t) and the preceding year (t-1), defined as RERV3, and
3. the standard deviation of the first difference of the annual natural logarithm of the nominal exchange rate in the five years preceding period t, defined as RERV4.

We use each of these three measures of volatility to estimate equation 6.6 using log(real exports) as our dependent variable for the full sample period only so that we can use the results of table 6.3 as our bench mark. We do the same for equation 6.7 with log(real exports + real imports) as dependent variable with table 6.7 as the bench mark for comparison. The estimation results for equation 6.6 for the three volatility measures are shown in appendices A.19-A.21. In terms of the basic gravity equation variables, GDP and distance, all the estimations in the three tables are consistent with table 6.3. Common language and common border are all positive and significant in all three tables and landlocked/Island is consistently negative and significant both before and after time dummies and LDV just as the case in table 6.3. Most importantly our key variable of interest, CU, have results in the three tables very similar to those in table 6.3. All OLS estimators estimate the CU coefficient as positive significant both before and after time dummies with very similar size to the bench mark. Like table 6.3, the FE estimates in appendices A.19-A.21 for the currency union dummy are all negative significant both before and after LDV and time dummies with the size of the coefficients close to each other. Just like the results of table 6.3 the size of the CU coefficient, in appendices A.19-A.21, is significantly reduced when we included the LDV as an explanatory variable. For the RERV variable there is no significant departure from the bench mark results in all three appendices.

Our finding from this perturbation is that irrespective of the exchange rate volatility measure that we use, including even nominal exchange rate volatility, the finding from our main results are unaltered.

We repeat the same perturbation with the three alternative volatility measures and use the full sample period to estimate equation 6.7 using as dependent variable log(real exports + real imports). The estimation results for the three measures, RERV2, RERV3 and RERV4 are shown in appendices A.22, A.23 and A.24 respectively. GDP, GDPC and distance carry similar sign to the results in table 6.7. Common border has positive and significant impact on total trade in all the three appendices same way as in table 6.7 while the effect of landlocked/Island is negative and significant. The impact of common language on trade in appendices A.22-A.24 is no different from that in table 6.7. The OLS CU estimates are all positive and significant while the fixed effects are all positive but not significant in all the three appendices both before and after time dummies and LDV which are similar to the results of table 6.7. The RERV is also consistently estimated, by the FE estimator, to be negative but not significant before and after time dummies and LDV. The double index estimates like the triple index case are consistent to the main estimates in table 6.7 which suggest that our results are insensitive to the exchange rate volatility measures.

6.6.3.3 Endogeneity and country-pair effects

In section 6.4 we discussed the problem of endogenity and how it is addressed in the literature. In that section we presented a detailed argument on the relevancy/irrelevancy of reverse causality of currency union especially that made by Rose (2000a). The difficulty of getting appropriate instruments to control for endogeneity in different studies was also discussed in the section. We believe that an attempt to search for valid instrument(s) for ECOWAS countries where data availability for empirical work is always a concern may compound the estimation problems. Similar to Rose (2000a) and Micco et al. (2003) we argued in section 6.4 that any impact of endogeneity should not be of a serious concern for ECOWAS countries. However, we conduct a Granger causality test and the results are shown on the first two columns of appendices A.25, for TIM, and A.26 for DIM. In column 1 we regressed trade1 (log real exports) on currency union and other trade determinants and in column 2 we regressed the currency union dummy on the lag of trade1 and other trade determinants. In both cases the null

hypothesis of no reverse causality is rejected. Following Micco et al. (2003), we addressed the problem by using the OLS estimator with country pair dummies included as part of the regressors. The regression estimates are reported in columns 5 and 6 of appendices A.25 and A.26 of TIM and DIM respectively. In addition to country-pair dummies, time dummies are also included in the estimates of column 6 (OLS_1CPT). We presented the FE and OLS estimates alongside the estimation in appendices A.25 and A.26 for comparison. The results from these two appendices are no different from the results of our main analysis as shown in tables 6.3 and 6.7. In columns 5 and 6 of appendix A.25 the CU coefficient is not only negative but identical to the FE estimates in columns 5 and 6 of tables 6.3.

The results in appendix A.26 are also consistent with our main results in table 6.7. With the FE estimator we found the impact of currency union on total trade to have a positive but not significant effect and real exchange rate volatility negative but not significant as shown in columns 5 and 6 of appendix A.26. There are no differences in both the signs and magnitude of the coefficients in columns 5 and 6 with those in column 4 (the fixed effects).

However the results in appendices A.25 and A.26 deviate from the inverse relationship between trade and distance as stated in the general theory of gravity model. The distance coefficient is positive and significant in columns 5 and 6 of both appendices except column 6 of A.25 where it is not significant. Such phenomenon may not occur if the ECOWAS countries are included in a global sample study. We found in this study and previous studies that ECOWAS countries are heavily dependent on primary produce especially agriculture. The positive distance in our estimation may be associated with the explanation provided by (Wu, 2015). In this paper Wu disaggregated total distance coefficient into three: Agricultural distance coefficient, manufacture distance coefficient and service distance coefficient. (S)he found the three distance coefficients to be positive not significant, negative significant and negative not significant respectively. The author argued that when science and technology are not well developed (which is the case for ECOWAS) and transportation methods limited to land and sea the role of distance (a proxy for transportation cost) is less since the marginal cost per distance is low. In such a case they argued that the difference in climate, which governs the type of agricultural product, is probably the most important

factor such that the closer the countries the more are likely to be affected by similar climatic conditions and therefore the more likely to produce similar or same product which may not create any absolute or comparative advantage. The further apart the countries the more they can produce different agricultural product and more likely to trade between them. Adding to this we also argue that Nigeria is a big market for ECOWAS due to its size and as a result countries may not resist trading with Nigeria on distance grounds.

6.7 Cross sectional dependence (CSD)

We examined our models for cross sectional dependence using a number of tests proposed by Pesaran (2004), Friedman (1937), Frees (1995). In all these tests the null hypothesis of cross sectional independence is rejected. The method that is use in the literature to control for CSD for both balanced and unbalanced panels with large time dimension (i.e. $T\rightarrow \infty$) is the one proposed by Driscoll and Kraay (1998). The Driscoll and Kraay (DK) non-parametric estimator is said to produce heteroscedasticity- and autocorrelation- consistent standard errors that are robust to general forms of spatial and temporal dependence (Hoechle, 2007). The DK standard errors for coefficients can be estimated by pooled OLS and weighted least squares or fixed-effects (within) regression. We estimated the DK robust standard errors for the full sample period using both pooled OLS and FE estimators for all our six trade measures and the results for four of them are reported on tables 6.9-6.12. Tables 6.9 and 6.10 show the results using equation 6.6 (TIM) for log(real exports), Trade1, and log(1+ real exports), trade 3 respectively. The estimation results from equation 6.7 (DIM) for log of total trade (trade7) and the truncated total trade (trade8) are shown on tables 6.11 and 6.12 respectively. The OLS consistently estimates the CU to have a positive and significant effect on ECOWAS bilateral trade irrespective of the trade measure and the model used for the estimation. After controlling for CSD the results from table 6.9 shows CU to have a negative and significant effect on ECOWAS trade but the effect becomes negative not significant after controlling for zero trade as shown on table 6.10. The effect of CU on ECOWAS total trade is positive not significant before (table 6.11) but negative and significant after controlling for zero trade (table 6.12).

Table 6.9 Regression results for log real exports (TIM)-1980-2012

VAR	(1) OLS_DK	(2) OLS_DKl	(3) FE_t	(4) FE_DK	(5) FE_DKl
gdpi	1.11***	0.23***	-0.15	0.40	0.41
	(0.10)	(0.03)	(0.55)	(0.53)	(0.41)
gdpj	0.59***	0.12***	1.89***	2.68***	1.33***
	(0.02)	(0.01)	(0.51)	(0.65)	(0.36)
gdpci	-0.11	-0.05	0.37	-0.07	-0.28
	(0.17)	(0.03)	(0.56)	(0.59)	(0.44)
gdpcj	-0.43***	-0.09**	-1.83***	-2.50***	-1.25***
	(0.08)	(0.03)	(0.52)	(0.71)	(0.39)
dist	-0.67***	-0.12***		0.67***	0.22*
	(0.08)	(0.02)		(0.16)	(0.12)
cu	0.83***	0.20***	-0.65***	-0.69***	-0.20**
	(0.08)	(0.05)	(0.10)	(0.16)	(0.09)
rerv1	-1.66***	-0.43**	-0.16	-0.59	-0.42**
	(0.35)	(0.16)	(0.25)	(0.39)	(0.20)
sim	-0.19***	-0.02	0.09	0.05	0.06
	(0.07)	(0.03)	(0.07)	(0.12)	(0.05)
rlf	0.18***	0.03*	0.07**	0.06**	0.05**
	(0.04)	(0.02)	(0.03)	(0.02)	(0.02)
div	0.27***	0.09**	-0.26***	-0.25**	0.01
	(0.08)	(0.04)	(0.08)	(0.10)	(0.07)
lang	0.26***	0.05*		0.00	0.00
	(0.08)	(0.02)		(0.00)	(0.00)
fta	-0.05	0.02	-0.31**	-0.12	-0.08
	(0.08)	(0.04)	(0.16)	(0.11)	(0.05)
bor	0.44***	0.07***		0.00	0.00
	(0.05)	(0.02)		(0.00)	(0.00)
lalis	-0.46***	-0.11***		0.00	0.00
	(0.04)	(0.03)		(0.00)	(0.00)
trade1l		0.81***			0.53***
		(0.02)			(0.04)
Constant	2.05***	0.39**	3.96***	0.00	0.00
	(0.48)	(0.16)	(0.61)	(0.00)	(0.00)
Observations	4,417	3,991	4,417	4,417	3,991
R-squared	0.43	0.81	0.19		
No of groups	198	185		198	185
No of ind			198		

Notes: In this table the dependent variable is Log real exports- Trade1. OLS_DK is pooled OLS with Driscoll and Kraay robust standard errors, _DKl means Driscoll Kraay robust standard errors with LDV included. All other definitions are as in table 6.3.

Table 6.10 Regression results for truncated real exports (TIM)-1980-2012

VAR	(1) OLS_DK	(2) OLS_DKl	(3) FE_t	(4) FE_DK	(5) FE_DKl
gdpi	1.67***	0.46***	5.38***	3.49***	1.36**
	(0.14)	(0.08)	(0.83)	(1.09)	(0.63)
gdpj	1.37***	0.33***	3.11***	1.25	0.67
	(0.07)	(0.06)	(0.83)	(0.95)	(0.54)
gdpci	-0.82***	-0.18*	-6.56***	-4.61***	-1.83**
	(0.21)	(0.09)	(0.84)	(1.19)	(0.71)
gdpcj	-0.26	-0.02	-2.73***	-0.82	-0.49
	(0.24)	(0.09)	(0.84)	(1.02)	(0.59)
dist	-1.64***	-0.37***		1.05***	0.39
	(0.20)	(0.12)		(0.32)	(0.24)
cu	1.81***	0.45***	-0.33*	-0.53***	-0.13
	(0.16)	(0.10)	(0.18)	(0.18)	(0.14)
rerv1	-4.20***	-1.05	-0.66	-0.95*	-0.40
	(1.19)	(0.73)	(0.46)	(0.48)	(0.43)
sim	0.16	-0.01	0.64***	0.58*	0.01
	(0.34)	(0.11)	(0.13)	(0.29)	(0.09)
rlf	0.39***	0.10***	-0.08*	-0.10	-0.02
	(0.09)	(0.03)	(0.05)	(0.06)	(0.03)
div	0.30**	0.10*	-0.39***	-0.53***	-0.17
	(0.15)	(0.05)	(0.12)	(0.14)	(0.10)
lang	0.67***	0.15***		0.00	0.00
	(0.10)	(0.05)		(0.00)	(0.00)
fta	0.41***	0.08	-0.51**	0.25***	0.12*
	(0.08)	(0.06)	(0.24)	(0.09)	(0.06)
bor	1.02***	0.26***		0.00	0.00
	(0.09)	(0.04)		(0.00)	(0.00)
lalis	-1.04***	-0.29***		0.00	0.00
	(0.14)	(0.03)		(0.00)	(0.00)
trade3l		0.76***			0.55***
		(0.04)			(0.04)
Constant	-0.83	-0.66	1.36	0.00	0.00
	(1.74)	(0.52)	(0.95)	(0.00)	(0.00)
Observations	6,924	6,715	6,924	6,924	6,715
R-squared	0.49	0.79	0.15		
No of groups	210	210		210	210
No of ind			210		

Notes: In this table the dependent variable is Log(1+real exports)- Trade3. All other definitions are as in tables 6.3 and 6.9.

Table 6.11 Regression results for log real total trade (DIM)-1980-2012

	(1)	(2)	(3)	(4)	(5)
VAR	OLS_DK	OLS_DKl	FE_t	FE_DK	FE_DKl
gdp2	0.92***	0.15***	2.62***	1.64***	0.76***
	(0.04)	(0.03)	(0.42)	(0.25)	(0.16)
gdpc2	-0.16	-0.04	-2.68***	-1.54***	-0.71***
	(0.10)	(0.03)	(0.44)	(0.34)	(0.19)
dist	-0.66***	-0.10***		1.07***	0.44***
	(0.11)	(0.03)		(0.14)	(0.09)
cu	0.99***	0.17***	0.12	0.07	0.07
	(0.09)	(0.04)	(0.10)	(0.08)	(0.05)
rerv1	-1.53***	-0.40**	-0.07	-0.30	-0.31*
	(0.26)	(0.20)	(0.26)	(0.24)	(0.18)
sim	-0.15	-0.00	0.20**	0.16	0.08
	(0.14)	(0.03)	(0.08)	(0.13)	(0.07)
rlf	0.12**	0.02	-0.05	-0.05*	-0.01
	(0.05)	(0.02)	(0.03)	(0.03)	(0.02)
div	0.44***	0.08**	0.07	0.06	0.08
	(0.09)	(0.04)	(0.08)	(0.08)	(0.05)
lang	0.28***	0.02		0.00	0.00
	(0.10)	(0.02)		(0.00)	(0.00)
fta	-0.06	-0.00	-0.76***	-0.17	-0.07
	(0.05)	(0.03)	(0.17)	(0.11)	(0.06)
bor	0.57***	0.08***		0.00	0.00
	(0.04)	(0.01)		(0.00)	(0.00)
lalis	-0.48***	-0.07***		0.00	0.00
	(0.05)	(0.02)		(0.00)	(0.00)
trade7l		0.84***			0.55***
		(0.03)			(0.05)
Constant	1.28***	0.27	3.09***	0.00	0.00
	(0.42)	(0.19)	(0.64)	(0.00)	(0.00)
Observations	2,533	2,333	2,533	2,533	2,333
R-squared	0.53	0.87	0.25		
No of groups	103	99		103	99
No of ind			103		

Notes: In this table the dependent variable is Log(real exports + real imports)- Trade7. All other definitions are as in tables 6.3 and 6.9.

Table 6.12 Regression results for truncated real total trade (DIM)-1980-2012

VAR	(1) OLS_DK	(2) OLS_DKl	(3) FE_t	(4) FE_DK	(5) FE_DKl
gdp2	1.61***	0.37***	4.99***	2.62***	1.06***
	(0.06)	(0.06)	(0.81)	(0.34)	(0.26)
gdpc2	-0.32*	-0.01	-5.11***	-2.68***	-1.05***
	(0.16)	(0.07)	(0.82)	(0.48)	(0.37)
dist	-1.12***	-0.22*		0.53	0.15
	(0.30)	(0.12)		(0.47)	(0.27)
cu	1.31***	0.31***	-0.51**	-0.67***	-0.23*
	(0.17)	(0.07)	(0.21)	(0.18)	(0.13)
rerv1	-2.82***	0.01	-0.62	-0.39	0.45
	(0.98)	(0.67)	(0.57)	(0.84)	(0.47)
sim	-0.03	-0.10	0.58***	0.55	-0.03
	(0.28)	(0.10)	(0.18)	(0.34)	(0.13)
rlf	0.42***	0.09***	0.06	0.03	0.03
	(0.12)	(0.03)	(0.07)	(0.06)	(0.02)
div	0.06	0.04	-0.69***	-0.81***	-0.30**
	(0.12)	(0.06)	(0.15)	(0.20)	(0.13)
lang	0.96***	0.24***		0.00	0.00
	(0.12)	(0.08)		(0.00)	(0.00)
fta	0.71***	0.14*	-0.39	0.47***	0.23**
	(0.11)	(0.08)	(0.32)	(0.15)	(0.11)
bor	1.20***	0.31***		0.00	0.00
	(0.13)	(0.05)		(0.00)	(0.00)
lalis	-1.13***	-0.31***		0.00	0.00
	(0.21)	(0.06)		(0.00)	(0.00)
trade8l		0.77***			0.54***
		(0.03)			(0.04)
Constant	-3.98**	-1.47***	-1.18	0.00	0.00
	(1.50)	(0.53)	(1.26)	(0.00)	(0.00)
Observations	3,459	3,355	3,459	3,459	3,355
R-squared	0.54	0.82	0.23		
No of groups	105	105		105	105
No of ind			105		

Notes: In this table the dependent variable is Log(1 + real exports + real imports)- Trade8. All other definitions are as in tables 6.3 and 6.9.

The effect of RERV1 on exports and imports (the latter results not reported) is both negative significant before but negative not significant after controlling for the zero trade as shown on tables 6.9 and 6.10. The effect on total trade is negative significant before (table 6.11) and positive not significant after controlling for the zero trade.

6.8 Summary of findings

In this chapter we estimate the gravity model with two different specifications (TIM and DIM) using panel data methodology with different trade measures. The main findings from the analysis are:

For currency union

- The effect on exports is negative significant before controlling for zero trade but negative not significant after.
- The effect on imports is negative but not significant both before and after controlling for zero trade.
- The effect on total trade is positive but not significant before controlling for zero trade but it becomes negative and significant after.

For real exchange rate volatility

- The effect on exports and imports is negative significant before but negative not significant after controlling for zero trade.
- The effect on total trade is negative significant before but positive not significant after controlling for zero trade

Our findings are consistent with alternative measures of exchange rate volatility and even after controlling for the effect of cross sectional dependence.

Chapter 7 A Cluster Analysis of ECOWAS proposed Monetary Union

7.1 Introduction

This chapter uses cluster analysis, a different methodology from the previous chapter, to continue to address our research questions and objectives. The central focus of this chapter is to explore on the question of whether ECOWAS countries are good candidates to form a currency union. We attempt to answer this question by grouping the countries according to eight macroeconomic characteristics as defined by the OCA theory and the ECOWAS convergence criteria. The resulting clusters/groups provide us with information on the degree of similarity or dissimilarity of these countries. According to the OCA theory the more similar the countries are the lesser the costs of abandoning their individual national monetary policy and the more suitable they are to form a currency union, verse versa.

Our analysis, in this chapter, revealed a high degree of dissimilarity (heterogeneity) among ECOWAS countries especially within WAMZ. We found the eight WAEMU countries to exhibit high degree of similarities that made these countries to belong to the same cluster in almost all our clustering results. On the other hand, WAMZ countries are very heterogeneous making them fragmented into different clusters and hardly to find most of these countries in the same cluster with WAEMU countries. We conduct sensitivity analysis as robustness check of our results by using different agglomerative methods, different distance (similarity/dissimilarity) measures and dividing our eight variables into OCA and ECOWAS convergence categories and we found our results to be insensitive to these options.

The remaining part of this chapter is structured as follows: The next section discusses the empirical literature of cluster analysis then followed by the methodology in section 7.3. We report and discuss our empirical results in section 7.4. Finally section 7.5 concludes.

7.2 Empirical literature

Two criteria are identified in evaluating the feasibility of a monetary union, the nature of the shocks affecting the members or potential members of the union and the speed with which they adjust to these shocks. Since monetary union entails the loss of flexibility, as member countries cannot use monetary policy (interest or exchange rate),

it is therefore argued in the literature that countries that are found to cluster together (homogeneous) can form a monetary union, as one monetary policy would be appropriate. On the other hand a lack of homogeneity is an indication that a single monetary policy would be unsuitable for such countries unless alternative channels for adjustments are available (Buigut, 2006). The implication is that the costs of forming a currency union are lower if the shocks are symmetrical, but higher if they are asymmetric. However, if after the shocks there are adjustment mechanisms (labour mobility, wage flexibility, fiscal transfers) to quickly restore equilibrium then asymmetric shocks need not necessarily imply large costs even if they are large (Bayoumi and Eichengreen, 1994) .

Since the formation of the Euro in 1999, the enthusiasm for economic and monetary integration in other regions has grown and much research has been done in this area. Different methodologies have been used to address this topic but what is becoming popular in recent studies is the application of cluster analysis. Bénassy-Quéré and Coupet (2005) used cluster analysis methodology on seventeen sub-Saharan African countries (12 from ECOWAS and 5 from CEMAC) to examine the economic rationale for monetary union in sub-Saharan Africa. They found that the existing CFA franc zone (WAEMU and CEMAC) countries do not belong to the same clusters and that a core of WAEMU can be defined on economic grounds. Their findings also support the inclusion of the Gambia, Ghana and Sierra Leone (and perhaps also Guinea) in an extended WAEMU arrangement, or the creation of a separate monetary union with the core of the WAEMU and the Gambia, rather than the creation of a monetary union around Nigeria. Their results support the creation of WAMZ with a regional monetary arrangement in the limited sense connecting the Gambia, Ghana and Sierra Leone to the WAEMU. However, the inclusion of Nigeria in this monetary zone is not supported by their analysis; neither does the creation of a separate WAMZ monetary union. In another study, Tsangarides and Qureshi (2008) applied cluster analysis on twenty sub-Saharan African countries (14 ECOWAS and 6 CEMAC) to examine the preparedness and status of the candidate countries for the proposed WAMZ and ECOWAS monetary unions. The details of their findings are as follows:

I. WAMZ do not form cluster with WAEMU.
II. Significant lack of homogeneity

III. Significant heterogeneity within CFA zone countries (WAEMU and CEMAC)
IV. Some similarities between CEMAC and WAMZ countries
V. WAMZ countries with the highest degree of dissimilarity and have little in common with WAEMU countries, which in principle tend to cluster together
VI. Ghana and especially Nigeria appeared as singletons i.e. independent of any other cluster, the remaining WAMZ countries tend to group together casting doubt on the inclusion of Ghana and Nigeria in WAMZ and the feasibility of separate monetary union that includes all WAMZ countries.

Another study by Cham (found that WAMZ does not meet the convergence and OCA criteria. Out of the three OCA criteria used in his analysis (openness, labour mobility and synchronisation of shocks) WAMZ only did well in the openness criteria. However, the good performance in openness may be due to the measure used- (Exports + Imports)/GDP. A smaller study focusing only on WAMZ was conducted by Alagidede et al. (2012). They attempt to explain the level of similarity in economic structure of the four of the current six member countries using fractional integration and cointegration methods. They found significant heterogeneities in behaviour among the countries. An interesting comment made by the authors is that attention is currently being placed on convergence criteria and preparedness of the aspiring member states, with less attention given to the extent to which the dynamics inflation and economic trends in the individual countries are (dis)similar.

A similar study was conducted by Buigut (2006) for the Eastern and Southern African (ESA) region using a combined methodology of vector autoregression (VAR) and cluster analysis. In light of the OCA and nominal convergence criteria the author classified countries that are good candidates for monetary union in the region. He also attempts to resolve the overlapping monetary arrangement in the region and more specifically whether the EAC should be grouped within COMESA or the SADC. His results revealed that the ESA region is not converged enough for an ESA-wide monetary union. He found two fairly distinct clusters, one in the southern cone around South Africa and the other around the EAC. He implied from his study that a two-track monetary integration route is more appropriate for the region. His results further identified EAC as a sub-group within COMESA, which suggests that Tanzania should cede SADC membership for COMESA. On the suitability of East African (EA)

countries to form a monetary union Buigut and Valev (2005) used a VAR approach in their investigation. They found that supply and demand shocks are generally asymmetric, which does not lend strong support for forming a monetary union in the EA region.

Another study involving 43 sub-Saharan African countries for 1963-89 by Bayoumi and Ostry (1997) looked at whether the existing highly fractured monetary arrangements in the region correspond to the expectation of the OCA criteria. Their methodology is based on the size and correlation of real disturbances across countries and the level of intra-regional trade. The results indicate that most SSA countries have significantly smaller links than those across the three major industrial countries implying that the main benefit from the existing arrangements of the CFA franc zone may well come from the monetary stability generated by the peg rather than the common currency across members. They argued such monetary stability does not require the existence of a common currency. In both macroeconomic disturbances and intra-regional trade the results provide no evidence in support of monetary union in SSA. Their conclusion is that there is little evidence that SSA countries would benefit in the near future from larger currency unions.

In a global sample of 39 countries (15 Western Europe, 11 East Asia, 13 the Americas) Bayoumi and Eichengreen (1994) used a VAR approach to identify groups of countries suited for monetary union. On the basis of macroeconomic disturbances and responses they identified three sets of countries that are plausible candidates for monetary unification: a Northern-European group (Germany, Austria, Belgium, Denmark, France, the Netherlands, and perhaps Switzerland); a Northeast Asian bloc (Japan, Korea, and Taiwan); and a Southeast Asian zone (Hong Kong, Indonesia, Malaysia, Singapore, and possibly Thailand). For the Americas, their results suggest the need for the region to undertake major adjustments in policy and performance in laying the foundation for monetary union. One of the limitations of their study which they mentioned is the focus on aggregate disturbances, ignoring other factors such as the level of intra-regional trade, which may also be relevant to the benefits of monetary union. Cluster analysis with the feature to incorporate many variables, including intra-regional trade in our study, has the potential to remedy this limitation. On the European side, a policy

implication that emerged from their study is that EMU might run more smoothly if limited to a sub-set of EU countries.

Further on the Asian studies Ibrahim (2008) applied cluster analysis to examine the feasibility of ASEAN+3 Monetary Union by investigating the homogeneities of the countries. Their results suggest that the sub region is not OCA compliance as indicated by the high degree of heterogeneities. He concluded that an immediate formation of a monetary union by the ASEAN+3 member states could entail serious potential costs as the 'one-size-fits-all' monetary policy would be inappropriate. Another finding is that the clustering of countries pre and post 1997 financial crisis differs which he interpreted as a reflection of the varied impact of the Asian financial crisis on member states economies and the different response of each. A similar investigation in East Asia with the use of cluster analysis by Quah and Crowley (2010) found a significant rise in the degree of regional symmetry in terms of the OCA features after the 1997-98 Asian crisis

As the creation of the Euro in 1999 is the motivating factor for other regions to emulate the path to monetary integration, a number of studies have been conducted on the European economies. For instance Artis and Zhang (2001) attempt to answer the question whether, in the light of traditional OCA criteria, the EMU is a wholly homogeneous group of countries. With cluster analysis methodology, their results revealed that the member countries may be divided into those belonging to the core (Germany, France, Austria, Belgium and the Netherlands) or to one of two peripheries, Northern (the Scandinavian countries, the UK, Ireland and Finland) and Southern (Spain, Italy, Portugal and Greece). They commented that with such well-defined grouping it may have the implication of a potential problem of 'fit' of the single monetary policy to the needs of the member countries. A subsequent study on Europe with the same methodology found similar core-periphery classification (Artis and Zhang, 2002). Similar studies carried on Europe using cluster analysis all point to similar core-periphery classification (Artis, 2000; Boreiko and Nationalbank, 2002; Crowley, 2009; Ferreira-Lopes and Pina, 2011).

7.3 Methodology

Cluster analysis (CA) is a term used to describe a family of statistical procedures specifically designed to discover classifications within complex data sets with the

objective of grouping objects into cluster (groups) such that objects within one cluster share more in common with one another than they do with objects of other clusters (Gore(JR), 2000). The purpose of the analysis, therefore, is to arrange objects into relatively homogeneous groups based on multivariate observations. The resulting partitioning improves our understanding of the data by revealing its internal structure. Clustering is a useful exploratory tool that has been applied to a wide variety of research problems with the aim to examine the underlying relationships in the data for classification, pattern recognition, model reduction, and optimisation purposes. There are a number of clustering methodologies which are generally classified into two groups according to the types of clusters obtained: (a) Crisp (or hard) clustering methods and (b) soft (or fuzzy) clustering method. We discuss these methods in details in the next section but before that let's first look at the pros and cons of cluster analysis as an analytical technique.

First, cluster analysis allows us to account for a number of variables simultaneously which in turn enables us to investigate synchronisation in terms of the symmetry of business cycles as well as the symmetry of various other relevant variables. Second, CA has less stringent data requirements in terms of the time dimension of data than other methodologies. This makes the technique to work well for countries with limited time-series data such as the African economies. Third, by exploring the group pattern in the data, the CA methodology identifies the areas in which each country needs to improve to achieve macroeconomic convergence, which is necessary for the formation of the monetary union. In this respect the technique provides useful information for making informed policy choices.

On the other hand CA is not without problems. Everitt (1972) discussed some of these problems. The first one is the lack of a well-defined concept of a cluster. A possible reason for this as suggested by Gower (1967) cited in Everitt (1972) is that no single definition is sufficient. It is argued that some CA techniques are better at finding clusters of a certain shape than others (e.g. spherical, long parallel clusters). Most techniques in common use are said to be good at finding clusters of the latter shape. This problem is compounded, as stated in Everitt (1979) that different techniques of CA applied to the same data set may give very different results, hence the need to validate any clusters found. One way to partially overcome this problem is to run the data on

more than one clustering technique of different types and accept as definite entities only those clusters which are found by all the techniques (Everitt, 1972). The second problem is the choice of variables to measure on the objects. The technique itself has no mechanism for differentiating between relevant and irrelevant variables. The choice of variables for inclusion must therefore be guided by theoretical or conceptual considerations. The formation of clusters is partly influenced by the types of variables included. A problem which is related to the selected variables is whether to standardise or not. The final problem which is considered to be difficult is the question of how many groups/clusters are there in our data. Several methods have been proposed to answer this question but none of them have a very high accuracy rate. In the next section we discuss the two commonly used clustering methods and measurement of (dis)similarities.

7.3.1 Fuzzy/soft clustering (FC)

Unlike hard clustering (HC), fuzzy clustering technique allows some ambiguity in the data by assigning each object to a cluster with a probability indicating the degree of belongingness of the object to that cluster. The probabilities are termed membership coefficients and lie in the range 0 to 1. A membership coefficient close to or equal to zero (one) suggests that the object is dissimilar (similar) to other objects in that cluster. An object is most likely to belong to the cluster with which it has the highest membership coefficient. The main advantage of fuzzy clustering over HC is that it yields much more detailed information on the structure of the data and therefore allows a description of some of the uncertainties that often go with real data. On the other hand, this could also be considered a disadvantage, because the amount of output grows very fast with the number of objects and the number of clusters, which may become too much to digest (Kaufmann and Rousseeuw, 1990). Also given the problem of incomplete and noisy data, fuzzy clustering has an advantage over HC especially with missing data. As it allows for ambiguity, FC is also said to be better equipped to analyse data where some ambiguity is present.

Fuzzy clustering is performed using the fuzzy c-means (FCM) algorithm developed by (Dunn, 1974) and further extended by Bezdek et al. (1984). The algorithm of FC is taken from Kaufmann and Rousseeuw (1990) and is briefly described as follows. The data set consists of n objects (countries in our case) and for each country there are p

variables (using the OCA criteria and the ECOWAS convergence criteria), which are denoted by

$X_{np} = \{X_1, X_2, \dots, X_n\}$, where each $X_i = \{X_{i1}, \dots, X_{ip}\}$.

Each variable is standardised with mean zero and standard deviation of one in order to treat them as having equal importance in determining the structure. Standardisation of the variables (i.e. converting to z scores) is also important in order to keep variable with high variance from dominating the cluster analysis. When variables are of different magnitude and are not directly comparable, standardisation helps to overcome this problem.

We use the standardised variables to classify the objects into cluster using certain mathematical relationships known as algorithm which we briefly described as follows:

The *dissimilarity coefficient* or distance between two objects/countries i and j i.e. d(i, j) is defined as the *Euclidean distance*:

$$d(i,j) = \sqrt{\sum_{k=1}^{p}\left(x_{ki} - x_{kj}\right)^2} \qquad 7.1a)$$

A version of this, the squared Euclidean distance, is obtained by squaring 7.1a as follows:

$$d^2(i,j) = \sum_{k=1}^{p}(x_{ki} - x_{kj})^2 \qquad 7.1b)$$

The objective of the algorithm of fuzzy clustering analysis is to minimise the function C (total dispersion):

$$C = \sum_{v=1}^{k} \frac{\sum_{i,j=1}^{n} u_{iv}^2 u_{jv}^2 d(i,j)}{2\sum_{j=1}^{n} u_{jv}^2} \qquad (7.2)$$

Subject to the constraints:

$u_{iv} \geq 0$ for i = 1,….,n; v = 1,….,n (7.3a)

$\sum_v u_{iv} = 0$ for i = 1,….,n (7.3b)

For equations 7.1a to 7.3b: u_{iv} represents the unknown membership coefficient of object i to cluster v, and k represents the number of clusters into which the data is partitioned. The algorithm produces the matrix of coefficients $U_{n\times k}$ with rows summing to one indicating the degree of belongingness of that object to each of the clusters. If one of the

coefficients is very high then it can be said that there is a high degree of certainty that this object belongs to that group, otherwise this object cannot easily be classified. The factor 2 in the denominator compensates for the fact that each of the terms u_{iv} and u_{jv} appear two times in the multiple sum. The two constraints (7.3a and 7.3b) is an expression that memberships cannot be negative and that each object has a constant total membership, distributed over the different clusters.

To choose the optimal number of cluster that helps to analyse how well the data is partitioned, several statistical measures are used as validity tests and we discussed three of these. The first test is the normalised *Dunn coefficient (DC)* defined as

$$F_k = \frac{\frac{k}{n} \times \sum_{i=1}^{n} \sum_{v=1}^{k} u_{iv}^2 - 1}{k-1} \qquad (7.4)$$

The Dunn coefficients vary between 1 (indicating well-partitioned data) to 0 (indicating complete fuzziness of the data). The value reaches 1 only if, for each object/country, there is one coefficient equal to 1and the others to 0, and 0 when all the coefficients of belongingness are 1/k.

The second validity test is the *silhouette width (SW)* for each object which is defined as:

$$s(i) = \frac{b(i) - a(i)}{\max(a(i), b(i))} \qquad (7.5)$$

Where a(i) represents the average dissimilarity of object i to all objects in the same cluster and b(i) as the minimum across all other clusters of average dissimilarity of object i to all objects in each cluster. The value of SW ranges from -1 to 1. A value close to 1 indicates that the object is well-clustered while a value near 0 signals high degree of fuzziness (ambiguity) and the object might be better classified to a neighbouring cluster. A negative SW indicates the object is misclassified. The corresponding average for each cluster and for the total data set indicates how well the data in each cluster and the total data set were partitioned.

A third optimal cluster validity test is the Xie and Beni (1991) (XB) index:

$$XB = \frac{1}{n} \frac{\sum_{i=1}^{n} \sum_{j=1}^{c} u_{i,j}^2 d_{i,j}^2}{min\left\{ \left(k_j - k_v\right)^2 \middle| j, v = 1,2, \dots c; j \neq v \right\}} \qquad (7.6)$$

Where kj, kv are the centres of cluster j and cluster v respectively. Smaller XB index indicates more compact and separated clusters.

7.3.2 Crisp/hierarchical/hard clustering (HC)

Hierarchical clustering technique attempts to assign each object to one and only one cluster. Expressed mathematically, Hierarchical clusters must satisfy the following properties:

$u_{ik} \in 0,1$ and $1 \leq i \leq n$; $1 \leq k \leq c$, (7.7a)

$\sum_{k=1}^{c} u_{ik} = 1$, $1 \leq i \leq n$, and (7.7b)

$0 < \sum_{i=1}^{n} u_{ik} < n$, $1 \leq k \leq c$, (7.7c)

Where u_{ik} represents the membership coefficient or degree of belongingness of an object i to a cluster k, c is the number of possible clusters, and n is the number of objects/countries in the data set. Properties 7.7a-7.7c states that a membership coefficient is either zero or one meaning that an object belongs to either one cluster or the other), the sum of the membership coefficients of an object across clusters is equal to one (i.e. every object must belong to a cluster), the sum of the membership coefficients in a cluster lies between zero and the total number of objects in the data set (i.e. each cluster must contain at least one but less than all objects in the data set), respectively. Broadly speaking, hierarchical method is subdivided into two. The first is the Divisive methods: in this technique all objects start in the same cluster and the agglomerative procedures are applied in reverse order until every object is in a separate cluster. The second is the agglomerative method and this is the most commonly used in cluster analysis literature. In the next section we discuss in detailed the second method.

7.3.2.1 Agglomerative hierarchical clustering (AHC)

In agglomerative hierarchical clustering, the method starts with N separate objects (i.e. clusters of one member). The two closest (most similar) are then merged to yield N-1 clusters. The next two are merged to produce N-2 clusters and so on. This process is done repeatedly until all the objects are in one large cluster. At the end of this process, the optimum number of clusters is then chosen out of all cluster solutions. When merging clusters, the agglomerative algorithms use dissimilarities or distance between objects which therefore call for a definition of the dissimilarity between clusters based on the dissimilarities between their objects.

Within AHC approach to cluster analysis there are a number of different agglomerative algorithms, suggested in the literature, used to determine which cluster should be joined at each stage. The difference in these methods lies in the way they define dissimilarity (or distance) between objects/clusters. The methods include: single linkage (nearest neighbour), complete linkage (furthest neighbour), Average (between groups) linkage (sometimes known as UPGMA), centroid, and Ward's method. The most popular and common in the literature is the group average (average) linkage method as applied in (Artis and Zhang, 2001; Buigut, 2006; Quah and Crowley, 2010; Tsangarides and Qureshi, 2008).

I. Ward's method

The Ward's method is also known as Minimum Variance Clustering (MVC). Ward's method combines groups based on minimisation of the sum of squared errors (ESS) of any two, hypothetical, clusters that can be formed at each step. In other words the method combines all possible pairs of clusters and the sum of the squared distances within each cluster is calculated. This is then summed over all clusters. We then choose the combination that gives the lowest sum of squares. Ward's method tends to produce clusters of approximately equal in size, which is not always desirable. The method is also sensitive to outliers. Despite this problem, it still remains one of the most popular methods, along with the average linkage method. The Ward distance is calculated as:

$$DistW_{1,2} = \frac{n_1 n_2 d^2(\bar{x}_1, \bar{x}_2)}{(n_1 + n_2)} \qquad (7.8)$$

Where $\bar{x}_c = \frac{1}{n_1}\sum_{i=1}^{n_1} x_{ci}$ is the centre of each cluster and $d^2(\bar{x}_1, \bar{x}_2)$ is the distance between the centres of two clusters.

II. Average linkage (group average) method. The average linkage method is also known as unweighted pair-group average method (UPGMA). In this method the dissimilarity or closeness between clusters 1 and 2 is taken to be the average of all dissimilarities d(i,j), where i is any object of cluster 1 and j is any object of cluster 2. Assume n_1 and n_2 are the number of observations in clusters 1 and 2 respectively. The average linkage method measures proximity (DistGA), as

$$DistGA_{1,2} = \frac{1}{n_1 n_2}\sum_{i=1}^{n}\sum_{j=1}^{n} d(x_{1i}, x_{2j}) \qquad (7.9)$$

III. Single linkage (nearest neighbour) method

In this method the distance between two clusters is taken to be the distance between the two closest members, or neighbours in the two clusters. In other words it looks for an object in a cluster that is most closely placed to another object in a different cluster and uses the distance between them to measure the closeness of clusters. It is expressed as

$$DistS_{1,2} = min\{d(x_{1i}, x_{2j})\} \quad (7.10)$$

Where $i \in (1, 2, \dots, n_1), j \in (1, 2, \dots, n_2)$.

IV. Centroid

The centroid (the mean value for each variable) of each cluster is calculated and the distance between centroids is used. The algorithm merges clusters whose centroids are closest together. Due to the differences in measuring the dissimilarities (distance) between objects within clusters and between clusters in the different algorithms the usual practice in cluster analysis is to conduct the computation using more than one of the algorithms and choose the one that best represents the data. The choice between algorithms is guided by the cophenetic correlation coefficient (CCC) which determines how well the generated clusters represent dissimilarities between objects, with values close to one representing better clustering. Letting d be the average of d(i,j), and letting t be the average of t(i,j), the distance generated by the linkage method when two objects are first joined together, then the cophenetic correlation coefficient is defined as

$$CCC = \frac{\sum_{i<j}(d(i,j)-d)(t(i,j)-t)}{\sqrt{[\sum_{i<j}(d(i,j)-d)^2][\sum_{i<j}(t(i,j)-t)^2]}} \quad (7.11)$$

The outcome of hierarchical clustering is represented in a hierarchical tree diagram, called a dendrogram. The heights of the links of the dendrogram represent the distance at which each fusion is made such that greater dissimilarity between objects is reflected by large distances and taller links. A dendrogram provides a natural visual rule of thumb for cluster divisions, where large changes in fusion levels indicate the best cut for forming clusters and therefore deciding on the number of clusters. However, there are several formal rules proposed to determine the best number of clusters (Everitt et al., 2001). Amongst them is the pseudo-F (CHI) index developed by Calinski and Harabasz (1974) is one of the widely applied criterion to determine the optimal number of

clusters. The empirical popularity of the CHI is supported by a study by Milligan and Cooper (1985) who evaluated the performance of thirty cluster-stopping rules and found that the pseudo-F index performs the best. The CH index is defined as

$$CHI = \frac{S_b/(K-1)}{S_w(n-k)} \qquad (7.12)$$

Where S_b is the between clusters sum of squares, S_w is the within-clusters sum of squares, k is the number of clusters and n is the number of objects. Higher values of the index indicate more distinct partitioning and therefore better clustering.

Despite its usefulness in cluster analysis, Agglomerative Hierarchical clustering method is not without its problems. The method suffers from the defects that it can never repair what was done in previous steps. Indeed, once an agglomerative algorithm has joined two objects, they cannot be separated any more. Also, whatever a divisive algorithm has split up cannot be reunited. This rigidity of hierarchical methods is both the key to their success - because it leads to small computation times- and their main disadvantage (the inability to correct erroneous decisions).

7.3.3 Data sources and variables description

Cluster analysis provides no guidance on the choice of variables as already discussed is one of its limitations. The variables chosen for our analysis and described in this section is guided by the OCA theory discussed in chapter 4 and the ECOWAS convergence criteria in chapter 2 shown in appendix A.3.

I. Synchronisation in the business cycle phase (BUS)

It is argued that when business cycles between two economies are synchronised, the need for flexible exchange rates that can absorb asymmetric shocks becomes less relevant. This means that the more synchronised the business cycles of member states of a monetary union the less the need for an independent exchange rate and interest rate policy and therefore the more appropriate a common monetary policy. According to the OCA theory the more synchronised the business cycles are the less the costs on monetary union membership and verse versa. Countries with similar or synchronised business cycles are said to be good candidates for the formation of monetary union. Business cycle synchronisation/symmetry is measured in different ways in the literature. Ibrahim (2008) measured BUS as the standard deviation of the difference of the

logarithm of real GDP between each country and the anchor/reference country. Another method is to identify shocks by applying a switching vector autoregressive (SVAR) (Bayoumi and Eichengreen, 1994) on the basis that it facilitates the separate identification of the initial shock and the policy response. The most popular method of measuring the business cycle in the literature is the cross correlation of the cyclical components of output (Artis and Zhang, 2001; Bénassy-Quéré and Coupet, 2005; Quah and Crowley, 2010; Tsangarides and Qureshi, 2008). The computation of cross correlation usually requires an anchor country and the European studies mostly used Germany. The potential Germany for ECOWAS is Nigeria but has not been considered an appropriate anchor for the region due to its lack of financial development and disciplined fiscal policies (Tsangarides and Qureshi, 2008). Most studies in sub-Saharan Africa that focused on ECOWAS and Central Africa used the Euro area as an anchor on the basis of the extent of trade between those countries and Europe and also the pegging of the current single currencies (CFA franc zone) to the Euro. In this case two countries with high correlation values will exhibit similar business cycles and therefore will have the incentive both to form a monetary union and to choose the Euro as a monetary anchor rather than another foreign currency (Bénassy-Quéré and Coupet, 2005). Conversely, two countries with negative correlation values will face a low incentive to use the euro as a monetary anchor. The closer the correlation value is to zero, the lower the incentive to both join a monetary union and peg to the euro. This thesis used the Euro as our anchor and the cross correlation approach, described by (Artis and Zhang, 2001) as the more 'atheretical', is used as a measure of output symmetry. The annual (with frequency=1) real GDP of the individual countries and the Euro are detrended by applying the Hodrick-Prescott (H-P) filter (Hodrick and Prescott, 1997) with a smoothing parameter of 100 (i.e. the square of the frequency x 100). An alternative detrending method used by Nguyen (2007) is to take the log and then first difference the series.

II. Trade openness (GTI/RTI)

According to the OCA theory, countries that trade more with each other are good candidates for monetary integration, because they will benefit from significant transaction costs savings (McKinnon, 1963). Trade openness is measured for a country either with reference to the rest of the world (global trade intensity-GTI) or with

members in the region (regional trade intensity-RTI). This study adopts the latter which is measured as:

$\frac{X_{i,ECOWAS}+M_{i,ECOWAS}}{X_i+M_i}$ Where X_i denotes exports, M_i imports of goods and services and subscript ECOWAS indicates the direction of trade flows (destination or source). The reason for this choice is because the ECOWAS proposed currency union is not a global one but it is for only member countries and therefore extensive trade with non-ECOWAS members and less trade with members yield no transaction costs saving benefits for the region. We compute the annual regional trade intensity for each country and average it over the sample period and a higher value indicates higher intra-regional trade and more potential benefits from joining the monetary union.

III. Terms of trade synchronisation (TOT)

A country's terms of trade measures its exports prices in relation to its imports prices, and is expressed as (index of exports prices/index of imports prices) x 100. Similar to the business cycle synchronisation, the computation of terms of trade synchronisation requires an anchor country and for reasons already discussed in BUS above we used the Euro area for this purpose. Just as in the case of BUS the more synchronised/correlated the terms of trade of member states the lower the costs of joining a monetary union as the exchange rate is no longer available as a policy instrument to cushion against these shocks. To measure the cross correlation of the terms of trade movements, we follow Tsangarides and Qureshi (2008) by computing the first difference of the annual terms of trade index for each of the ECOWAS countries and the Euro area, and measure the correlation between them. We compute terms of trade index taking the exports value index divided by the imports value index. We used the same formula for each euro country and calculate a weighted average taking total trade (exports + imports) as weights for each year.

IV. Convergence of inflation (INF)

It is noted by Artis and Zhang (2001), Artis and Zhang (2002) that the traditional OCA literature was generated during the 'fix-price' economics era, so the introduction of inflation convergence as a criterion could just be regarded as an appropriate normalisation. Because similar inflation rates can result from similar monetary and fiscal policy stances as well as similar institutional economic structures, the cost of

joining a monetary union is presumably low when inflation rates are similar across countries (Nguyen, 2007). In addition to the OCA, convergence in inflation is a primary criterion in ECOWAS monetary integration. WAMZ requires a single digit inflation rate, WAEMU requires inflation rate of less or equal to 3% and ECOWAS less or equal to 5% (appendix A.3, in chapter 2). Overall ECOWAS requires low inflation rates for its members to converge. We measure inflation convergence as the absolute inflation differential between each country (X_i) and the anchor country ($X_€$), the euro in our case i.e. $|X_i - X_\epsilon|$. This measurement is common in the literature (Ibrahim, 2008; Quah and Crowley, 2010). Although (Artis and Zhang, 2001) used the inflation differential of each country and Germany without taking the absolute value, (Quah and Crowley, 2010) noted that in a correspondence with Artis he indicated that the absolute value may be a better option in order to avoid the problem of cancellation of values of the opposite sign. The smaller is the inflation differential, the higher the convergence.

V. Volatility in the real exchange rate (RER)

As already explained in the OCA theory in chapter 4 the loss of an independent exchange rate, as one of the monetary policy tools to stabilise the economy in the case of a shock, is one of the costs of joining a monetary union. It is the real exchange rate that is the concern here, even though monetary policy can only directly influence the nominal rate with the implication that the real exchange rate will be able to move in the right way responding to the independent monetary policy action (Artis and Zhang, 2001). If there has been little cause for real exchange rate volatility, the cost of abandoning a separate exchange rate would be presumably small (Nguyen, 2007). It is also argued that lower real exchange rate volatility might indicate an absence of asymmetric shocks and greater business cycle synchronicity, and thus a stronger case for monetary union (Artis and Zhang, 2001). Across many studies the common measurement of volatility in the real exchange rate is the standard deviation of the log difference of the annual real exchange rates, in our case, of the individual countries. We compute real exchange rate as the nominal exchange rate in local currency per unit of US$ of a given year divide by the GDP deflator of that year then multiplied by GDP deflator of 1996 (i.e. 1996=100).

The exchange rate variable is not only an OCA criterion but also one of ECOWAS secondary convergence criteria. It therefore has a dual important role to play in our analysis.

VI. Government/fiscal balance (FIB)

Fiscal balance is one of ECOWAS primary convergence criteria for the membership of monetary union. It is common for both ECOWAS and its sub units (WAMZ and WAEMU). ECOWAS and WAMZ require a budget deficit to GDP ratio of greater or equal to -4% where as WAEMU requires the same ratio to be greater or equal to zero. The ratio is computed by taking the annual central government balance as a percentage of annual GDP. The ratios are then averaged for each country over the analysis period.

VII. Debt servicing requirement (DSR)

Debt service requirement is one of the primary convergence criteria for ECOWAS. The convergence criteria require member countries to build up surpluses to attain sustainable debt levels so as to ensure that they adequately service their debt stock without creating inflation. Debt repayment is important as it lowers the risk associated with a country, improves its credit rating, and strengthens the confidence of foreign investors thereby reducing its borrowing costs and increasing capital inflow. It is also argued that because the debt service is denominated in hard currencies, countries with higher debt service are likely to have a lower incentive to devalue their currencies. Hence, countries with high debt service ratio are expected to be more willing to peg and possibly form a monetary union with a peg on a foreign anchor (Bénassy-Quéré and Coupet, 2005). For the purpose of our analysis we calculate the debt service requirement for each country as the ratio of total debt service requirement to the total exports of goods and services and then average the ratios over the period. The alternative of looking at the same measure in the literature is to compute the debt service requirement as a ratio of the GDP. However, this latter measure is more of a measure of national indebtedness, i.e. level of borrowing, rather than debt servicing ability. Although WAEMU's equivalent primary criterion is the latter, we decide to use the former because it is the primary criteria for both WAMZ and ECOWAS.

VIII. Tax revenue (TAR)

Performance in terms of tax receipts is a secondary convergence criterion for ECOWAS. This variable is measured as the ratio of tax revenue to GDP. Both ECOWAS and WAMZ require member countries to achieve a ratio of greater or equal to 20%. However, WAEMU's equivalent secondary criterion to the tax revenue to GDP ratio is current account balance excluding grants to be greater or equal to -5% (appendix A.3). WAMA's macroeconomic convergence report for the first half of 2009 indicates that the tax revenue to GDP ratio is one of ECOWAS countries worst performance over the nine year period in the report. For the years 2001-2003 none of the fifteen countries met the requirement and for six of the years only two countries and for 2007 and 2009 three countries met the criterion. Due to lack of data for the Tax revenue during the period of our study, we decide to use the current account balance to the GDP ratio.

We collect our data from the international data bases. Real GDP (constant 2005 US$), nominal exchange rates, GDP deflators, exports price index, imports price index, Inflation (GDP deflator) annual percentage, are from the World Bank- World Development indicators (WB-WDI). Exports and imports data from the IMF-DOTs, total debt service on external debt is from the international debt statistics.

7.3.4 Standardisation of data

In most statistical analyses the data are standardised by some appropriate method in order to overcome the problem of different scale measures and ensure equal weighting of the variables. Milligan and Cooper (1988) discussed a number of methods of standardisation that exist in the literature although many of them are not widely used[8]. For different scale values data the common approach is to standardise to a mean of 0 and to a unit variance. This made the z-score formula, equation 7.13, to be very popular with researchers.

$$Z_1 = \frac{X - \bar{X}}{StdX} \qquad 7.13$$

Where X is the original data, $\bar{X}$ is the sample mean and StdX is the standard deviation of X.

8 For details on the discussion of the various methods of standardisation see Milligan and Cooper (1988)

Despite the wide use of standardisation in empirical work there is still a debate in the literature as to whether standardisation affects similarity measures. According to Everitt (1980) standardisation to unit variance and mean of 0 reduces the differences between groups on those variables. Edelbrock (1983) on the other hand noted that variables in multivariate data sets may have different distribution parameters across groupings which may render standardisation not to constitute an equivalent transformation of these variables and may possibly change the relationship between them. In a subsequent Monte Carlo studies using correlation coefficient and other hierarchical clustering techniques he found that the use of standardised and non-standardised variables yield no substantial differences between the classification results. Milligan (1980) found that standardisation appears to have only a minor effect on the results of a cluster analysis. On the other hand Mathews (1979) cited in Aldenderfer and Blashfield (1984) showed that standardisation did have a negative effect on the adequacy of the results of a cluster analysis when compared to an optimal classification of the cases under study.

7.4 Empirical results

7.4.1 Features of the data

The cluster analysis in this chapter is based on standardised/normalised data. However we start our discussion with a brief comment on some of the features of the data both before and after standardisation as represented in figures 7.2 and 7.1 respectively. In these two figures the data for all the eight variables, for the full period of our study (1998-2012), are plotted in a hatch-plot, displaying the distribution of the variables in the form of a matrix.

Figure 7.1 Hatch-Plot for standardised variables 1998-2012

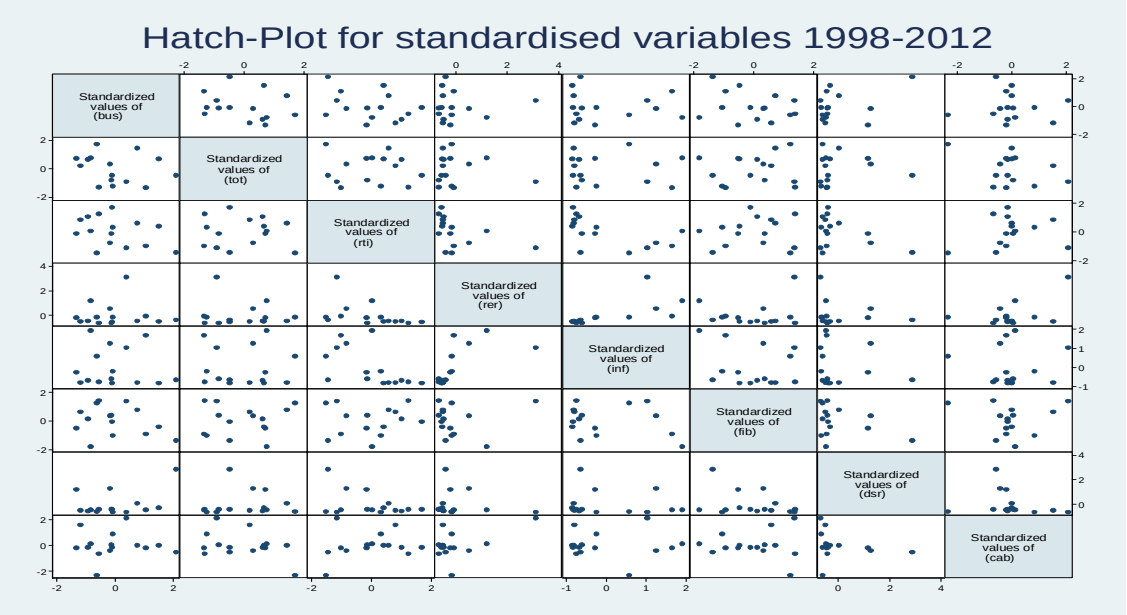
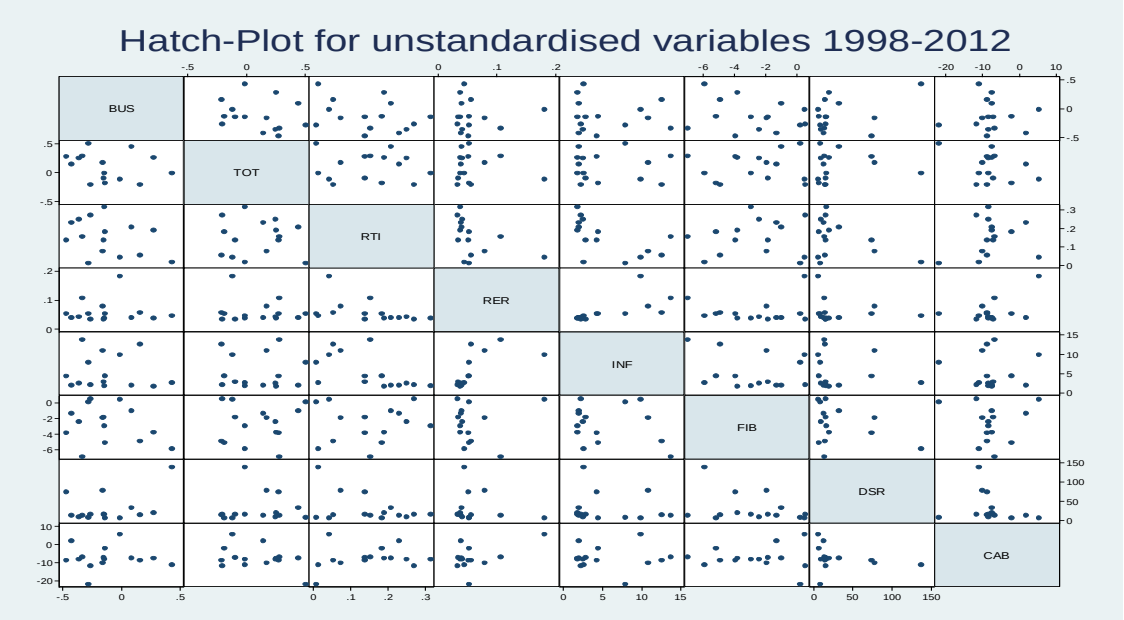


Figure 7.2 Hatch-Plot for unstandardised variables 1998-2012



The first observation from the two hatch-plots is that the distributions (correlations and other measures) seem similar to each other. The similarities between the two distributions may imply that the results of clustering based on the standardised data may not significantly be different from the original (unstandardised) data. A second observation from the inspection of the plots is that there are no obvious groupings of countries for the variables under consideration, although RER, INF, DSR and CAB

appear to be the exception. These four variables seem to separate one of few countries from the rest of the group but this depends more on which other variables we look at. There are two possible implications from the second observation. First, the grouping of the data varies for each variable and that there is no simple way to categorising the data according to simple high/medium/low categories across all variables (Quah and Crowley, 2010). This feature of the data provides the justification for using an optimisation-based clustering technique to analyse the data.

7.4.2 Pre-cluster Analysis results-full period (1998-2012)

In this section we present the results and discuss them on a variable-by-variable basis in order to highlight the implications in terms of costs and benefits for forming a monetary union in ECOWAS. We do a much more in depth analysis for the full period (1998-2012), see graphical presentation in appendices A.27-A.34. We also look at the three sub periods for any trend and changes in the macroeconomic structure of the countries. For each variable, the discussion is based on individual countries relative to sub-regional average, WAEMU and WAMZ, and also relative to overall ECOWAS average. We also attempt to compare WAEMU and WAMZ relative to each other and to ECOWAS. This approach enables us to come up with any similarities and dissimilarities, in accordance with the OCA and convergence criteria, and how these are linked to the cluster analysis results.

A detailed description of the data is in the methodology above (section 7.3.3). For each country, the average of the data for each variable for the period 1998-2012 is presented in table 7.1. Eight of the fifteen ECOWAS countries are members of WAEMU (CFA zone), six are members of WAMZ and one (Cape Verde) is not a member of any of the two sub-regional arrangements. However, both the CFA (WAEMU's currency) and the Escudo (Cape Verde's currency) are pegged to the Euro since the inception of the Euro in 1999 through bilateral agreements. Prior to the Euro, the Cape Verde Escudo was linked to the Portuguese escudo. The current peg is 1 Euro = 655.957 CFA Franc and 1 Euro = 110.265 Escudo. Due to the peg of these two currencies to the same anchor, we grouped Cape Verde into WAEMU for the purpose of computing the descriptive statistics and refer to this grouping of nine countries as WAEMU+1. For a fairer comparison between WAEMU and WAMZ, we re-computed the mean of WAEMU

without Cape Verde, shown as mean no CPV, since it is not a member despite their similarity in pegging.

Table 7.1 Unstandardised data and descriptive statistics- 1998-2012

country	BUS	TOT	RTI	RER	INF	FIB	DSR	CAB
BEN	-0.149	-0.097	0.138	**0.034**	2.823	-1.823	15.865	-7.199
BFA	-0.143	-0.013	**0.314**	0.038	1.847	-2.908	16.716	-8.354
CPV	**0.431**	-0.012	0.016	0.045	2.622	-5.885	**137.31**	-11.004
CIV	-0.428	0.145	0.231	0.040	1.974	-1.323	13.360	1.981
GHA	-0.336	0.281	0.153	0.106	**13.726**	**-6.915**	14.099	-6.711
GIN	0.159	**-0.211**	0.056	0.057	12.597	-4.923	14.763	-8.785
GNB	-0.135	-0.189	0.183	0.053	4.462	-5.162	7.164	-2.147
LIB	-0.283	**0.502**	**0.009**	0.053	7.979	0.177	8.939	**-21.889**
MLI	0.085	0.441	0.209	0.040	1.946	-0.992	32.776	-7.423
NER	-0.262	-0.208	0.271	0.034	2.205	**0.562**	15.981	-11.618
NGA	-0.013	-0.118	0.044	**0.181**	9.871	0.478	**6.419**	**5.405**
SEN	0.272	0.258	0.190	0.039	**1.784**	-3.769	20.307	-7.534
SLE	-0.162	0.176	0.075	0.080	10.843	-1.908	78.094	-10.125
GMB	**-0.466**	0.270	0.138	0.052	4.299	-3.892	74.403	-8.757
TGO	-0.363	0.250	0.250	0.041	2.536	-2.377	9.579	-8.344
Descriptive statistics								
ECOWAS								
Min	-0.466	-0.211	0.009	0.034	1.784	-6.915	6.419	-21.889
Max	0.431	0.502	0.314	0.181	13.726	0.562	137.307	5.405
Mean	-0.120	0.098	0.152	0.060	5.434	-2.711	31.051	-7.500
WAEMU								
Min	-0.428	-0.208	0.016	0.034	1.784	-5.885	7.164	-11.618
Max	0.431	0.441	0.314	0.053	4.462	0.562	137.307	1.981
Mean	-0.077	0.064	0.200	0.041	2.467	-2.631	29.895	-6.849
mean no CPV	-0.140	0.073	0.223	0.040	2.447	-2.224	16.468	-6.330
WAMZ								
Min	-0.466	-0.211	0.009	0.052	4.299	-6.915	6.419	-21.889
Max	0.159	0.502	0.153	0.181	13.726	0.478	78.094	5.405
Mean	-0.183	0.150	0.079	0.088	9.886	-2.831	32.786	-8.477

Source: author's computation from the data sources stated above

I. Synchronisation in the business cycle (BUS)

The cross correlation of the cyclical components of real output of ECOWAS countries and EU 12, a measure of the synchronisation of the ECOWAS business cycle with the EU countries, is shown on the first column of table 7.1.

The a priori expectation, according to the OCA theory, is that the higher the correlation between the individual countries output with the EU the more symmetric the shocks are and hence the more appropriate a monetary policy for the countries. Our results in table 7.1 show that out of the 15 ECOWAS countries, only four (27%) with positive correlation with the EU (Cape Verde, Guinea, Mali and Senegal). Guinea's correlation (0.159) is low and that of Mali's (0.085) is even much lower to economically justify any incentive to peg to the euro or form a monetary union. Only Cape Verde with a

correlation of 0.431, which we will say high by other standards, could be said to have a more synchronised business cycle with the EU and therefore more justification for a peg to the euro. 11 of the ECOWAS countries (73%) all have a negative business cycle correlation with the EU, ranging from -0.013 (Nigeria) to -0.466 (The Gambia). WAEMU with Cape Verde average correlation is -0.077 and without it is -0.140 which is not too far from the ECOWAS average correlation of -0.12. For WAMZ, the maximum correlation is 0.159 (Guinea) and the overall average is -0.183. On the basis of the BUS there is not much positive performance for any of the two monetary zones in ECOWAS.

Out of the 18 countries (EU15 & US, Canada and Japan) studied by Zhang and Artis (2001) only one country has a negative business cycle correlation (-0.075) with Germany, the anchor country, and they classified it as low. Eight of the countries (44%) they classified as high correlation have a range of 0.444-0.745. Nine of the countries (50%) they classified as having a medium correlation range from 0.343-0.106. Bayoumi and Ostry (1997) used a benchmark from a previous study that considered the correlation between a group of 3 industrialised countries (Germany, Japan and US). The correlation coefficients between these three countries range between 0.34-0.57. Considering our results in table 7.1 with the exception of Cape Verde, no other ECOWAS countries could be said to meet any of these benchmarks. Based on these benchmarks the ECOWAS results for 1998-2012 provide us with no evidence that there is any degree of correlation of business cycle with EU that may justify a peg to the Euro neither the economic motivation to form a monetary union.

II. Terms of trade synchronisation (TOT)

As already discussed in the variable description section, the higher the correlation of the TOT with the anchor, EU, in our case the more synchronised the terms of trade and therefore the lower the costs of forming a monetary union. The second column of table 7.1 shows the correlation of ECOWAS countries terms of trade with EU12. Eight out of the fifteen countries (53%) have positive terms of trade correlation with EU, ranging from 0.145 (Cote d'Ivoire) to 0.502 (Liberia). However, only two of these eight countries (LIB=0.502, MLI=0.441) may be considered as having a high TOT correlation. The third country in the TOT correlation rank is Ghana which is 0.281 followed by The Gambia with 0.270. On the two ECOWAS zones there is no distinctive

statistics that could classify the two zones far from each other. WAEMU+1 shows a mean correlation of 0.064 and without Cape Verde, the correlation is 0.073 which makes no significant difference between them. WAMZ correlation average is 0.150 which slightly exceeds the ECOWAS average of 0.098. Apart from the two countries, Liberia and Mali, the overall picture of ECOWAS terms of trade is not promising, a situation which is similar to the business cycle synchronisation.

III. Trade openness (GTI/RTI)

As described in the methodology section of this chapter, we measure trade openness by the regional trade intensity (RTI). According to the OCA theory the higher this ratio, the more the intra-regional trade and therefore the more the potential benefits from joining the monetary union. Column 3 of table 7.1 shows our intra-regional trade openness for ECOWAS countries for the period 1998-2012. Starting with the regional average trade openness of ECOWAS countries total trade to each other on average is 0.152 (15.2%) with a maximum of 31.4% (Burkina Faso) from WAEMU and minimum of 0.9% (Liberia) from WAMZ. The average trade of WAEMU+1 countries to other ECOWAS countries is 20% but without Cape Verde the figure increases to 22.3% which is 7.1(46.7%) above the ECOWAS average intra-regional trade openness. WAMZ overall average trade within ECOWAS for the period is 7.9% which is 7.3(48%) below the ECOWAS average and 14.4 (64.6%) below the WAEMU average trade. Seven of the eight WAEMU countries (87.5%) trade with other ECOWAS countries at a level that is above the ECOWAS average of 15.2% while for WAMZ, apart from Ghana which trades with other ECOWAS countries just at the average level of ECOWAS, all the other five countries (83.3%) trade at a level that is below the ECOWAS average trade. Out of these five countries, all of them even trade at a single digit average ranging from 0.9% (Liberia) to only 7.5% (Sierra Leone) with the exception of The Gambia which trades at 13.8%. Nigeria's, the power house of WAMZ and ECOWAS, trade level with other ECOWAS countries stands at a level of 4.4% which is 3.5(44%) below WAMZ average, 17.9(80%) below WAEMU average and 10.8(71%) below the ECOWAS average. This ranks Nigeria in the bottom 3 of the six WAMZ countries and the bottom 3 of the 15 ECOWAS countries exceeding only Cape Verde (1.6%), one of the smallest economies of ECOWAS and Liberia (0.9%), a war torn economy. What seems to be clear from these trade figures is that WAEMU countries trade a lot more than the

WAMZ countries both on individual basis and sub-regional basis and therefore stand distinctively from the others.

We have observed that there is more intra-regional trade in WAEMU than in WAMZ but is the ECOWAS trade level sufficient enough for the region to earnest the potential benefits of transaction costs savings advocated in the literature? To answer this question we corroborate the current trade statistics with those of our comparative data analysis in chapter 5. A more detailed analysis in that chapter uses different trade openness measures for ECOWAS comparative with EU12. The results of the measure which is the same as the one we use in table 7.1 are in appendix A.11 for ECOWAS and A.12 for EU12. From those two tables we saw that for the years under consideration the minimum intra-regional trade for ECOWAS range from 0.9-1.6% and the maximum range from 26.5-35.3% compared to 38.5-55.5% and 75.4-88% respectively for EU12. Based on the consistency of the ECOWAS results in this chapter and chapter 5 relative to the EU12 benchmark, it is difficult for one to conclude that the level of intra-ECOWAS trade statistics in table 7.1 is sufficient to yield the transaction costs saving benefits that will justify the formation of a monetary union in ECOWAS.

Our trade openness conclusion therefore is that, although, in relative terms, WAEMU countries stands to gain more from transaction cost savings than their WAMZ counterpart the evidence does not support the argument that these savings, relative to the extra-regional trade level, are sufficient to justify a monetary union formation in ECOWAS.

IV. Volatility in real exchange rate (RER)

Exchange rate is one of the policy instruments, perhaps closer to interest rate that countries use to stabilise macroeconomic shocks. In a monetary union this is no longer available to the specific needs of countries. As we have already mentioned above, the lower the exchange rate volatility the less we should be concerned with the cost of abandoning a separate exchange rate as such costs should presumably be small. We now examine the ECOWAS countries' position with regard to the real exchange rate volatility as presented in column 4 of table 7.1. The overall ECOWAS average real exchange rate volatility is 0.060 with a range of 0.034-0.181 which coincides with Benin from WAEMU and Nigeria from WAMZ respectively. The mean difference between WAEMU+1 and WAEMU is only 0.001, meaning classifying Cape Verde to

WAEMU makes no difference in exchange rate volatility. WAEMU has an average volatility of 0.040 with a minimum of 0.034 (Benin) and maximum of 0.053 (Guinea Bissau). This average is 0.02 (33.3%) below the ECOWAS average volatility. All the eight WAEMU countries have exchange rate volatility well below the ECOWAS average of 0.06 which is also the same for Cape Verde. On the other hands, WAMZ average exchange rate volatility is 0.088 with a minimum of 0.052 (The Gambia) and maximum of 0.181 (Nigeria). This average is 0.028 (46.7%) above the ECOWAS average volatility. Only one WAMZ country (Guinea) is on ECOWAS average with 3 (50%) above and 2 (33.3%) below it. Our finding from these statistics is that there is a higher volatility in exchange rates in WAMZ as compared to the volatility in WAEMU and Cape Verde meaning the latter two outperformed the former. This finding makes sense given that the eight WAEMU countries share the same currency (CFA Franc) with a rigid peg to the Euro and given their low inflation record (next variable to consider), one would not expect a high real exchange rate volatility for these countries.

V. Convergence in inflation (INF)

INF and RER are both OCA variables and ECOWAS convergence criteria variables. These two variables sit in between the two categories of variables we considered in this analysis. The details of the ECOWAS convergence requirements with respect to these variables are already shown in appendix A.3, chapter 2. As we have already seen in the methodology section above countries with similar inflation rates are good candidates for monetary union as they are suitable for a one-size-fits-all monetary policy. We examine the ECOWAS countries as to their suitability in respect of inflation convergence in accordance with the OCA theory. We measure inflation convergence by the inflation differential between each ECOWAS country and the group of EU12. The results are shown in column 5 of table 7.1. The a priori expectation is that the lower the inflation differential between the country and its anchor, the greater the propensity to peg the currency on the anchor and also the formation of a monetary union. The results revealed an average ECOWAS inflation differential with EU12 of 5.434% ranging from a minimum of 1.784 (Senegal) from WAEMU and a maximum of 13.726% (Ghana) from WAMZ. The average inflation differential for WAEMU is 2.447 (55%)- no material difference between WAEMU and WAEMU+1- below the average with a minimum of 1.784 (Senegal) and maximum of 4.462 (Guinea Bissau). All the eight WAEMU

countries and Cape Verde have inflation differential below the ECOWAS average. For WAMZ, the average inflation differential is 9.886 (≈10) which is 82% above the ECOWAS average differential. The WAMZ minimum inflation differential is 4.299 (The Gambia), almost equal to the WAEMU's maximum of 4.462 and the maximum is 13.728 (Ghana). With the exception of The Gambia which is slightly below the ECOWAS average inflation differential, all the other 5 WAMZ countries are above the ECOWAS average, four of which are in double digits.

Our finding from the inflation differential variable statistics is that the WAEMU countries and Cape Verde not only outperformed the WAMZ countries but appear to converged to the EU inflation rates. It could mean that these nine countries are benefiting from the low inflation in the Euro zone as a result of compliance with the possible disciplinary measures that may have been included in the bilateral agreement between them and France. This finding is consistent with our previous analysis in chapter 5 where figure 5.2 showed the 10 year average inflation rates for ECOWAS countries and EU12. We observed from this graph that all the eight WAEMU countries and Cape Verde grouped together with all EU12 countries, in almost a straight line, at the bottom of the inflation scale between 0 and 5%, just at the middle of this band. Strikingly, just as we found in this chapter, figure 5.2 showed the 6 WAMZ countries well scattered from the middle of the inflation scale, with The Gambia closer to WAEMU, up to the top of the scale with Guinea at the top end.

VI. Government/fiscal balance (FIB)

ECOWAS criterion calls for a fiscal balance of -4 or better whilst WAEMU requires a zero or better FIB. Positive or smaller negative FIB are favourable and indicate better performance than larger negative FIB. The overall ECOWAS average fiscal balance is -2.71% which is above the ECOWAS -4% requirements. The lowest, worst performing, is -6.92 (Ghana) from WAMZ and the highest, best performing, is 0.56 (Niger) from WAEMU. Next to Ghana, for adverse FIB, are Guinea Bissau (from WAEMU) and Cape Verde. Out of the eight WAEMU countries only Niger that has a positive fiscal balance of 0.56. All the WAEMU countries, except Niger failed the WAEMU zero or better FIB requirement, although 7 of these countries (87.5%) met the ECOWAS criterion of -4% or better. Without Cape Verde WAEMU has a FIB ranging from worst -5.16% (Guinea Bissau) to the best 0.562% (Niger). The average FIB for WAEMU is -

2.224 which is better than the ECOWAS average. The average for WAMZ is -2.83% which is slightly worse than the ECOWAS average FIB. Nigeria is the only country in WAMZ with a positive FIB of 0.478 next to Niger. Three of the WAMZ countries (50%)-Ghana, Guinea, and The Gambia - are below the ECOWAS average FIB and two of them- Ghana and Guinea- even performed worse than the ECOWAS -4% or better requirement. This means 4 (66.7%) of the WAMZ countries have a fiscal balance performance better than the ECOWAS criterion as compared to 87.5% for WAEMU. All in all four countries (26.7%)- Cape Verde, Ghana, Guinea and Guinea Bissau- in ECOWAS failed to meet the ECOWAS fiscal balance threshold.

What we can conclude from the fiscal balance variable is that there is a marginally better performance in WAEMU countries than the WAMZ and Cape Verde. Whilst we observe, from these statistics, some amount of convergence by 11 of the 15 countries by the ECOWAS benchmark, there is still a concern for the level of disparity of fiscal balances among even those 11 countries.

VII. Debt servicing requirement (DSR)

Debt servicing is one of the secondary criteria for ECOWAS convergence. The debt servicing requirements of ECOWAS countries are shown in column 7 of table 7.1. Cape Verde has the highest DSR up to 137.3%. This figure is exceptionally different from the rest of the ECOWAS countries which seems to be an outlier and because Cape Verde is not in any of the zones in ECOWAS we recalculate the ECOWAS average by excluding it in order to facilitate a fairer and more reasonable comparison of the two zones. ECOWAS average debt service requirement is 31.1% but reduces to 23.5% without Cape Verde. For the purpose of our analysis of the DSR we use the latter average. We have no benchmark for deciding whether the ECOWAS average is high or low. This is not much important since the focus of our analysis is the examination of the countries to know whether they are similar or not in macroeconomic terms. The average DSR for WAEMU is 16.5% which is 7 points (30%) below the ECOWAS. The lowest DSR is 7.2% (Guinea Bissau) and the highest is 32.8% (Mali). Mali's DSR appears to be an outlier within WAEMU as the next country to it, Senegal, is way below at 20.3%. Seven of the eight WAEMU countries (87.5%) are below the ECOWAS DSR. On the other side, WAMZ average DSR is 32.8% which is 8.3 points (40%) above the ECOWAS average. The lowest DSR for WAMZ is 6.4% (Nigeria) and the highest is 78.1% (Sierra

Leone). Four of the WAMZ countries (66.7%) are below the ECOWAS average and the two that are above the average (Sierra Leone and The Gambia) are exceptionally higher than the other WAMZ countries.

The DSR statistics revealed that WAEMU countries are slightly better than the WAMZ countries and most importantly there is a high degree of dissimilarities in DSR among the ECOWAS countries with Cape Verde being abnormally different from the rest.

VIII. Current account balance (CAB)

The current account balance statistics, for ECOWAS, expressed as a percentage of GDP are presented in column 8 of table 7.1. The statistics show an ECOWAS average of -7.5% with Nigeria having a surplus of 5.4% (best) and Liberia having -21.9% (the worst).

The average for WAEMU+1 is -6.8% and that of WAEMU is -6.3%. The WAEMU average is slightly better than the ECOWAS average. Cote d'Ivoire is the best performing country in WAEMU with a current account surplus of 2% whilst the worst performing country, Niger, has a CAB of -11.6%. WAMZ CAB average is -8.5% which is slightly worse than the ECOWAS average. Nigeria with a current account surplus of 5.4% is the best in WAMZ and also ECOWAS as a whole. The worst in WAMZ and ECOWAS as whole is Liberia with a current account balance of -21.9%.

Our finding for the CAB variable is that Nigeria outstandingly outperformed all ECOWAS countries but overall the WAEMU countries appear to be slightly better than the WAMZ countries and overall the CAB statistics provide no evidence that the ECOWAS countries are similar.

7.4.3 Pre- cluster analysis- sub periods

In this section we analyse the sub-periods 1998-2002 (period 1), 2003-2007 (period 2), and 2008-2012 (period 3) in order to see how the eight macroeconomic variables have changed over time as compared to the full period. The results for these periods are shown on tables 7.2-7.4 which are also graphically presented in appendices A.27-A.34. Like the full period analysis we do the sub-period analysis on a variable by variable basis. The averages for each variable for each monetary zone and ECOWAS as a whole are plotted in charts shown in figure 7.3.

I. Synchronisation in the business cycle (BUS)

The business cycle correlations of ECOWAS countries and the EU for each of 1998-2002, 2003-2007 and 2008-2012 are shown in the first column of tables 7.2, 7.3 and 7.4 respectively. The statistics in these tables and the charts in Appendix A.27 show no synchronisation pattern in the business cycles of ECOWAS countries with EU. The statistics show that for the five year period 1998-2002 only four of the fifteen ECOWAS countries (27%) have positive correlation (Cape Verde, The Gambia, Senegal and Togo) with a range of -0.966 to 0.899. In 2003-2007, just before the financial crisis, the number of countries with positive business cycle correlation increased to 9 (60%) with minimum of -0.717 to 0.931. Apart from Guinea Bissau with a positive correlation of 0.094, all the other 8 countries with positive correlations are greater than 0.5 meaning all of them can be considered to have a high correlation. Despite this improvement from the first period it is still difficult to say that there is symmetry in the ECOWAS business cycle since 7 (47%) of the countries business cycle is negative including Guinea Bissau with a marginally positive correlation. In the third period, 2008-2012, the countries with positive correlation even increased further to 10 (67%) with a minimum of -0.717 and maximum of 0.894. six of these positive correlations are higher than 0.5 which we can consider to be high correlation while three may be considered moderate as shown in table 7.4 and Appendix A.27. However, six of the countries (40%) still have negative correlation or marginally positive (as the case of Guinea Bissau).

Table 7.2 Unstandardised data and descriptive statistics (1998-2002)

country	BUS	TOT	RTI	RER	INF	FIB	DSR	CAB
BEN	-0.4038	-0.292	0.172	0.030	3.664	-1.680	25.594	-5.846
BFA	-0.6835	0.199	0.272	0.042	**1.042**	-4.160	27.982	-10.682
CPV	**0.8991**	-0.152	0.014	0.048	3.373	-4.860	175.23	-10.496
CIV	-0.2382	0.463	0.206	0.041	1.743	-1.000	24.633	-0.148
GHA	-0.9470	0.297	0.153	0.109	**18.957**	-6.060	21.903	-4.978
GIN	**-0.9658**	0.001	0.069	**0.025**	3.279	-4.320	22.082	-5.388
GNB	-0.2625	-0.322	0.097	0.079	6.998	**-9.360**	7.768	**1.162**
LIB	-0.8688	0.650	**0.008**	0.047	10.905	-0.240	**0.275**	**-12.802**
MLI	-0.4806	**0.796**	0.196	0.051	1.887	-2.980	43.467	-7.522
NER	-0.8134	**-0.963**	**0.309**	0.029	2.091	-3.240	18.885	-7.118
NGA	-0.2579	-0.275	0.050	**0.272**	9.462	**0.642**	9.728	-1.828
SEN	0.6819	0.320	0.153	0.033	1.267	-1.300	30.374	-5.348
SLE	-0.6189	0.704	0.070	0.145	10.863	-6.780	**220.77**	-2.804
GMB	0.8408	-0.333	0.113	0.032	4.443	-5.540	99.333	-4.166
TGO	0.5100	0.344	0.224	0.052	3.213	-0.380	14.175	-6.766
Descriptive statistics								
ECOWAS								
Min	-0.966	-0.963	0.008	0.025	1.042	-9.360	0.275	-12.802
Max	0.899	0.796	0.309	0.272	18.957	0.642	220.769	1.162
Mean	-0.241	0.096	0.140	0.069	5.546	-3.417	49.480	-5.649
WAEMU								
Min	-0.813	-0.963	0.014	0.029	1.042	-9.360	7.768	-10.682
Max	0.899	0.796	0.309	0.079	6.998	-0.380	175.227	1.162
Mean	-0.088	0.044	0.183	0.045	2.809	-3.218	40.901	-5.863
mean no CPV	-0.211	0.068	0.204	0.045	2.738	-3.013	24.110	-5.284
WAMZ								
Min	-0.966	-0.333	0.008	0.025	3.279	-6.780	0.275	-12.802
Max	0.841	0.704	0.153	0.272	18.957	0.642	220.769	-1.828
Mean	-0.470	0.174	0.077	0.105	9.652	-3.716	62.348	-5.328

Table 7.3 Unstandardised data and descriptive statistics (2003-2007)

country	BUS	TOT	RTI	RER	INF	FIB	DSR	CAB
BEN	**0.931**	-0.213	0.170	0.028	1.735	-1.720	12.351	-7.350
BFA	-0.325	-0.284	**0.387**	0.032	**1.166**	-0.600	13.165	-10.010
CPV	0.758	**-0.948**	0.020	0.039	2.421	-3.660	**165.09**	-8.806
CIV	-0.311	-0.281	0.231	0.026	1.229	-0.880	5.857	1.296
GHA	0.926	0.052	0.159	**0.145**	12.293	**-7.800**	13.220	-5.702
GIN	-0.692	-0.799	0.065	0.091	**21.791**	-2.060	15.256	-3.942
GNB	0.094	0.745	0.230	0.028	2.600	-3.380	8.162	-2.052
LIB	0.787	-0.073	**0.012**	0.029	6.149	1.260	6.448	**-16.066**
MLI	0.601	-0.532	0.207	0.028	2.135	2.820	30.965	-6.438
NER	0.585	**0.793**	0.255	0.028	2.040	**6.420**	19.981	-8.114
NGA	-0.443	0.111	0.043	0.044	9.615	2.040	9.057	**10.148**
SEN	**-0.717**	-0.121	0.202	0.029	2.107	-4.600	17.710	-8.582
SLE	0.815	-0.111	0.090	0.021	9.683	4.980	10.036	-4.290
GMB	-0.039	-0.028	0.170	0.068	5.617	-3.260	95.538	-7.478
TGO	0.887	0.154	0.297	**0.021**	1.902	-2.480	**5.658**	-9.562
Descriptive statistics								
ECOWAS								
Min	-0.717	-0.948	0.012	0.021	1.166	-7.800	5.658	-16.066
Max	0.931	0.793	0.387	0.145	21.791	6.420	165.090	10.148
Mean	0.257	-0.102	0.169	0.044	5.499	-0.861	28.566	-5.797
WAEMU								
Min	-0.717	-0.948	0.020	0.021	1.166	-4.600	5.658	-10.010
Max	0.931	0.793	0.387	0.039	2.600	6.420	165.090	1.296
Mean	0.278	-0.076	0.222	0.029	1.926	-0.898	30.993	-6.624
mean no CPV	0.218	0.033	0.247	0.027	1.864	-0.553	14.231	-6.352
WAMZ								
Min	-0.692	-0.799	0.012	0.021	5.617	-7.800	6.448	-16.066
Max	0.926	0.111	0.170	0.145	21.791	4.980	95.538	10.148
Mean	0.226	-0.141	0.090	0.066	10.858	-0.807	24.926	-4.555

ECOWAS average business cycle correlation overall has shown an improvement from a negative of -0.241 in 1998-2002 to a positive of 0.257 but a slight decline in the third period to 0.208 (tables 7.2-7.4). It appears that ECOWAS business cycle correlation was best in the period 2003-2007 and worst in the first period, 1998-2002. A feature that is also common in ECOWAS business cycle correlation is the lack of consistency in individual countries correlation. For instance, The Gambia has a high positive correlation in 1998-2002 then moved to a low negative in 2003-2007 and to a high negative in 2008-2012 and for the same periods Senegal has high positive, high negative and medium positive respectively. Guinea moved from high negatives in the first two periods to a high positive in the final period. Only Cape Verde and Togo that were consistent in positive business cycle correlation for all the three periods. Overall average shown in figure 7.3 indicate that there is fluctuation in business cycle correlation for WAEMU, WAMZ and ECOWAS as a whole with WAEMU cycle closely following that of ECOWAS with slightly worse performance in the WAMZ average which tends to be below ECOWAS with the exception of the period 2003-2007.

The finding for the trend in ECOWAS business cycle correlation is that there is a great degree of asymmetry among countries for each of the three sub-periods. Individual countries correlation performance is inconsistent over time and also WAEMU countries appear to show slightly a better performance than WAMZ.

Table 7.4 Unstandardised data and descriptive statistics (2008-2012)

country	BUS	TOT	RTI	RER	INF	FIB	DSR	CAB
BEN	0.317	**-0.711**	0.072	0.033	3.072	-2.520	9.650	-8.400
BFA	0.534	-0.340	**0.283**	0.038	3.333	-4.380	9.000	-4.370
CPV	**0.894**	-0.599	0.014	0.035	2.072	-8.320	**71.604**	-13.710
CIV	-0.421	-0.109	0.256	0.042	2.952	-2.000	9.590	4.794
GHA	0.812	0.136	0.149	0.033	9.928	**-8.440**	7.176	-9.454
GIN	0.746	-0.247	0.033	**0.008**	**12.720**	-8.340	6.951	-17.026
GNB	0.096	-0.385	0.222	0.037	3.789	-0.880	5.562	-5.550
LIB	**-0.717**	0.537	**0.008**	0.030	6.884	**-0.640**	20.094	**-36.798**
MLI	-0.193	**0.759**	0.223	0.035	**1.816**	-3.700	23.897	-8.310
NER	0.585	0.124	0.250	0.034	2.485	-2.760	9.077	-19.622
NGA	-0.153	0.305	0.040	**0.152**	10.536	-2.600	**0.471**	**7.894**
SEN	0.365	0.155	0.217	0.041	1.977	-5.900	12.836	-8.672
SLE	0.345	0.542	0.064	0.031	11.984	-4.740	3.476	-23.280
GMB	-0.611	0.518	0.131	0.042	2.836	-2.260	28.339	-14.628
TGO	0.526	-0.062	0.230	0.046	2.494	-4.460	8.904	-8.704
Descriptive statistics								
ECOWAS								
Min	-0.717	-0.711	0.008	0.008	1.816	-8.440	0.471	-36.798
Max	0.894	0.759	0.283	0.152	12.720	-0.640	71.604	7.894
Mean	0.208	0.042	0.146	0.042	5.258	-4.129	15.108	-11.056
WAEMU								
Min	-0.421	-0.711	0.014	0.033	1.816	-8.320	5.562	-19.622
Max	0.894	0.759	0.283	0.046	3.789	-0.880	71.604	4.794
Mean	0.300	-0.130	0.196	0.038	2.665	-3.880	17.791	-8.060
mean no CPV	0.226	-0.071	0.219	0.038	2.740	-3.325	11.064	-7.354
WAMZ								
Min	-0.717	-0.247	0.008	0.008	2.836	-8.440	0.471	-36.798
Max	0.812	0.542	0.149	0.152	12.720	-0.640	28.339	7.894
Mean	0.070	0.299	0.071	0.049	9.148	-4.503	11.084	-15.549

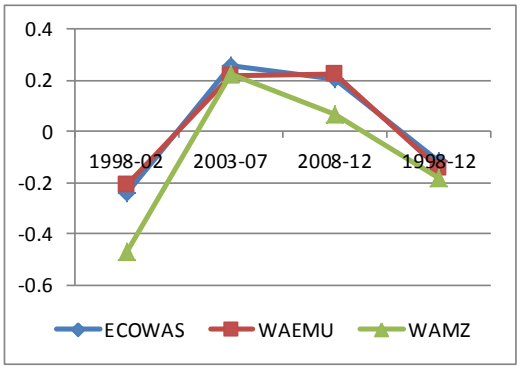
II. Terms of trade synchronisation (TOT)

The terms of trade correlations of ECOWAS countries with the EU are shown in the second column of tables 7.2, 7.3 and 7.4 for 1998-2002, 2003-2007 and 2008-2012 respectively. These correlations for the individual countries are plotted in charts shown in Appendix A.28 with overall regional averages shown in figure 7.3. The result show that for the whole of ECOWAS, nine of the fifteen countries (60%) show positive terms of trade correlation with EU during the period 1998-2002 with a minimum of -0.963 (Guinea) and maximum of 0.796 (Mali). Only four of these positive correlations are above 0.4 and lowest of the nine is Guinea with marginally positive at 0.001. For the second period (2003-2007) the number of countries with positive correlation fell to only five (33%) with a minimum of -0.948 (Cape Verde) to a maximum of 0.793 (Niger). Apart from Niger (0.793) and Guinea Bissau (0.745) all the other three positive correlations are around 0.1. This indicates deterioration in terms of trade from period 1 to period 2. In the third period (2008-2012) there is an improvement in the terms of trade as indicated by the increase in the number of positive correlation countries to 8 (53%) though, slightly below the first period figure. The minimum for the third period is -0.711 (Benin) and the maximum is 0.759 (Mali). The average terms of trade for

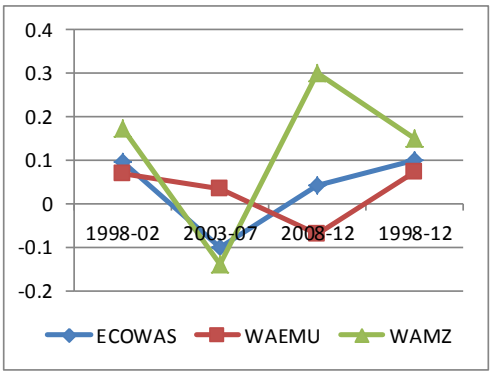
ECOWAS fell from 0.096 in period 1 to -0.102 in period 2 with a marginal improvement to 0.042 in period 3 (figure 7.3). The distribution of the countries in the scatter graph in Appendix A.28 shows a pattern similar to that of the business cycle correlation in Appendix A.27. There is no consistency in individual countries correlation performance. In 1998-2002 the countries on the top positive correlation scale (Mali, Sierra Leone and Liberia) all have varying degree of negative correlations in 2003-2007 with high positive again in 2008-2012. Guinea Bissau, one of the top correlation countries in 2003-2007 is at the bottom (negative) in both 1998-2002 and 2008-2012.

Figure 7.3 ECOWAS Macroeconomic variable charts- Average

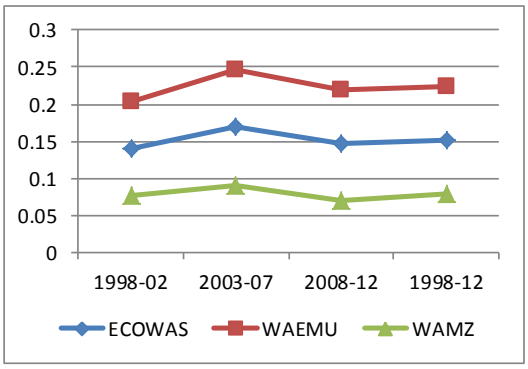
Business cycle correlation (BUS) chat- Average



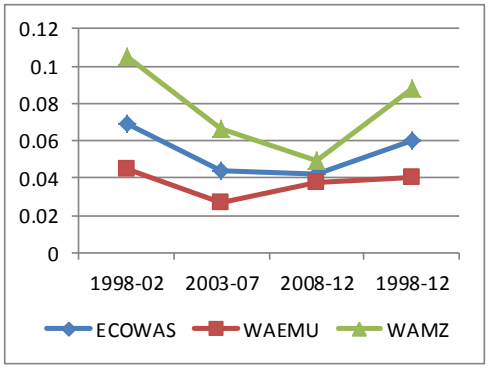
Terms of trade correlation (TOT) chat- Average



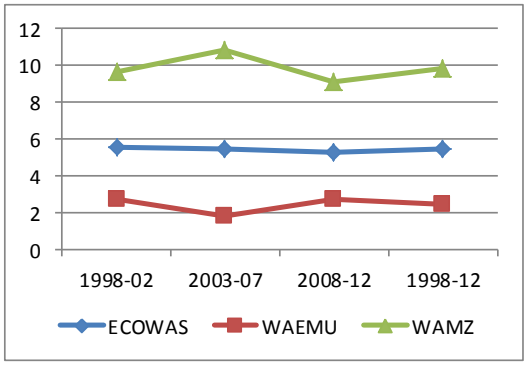
Trede openness (RTI)- Average



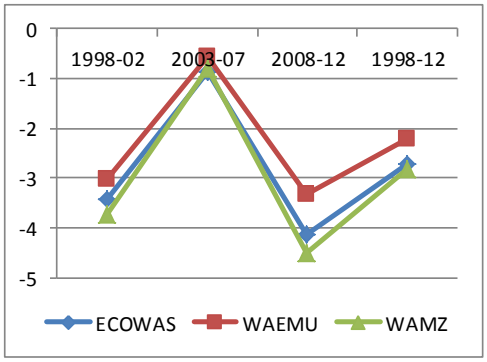
Convergence in RER- Average



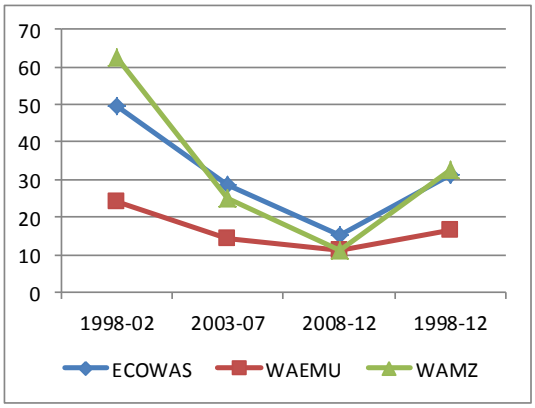
Inflation convergence (INF)- Average



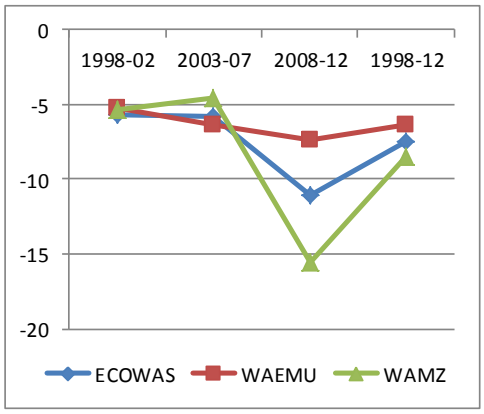
Fiscal Balance (FIB- Average



Debt service requirements (DSR)- Average



Current account balance (CAB)- Average



Similarly Niger, with the highest positive correlation in 2003-2007 (0.793) has the highest negative correlation (-0.963) in 1998-2002. These results suggest that there is no symmetry in ECOWAS terms of trade and that countries performance over time is very volatile.

III. Trade openness (GTI/RTI)

We report in the third columns of tables 7.2, 7.3 and 7.4, respectively, the intra-ECOWAS trade statistics for the three periods 1, 2 and 3. These intra-regional trade statistics are also graphically presented in appendix A.29 with averages plotted in figure 7.3. The ECOWAS averages are 14%, 16.9% and 23% for periods 1, 2, and 3 respectively. Although, the averages show an improvement over time they are however low relative to the comparative EU statistics we mentioned above. For period 1, 8 ECOWAS countries (53%) are above the ECOWAS intra-regional trade average, seven of which are WAEMU (87.5%. This figure increased to nine countries in period 2 (60%) with eight countries being from WAEMU (100%). The statistics for the number of countries above the ECOWAS average in period 3 are the same as those for period 1 for both ECOWAS and the zones. A distinctive trade pattern emerged for ECOWAS as indicated in appendix A.29 and figure 7.3. First, WAMZ countries trade with other ECOWAS countries is consistently lower than WAEMU for all the three periods and the full period and this trade is depicted by a U-shaped curve in all four periods with countries retaining their positions in the curve in all cases. All the four U-curves show that Ghana and the Gambia on each of the ends of the curves have the highest trade in WAMZ both maintaining their trade levels in double digits for all periods. Liberia is at the bottom of the curves in all four periods with trade level around 1% in all four periods. Liberia and Cape Verde are the lowest trade open countries in ECOWAS as shown in appendix A.29 with the latter being slightly better than the former. Nigeria's intra-ECOWAS trade for the three periods range from 4% (period 3) to 5% (period 1) which means that it is not only low in all periods but even declining over time. Intra-ECOWAS trade for WAEMU, as already mentioned, is higher than WAMZ with Burkina Faso being consistently having the highest level of trade. Benin's trade is not at the level of the WAEMU trade as in all the three periods it is always closer or within the WAMZ level. There also appear to be diversity in intra-ECOWAS trade within WAEMU especially in the first period. However, the countries' trade seem to converge

over time as seen in the distribution in the three periods with Benin being an outlier especially in 2008-2012. When the intra-ECOWAS trade averages are plotted in a graph as in figure 7.3 we see a clear demarcation between WAEMU, way above ECOWAS average, and WAMZ, well below the average.

The finding from these results is that for all the periods under consideration, the level of trade within ECOWAS is low. We also found that intra-ECOWAS trade in WAEMU countries is consistently higher than the WAMZ countries in all the periods, both on individual countries and on average bases, although there is no supporting evidence that the level of trade by WAEMU and ECOWAS as a whole do justify the case for monetary union.

IV. Volatility in real exchange rate (RER)

The results of the real exchange rate volatility for ECOWAS countries for the three periods 1998-2002, 2003-2007 and 2008-2012 are respectively shown in column 4 of tables 7.2, 7.3 and 7.4 and the respective graphical plots are in appendix A.30. The overall averages for the four periods are presented in figure 7.3. The ECOWAS average real exchange rate volatility for the first three periods are 0.068, 0.044 and 0.042 respectively. In the period 1998-2002 WAEMU's average real exchange rate volatility is 0.024 (35%) below the ECOWAS average while in 2003-2007 and 2008-2012 it is 0.017 (39%) and 0.004 (8.5%). For all the three periods all WAEMU countries' real exchange rate volatility are below the ECOWAS average except in period 3 where only one country, Togo narrowly exceeded the average by 0.004 (9.5%). Cape Verde exchange rate volatility is very much similar to WAEMU as their two currencies are both rigidly pegged to the Euro. The exchange rate volatility in WAMZ currencies is diverse within and over time periods under consideration. In 1998-2002 only three of the WAMZ countries (Guinea, Liberia and The Gambia) are below the ECOWAS average. In the period after the financial crisis all ECOWAS currencies tend to converged with the exception of Nigeria which is a way up the volatility scale as shown in appendix A.30 and figure 7.3. There is inconsistency in exchange rate volatility in WAMZ. For instance in the period 1998-2002 the three most volatile currencies (Nigeria, Sierra Leone and Ghana) are different from those in 2003-2007 (Ghana, Guinea and The Gambia). The fall in Ghana's real exchange rate volatility in 2008-2012 may also be partly explained by the re-denomination of their currency in 2007 which

coincided with the period just before the financial crisis. In 2008-2012 when almost all ECOWAS currencies converged, Nigeria still remained an outlier making its currency the most volatile in ECOWAS. Our result for Nigeria's currency volatility is consistent with the finding of Ogunkola (2002). The exchange rate volatility statistics suggest that WAEMU countries show a low level of exchange rate volatility than WAMZ countries. Also Nigeria's currency appeared to be the most volatile in ECOWAS.

The implication of these variations in real exchange rate volatility within and over time is that the cost of abandoning these currencies for monetary union may be low and of no concern if the cause of the volatility is by chance since the currency will be fixed in the union. However, there might be serious costs implications and therefore concerns for the abandonment of these currencies if the volatility is caused by policy changes in exchange rate in order to fine tune the economies of these countries when they experience shocks as such policy instrument is no longer available to the control of any particular country when once the monetary union kicks in.

V. Convergence in inflation (INF)

The results of the inflation differential between ECOWAS countries and EU for the three periods 1998-2002, 2003-2007 and 2008-2012 are respectively shown in column 5 of tables 7.2, 7.3 and 7.4 and the respective graphical plots are in appendix A.31. The overall averages for the four periods are presented in figure 7.3. Like the regional trade integration, the inflation differentials of ECOWAS countries show a clear division between WAEMU, with low differential, and WAMZ, with high differentials. The ECOWAS average inflation differential is 5.546, 5.499 and 5.258 for the periods 1998-2002, 2003-2007 and 2008-2012 respectively. There is hardly any improvement in the overall inflation situation. All the countries in WAEMU and Cape Verde have a low inflation differential with the EU, way below the ECOWAS average, for all the periods under consideration with the exception of Guinea Bissau which exceeded the ECOWAS average only in 1998-2002 by 1.45 (26%). The overall WAEMU average is below the ECOWAS average by 2.808 (51%), 3.864 (66%) and 2.518 (48%) for the periods 1, 2 and 3 respectively. On the side of WAMZ, the average is above the ECOWAS average by 4.106 (74%), 5.359 (97%) and (74%) for periods 1, 2 and 3 respectively. This shows a striking difference, more so in the opposite direction, between the two zones as shown in figure 7.3 and appendix A.31. In 1998-2002 only two of the WAMZ countries

(Guinea and The Gambia) have average inflation differentials below ECOWAS average while in 2003-2007 all the WAMZ countries inflation differential are above the ECOWAS average and in 2008-2012 only The Gambia has an average below the ECOWAS average. This means that WAMZ countries are not only worse than WAEMU, in terms of the inflation differential variable, in all the periods under consideration but their performance is not getting any better over time. Most of these countries' inflation differentials are in double digits rising as far as 19% for Ghana in 1998-2002 and 22% for Guinea in 2003-2007, tables 7.2 and 7.3 respectively. Similar to real exchange rate volatility, the inflation differential for Cape Verde converges to the WAEMU countries for all the periods. The weak inflation performance of WAMZ as compared to WAEM U and Cape Verde is clearly supported and visible in figure 7.3 and appendix A.31.

The inflation differential results revealed that there is a lack of inflation convergence for ECOWAS especially among the WAMZ countries whose inflation differentials with the EU is consistently high for all countries and over time with no sign for improvement. For all the periods under consideration the inflation differential of WAEMU appear to show convergence with the EU. Overall, these raise question on the one-size-fits-all monetary policy in a monetary union.

VI. Government/fiscal balance (FIB)

The fiscal balance statistics for ECOWAS for the periods under consideration are shown in tables 7.2, 7.3 and 7.4 with graphical presentation in appendix A.32 and figure 7.3. The ECOWAS averages are -3.417%, -0.861% and -4.129% for 1998-2002, 2003-2007 and 2008-2012 respectively. For the first period, only Nigeria has a positive fiscal balance of 0.64%. This figure increases to five countries (33%) in the second period with a decline to zero in period 3. Nine of the ECOWAS countries (60%) have fiscal balance performance better than the ECOWAS average but the figure declined to six (40%) in the second period and finally 8 (53%) in period 3. Ghana is consistently on the high negative side of fiscal balance for all periods with Sierra Leone showing an improvement only in 2005-2009 (period 2). The fiscal balance statistics for the ECOWAS countries are very diverse with hardly any consistent pattern to clearly distinguish between the two zones on country by country basis, although the overall averages in figure 7.3 show a slightly better performance for WAEMU.

The indication from the FIB variable is that there is lack of consistent similarity within the two zones and ECOWAS as a whole.

VII. Debt servicing requirement (DSR)

The debt service requirement as a percentage of total exports for ECOWAS for the periods 1998-2002, 2003-2007 and 2008-2012 are shown on tables 7.2, 7.3, and 7.4 respectively and the graphical presentation of the countries on appendix A.33 and the regional averages on figure 7.3. Cape Verde is an outlier for all the three periods with debt service ratio of 175%, 165% and 71% for 1998-2002, 2003-2007 and 2008-2012 respectively. However, in 1998-2002, Sierra Leone tops all ECOWAS countries with DSR of 221%. The three most indebted countries are Cape Verde, Sierra Leone and The Gambia as seen on the charts in appendix A.33. In the second period, Sierra Leone's DSR converged with the rest of ECOWAS countries leaving Cape Verde at the top of the ratio followed by The Gambia. Debt dissimilarities were highest in 1998-2002 with more convergence in 2003-2007 with the exception of the two outliers already mentioned. This may be due to debt forgiveness by international creditors. The overall averages plotted in figure 7.3 indicate that WAEMU countries have relative lower debt service ratios than WAMZ. Overall, we find a very volatile debt servicing requirement for ECOWAS countries

VIII. Current account balance (CAB)

The current account balance as a percentage of GDP for ECOWAS countries is shown on tables 7.2, 7.3 and 7.4 for 1998-2002, 2003-2007 and 2008-2012 respectively and the plots in appendix A.34 and regional averages plotted in figure 7.3. In the first period only one country, Guinea Bissau, has a positive current account balance of 1.16%. In the second and third periods only Nigeria and cote d'Ivoire have positive balances with Nigeria standing at an exceptionally high figure of 10% in 2003-2007 as compared to the extreme end of -16% for Liberia. Liberia suffered the worst CAB consistently for all the periods under consideration with the peak of

-37% in 2008-2012. Performance for the fifteen countries is mixed with high degree of diversity within period and over time as shown in the charts in appendix A.34. On overall average basis, figure 7.3 indicates that for the first period, 1998-2002, the two zones were at par with exactly the same average. In 2003-2007, WAMZ is slightly

better than WAEMU with averages of -4.6% and -6.4% respectively. The divergence between the two zones is highest in 2008-2012 with much better performance by WAEMU whose average is -7.4% (below ECOWAS average) and WAMZ average is -15.5 (above ECOWAS average).

Our finding, therefore, is that there is no pattern of symmetry in current account balances in ECOWAS and that the performance in both WAEMU and WAMZ is very uncertain and highly volatile.

7.4.4 Hierarchical clustering results for the full period

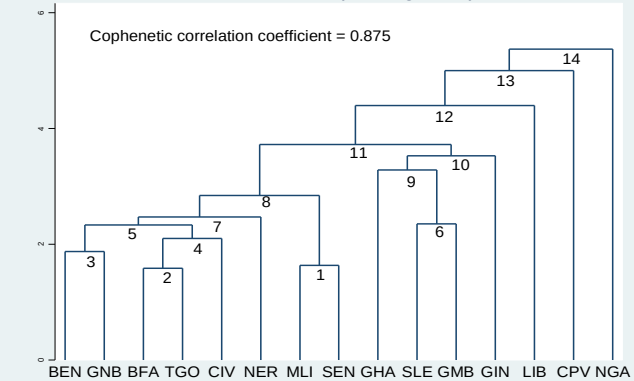
In this section, we apply the cluster analysis technique to group the fifteen ECOWAS countries according to all the eight variables already discussed above: the correlation or synchronisation of the business cycle (BUS), Trade openness or regional trade integration (RTI), correlation or synchronisation of terms of trade (TOT), convergence of inflation (INF), real exchange rate volatility (RER), Government/fiscal balance (FIB), debt servicing requirement (DSR) and current account balance (CAB). We cluster the countries in four different periods. We consider the fifteen year period 1998-2012 known as the full period. This enables us to see how these countries are similar or dissimilar in terms of their macroeconomic structure over a longer period of time. We then consider three sub-periods: 1998-2002, 2003-2007 and 2008-2012 known as period 1, period 2 and period 3 respectively. These three sub-periods enable us to analyse the degree to which the changing policy environments at the national and international levels have impacted on the homogeneity across these countries over time.

We use the aggregation algorithm with the highest cophenetic correlation coefficient (CCC) as the baseline for our analysis. In order to examine the robustness of the results, we use other aggregation algorithms alongside the baseline. To determine the number of clusters, we use the Calinski/Harabasz Pseudo-F index (CHI) and Duda-Hart stopping-rule (DH). The CHI selects the optimal number of clusters at the point with the highest possible index. Good practice suggests the use of two stopping rules jointly in this selection. For this purpose we use the second method DH jointly with CHI. The conventional wisdom, suggested in the STATA multivariate statistics reference manual, for deciding the number of groups based on the Duda–Hart stopping-rule table is to find one of the largest Je(2)/Je(1) values that corresponds to a low pseudo-T-squared value that has much larger T-squared values next to it. The CHI and DH stopping rules output

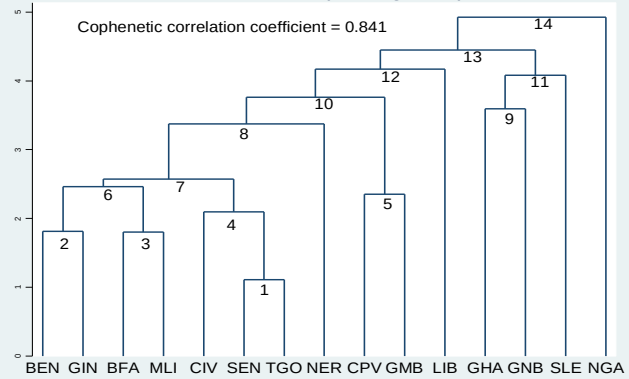
table is shown in appendix A.35 for the four periods in our analysis with the number of clusters selected in each case shown in bold. In general an effective representation of the data requires that the number of clusters be neither too small nor too large. As our sample contains 15 countries we limit the number of clusters to 2-7 solution (i.e. at least half of the number of cases). The merging of the countries is shown in the dendrograms in figures 7.4a-d for the average linkage agglomerative algorithm. The average linkage is the baseline for our analysis because it has the highest cophenetic correlation coefficients (CCC) of 0.875, 0.841, 0.851 and 0.906 for the periods 1998-2012, 1998-2002, 2003-2007 and 2008-2012 respectively.

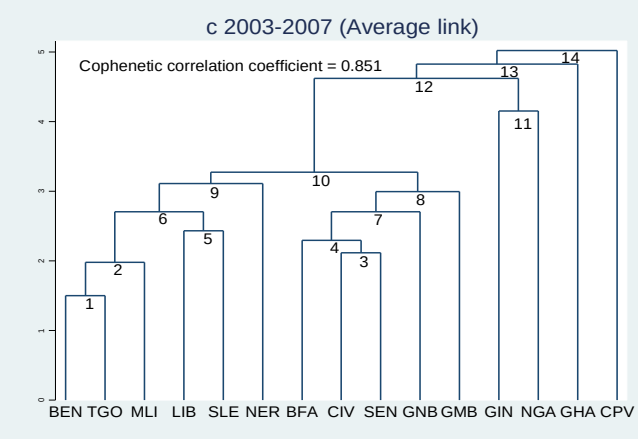
Figure 7.4 Dendrograms for all periods- group average clustering

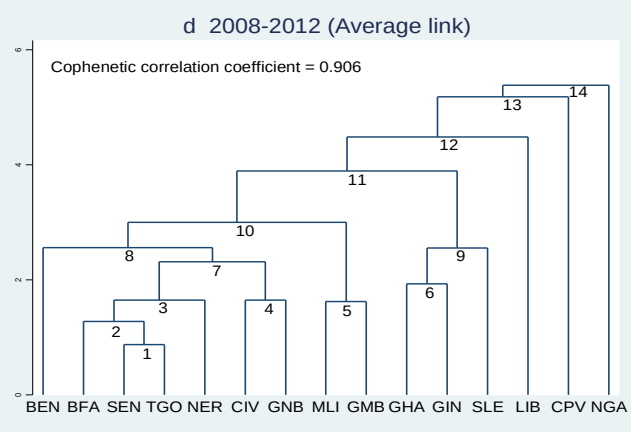
Average linkage Dendrogram for ECOWAS 1998-2012



Average linkage dendrogram for ECOWAS 1998-2002







The reported CCC for all the four dendrograms are reasonably high meaning that the cluster information generated by these dendrograms is a good representation of the dissimilarities in the data. In each of figures 7.4a-d the vertical axis represents distances (or dissimilarities) and the horizontal axis indicates the fifteen countries in our sample.

Starting with the left of the dendrogram for the full period in figure 7.4a we can see that Mali and Senegal are merged first at the smallest distance as shown by the shortest vertical lines. Burkina Faso and Togo are merged second at a vertical distance that is almost the same as that for the first two. The third merger in the far left is Benin and Guinea Bissau at a distance not too far from the first and second mergers. The second merged countries are joined by Cote d'Ivoire at level 4. We observed that the merger at level 8 completes the merging of the eight WAEMU countries which all appeared to be merged at relatively shorter distances to each other indicating closer similarities between these countries. On the right hand side we have Cape Verde and the six WAMZ countries. The first merger on the right at level 6 is Sierra Leone and The Gambia indicating that these two countries are most similar and the distance at which they are merged is within the WAEMU countries. These two countries are joined by Ghana at level 9 with a level of distance higher than the WAEMU countries distance. Guinea, then later joined this group of three at level 10, not a high distance away from the Ghana merger. The three countries that last merged the rest of the group to have a single cluster at levels 12, 13 and 14 are Liberia, Cape Verde and Nigeria respectively and all of these three countries appeared to be singletons. Nigeria been the least country to join the rest indicates it is the country with the least similarities with the rest of the ECOWAS countries. A visual inspection of the dendrogram for 1998-2012 jointly with the criteria of the two cluster stopping rules, CHI and DH, in appendix A.35 suggests an optimal number of five clusters. The output results for this clustering are presented in the top part of table 7.5 and the variable means of each cluster for the average linkage method are shown in table 7.6. Cluster 1 contains all the eight WAEMU countries shown on the left side of the Dendrogram in figure 7.4a: Benin, Burkina Faso, Cote d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo. The main features of this cluster are that it has the highest degree of compliance in regional trade integration (22.3%), real exchange rate volatility (0.04), and lowest inflation differential with the EU countries (2.447). In each of these three variables, the cluster performance is exceptional better than the ECOWAS average and all the other four clusters.

Table 7.5 Hierarchical clustering results- 1998-2012

Linkage method	Cluster number						
	1	2	3	4	5	6	7
Average Linkage (5 clusters) CCC=0.875	BEN BFA CIV GNB MLI NER SEN TGO	GHA GIN GMB SLE	LIB	CPV	NGA	-	-
Centroid Linkage (7 clusters) CCC=0.870	BEN BFA CIV GMB GNB MLI NER SEN TGO	SLE	GIN	GHA	LIB	CPV	NGA
Single Linkage (7 clusters) CCC=0.867	GHA	GIN	SLE	BEN BFA CIV GMB GNB MLI NER SEN TGO	LIB	CPV	NGA
Complete Linkage (5 clusters) CCC=0.832	BEN BFA CIV GNB MLI NER SEN TGO	GHA GIN GMB SLE	LIB	CPV	NGA	-	-
Ward's Linkage (6 clusters) CCC=0.578	BEN BFA CIV GNB NER TGO	MLI SEN	GHA GIN GMB SLE	LIB	CPV	NGA	-

Table 7.6 Variable means of each Cluster using Average Linkage

		BUS	TOT	RTI	RER	INF	FIB	DSR	CAB
Average Link 1998-2012	1	-0.140	0.073	0.223	0.040	2.447	-2.224	16.468	-0.6330
	2	-0.201	0.129	0.105	0.074	10.366	-0.410	45.334	-0.595
	3	-0.283	0.502	0.009	0.053	7.979	0.177	8.939	-21.889
	4	0.431	-0.012	0.016	0.045	2.622	-5.885	137.307	-11.004
	5	-0.013	-0.118	0.044	0.181	9.871	0.478	6.419	5.405
ECOWAS mean		-0.120	0.098	0.152	0.060	5.434	-2.711	31.051	-7.500
Average Link 1998-2002	1	-0.299	0.108	0.200	0.038	2.273	-2.383	25.899	-6.102
	2	0.870	-0.242	0.063	0.040	3.908	-5.2	137.28	-7.331
	3	-0.869	0.65	0.008	0.047	10.905	-0.24	0.275	-12.80
	4	-0.605	-0.013	0.125	0.094	12.978	-7.71	14.835	-1.908
	5	-0.619	0.704	0.070	0.145	10.863	-6.78	220.77	-2.804
	6	-0.258	-0.275	0.050	0.272	8.462	0.642	9.728	-1.828
ECOWAS mean		-0.241	0.096	0.140	0.069	5.546	-3.417	48.480	-5.649
Average Link 2003-2007	1	0.768	0.003	0.172	0.026	3.941	1.88	14.240	-8.637
	2	-0.260	0.006	0.244	0.037	2.544	-2.544	28.086	-5.365
	3	-0.692	-0.799	0.065	0.091	21.79	-2.06	15.256	-3.942
	4	-0.443	0.111	0.043	0.044	9.615	2.04	9.057	10.148
	5	0.926	0.052	0.159	0.145	12.293	-7.8	13.220	-5.702
	6	0.758	-0.948	0.020	0.040	2.421	-3.66	165.09	-8.806
ECOWAS mean		0.257	-0.102	0.169	0.044	5.499	-0.861	28.566	-5.797
Average Link 2008-2012	1	0.286	-0.190	0.219	0.039	2.871	-3.271	8.231	-7.218
	2	-0.402	0.639	0.177	0.038	2.326	-2.98	26.118	-11.47
	3	0.634	0.144	0.082	0.024	11.544	-7.173	5.868	-16.59
	4	-0.717	0.537	0.008	0.030	6.884	-0.64	20.094	-36.80
	5	0.894	-0.599	0.014	0.035	2.072	-8.32	71.604	-13.71
	6	-0.153	0.305	0.040	0.152	10.536	-2.6	0.471	7.894
ECOWAS mean		0.208	0.042	0.146	0.042	5.258	-4.129	15.108	-11.06

In terms of fiscal balance, cluster 1, is fourth out of the five clusters which is only better than cluster 4 (-5.9%). This means the fiscal balance position of these countries is not that good. In terms of the debt service requirement (DSR) and current account balance (CAB) the cluster is third in the rank. The average terms of trade (TOT) correlation with the EU is relatively low at 0.073 (even lower than the ECOWAS average correlation of 0.098). The business cycle correlation with the EU is on the low negative (-0.14) which is common problem for other clusters with the exception of cluster 4 which has a high positive correlation (0.431).

Cluster 2 contains four of the WAMZ countries: Ghana, Guinea, The Gambia and Sierra Leone which were also closely merged in figure 7.4a. From table 7.6, the features of these countries include a moderate level of intra-ECOWAS trade at 10.5% though lower than cluster one and ECOWAS as a whole, the second highest exchange rate volatility and the highest level of inflation differential from the EU (at 10.4). For the fiscal

balance, cluster 2 is better than clusters 1 and 4 but the DSR is second highest, exceeded only by cluster 4. Finally it has relatively low negative CAB, low negative BUS and low positive TOT correlation. Clusters 3, 4 and 5 are all singletons, as shown on the far right of figure 7.4a, and contain Liberia, Cape Verde and Nigeria respectively. The key features of cluster 3 include a very low level of intra-ECOWAS trade (0.9%), moderate exchange rate volatility, high inflation differential, positive fiscal balance, low debt service requirement, very high negative current account balance, the highest positive terms of trade correlation with the EU but low negative BUS. Cluster 4's features include highest business cycle correlation with the EU (0.431), very low negative TOT correlation, low intra-ECOWAS trade, second lowest exchange rate volatility and inflation differential (next to WAEMU), the highest negative fiscal balance, highest debt service requirement (137.3%) and second highest negative current account balance. Finally, cluster 5 main features include low level of intra-ECOWAS trade, highest exchange rate volatility, second highest inflation differential, positive fiscal and current account balances and a low debt service requirement.

We compare the baseline results for the full period with the other four agglomerative algorithms in the same period as shown in table 7.5 as our robustness check. The grouping of the ECOWAS countries is no different from our baseline results. This comparison provides us with evidence that our results are not affected by a change in the merging method. The cophenetic correlation coefficients of the dendrograms for the centroid linkage, single linkage, complete linkage and Ward's linkage are 0.870, 0.867, 0.832 and 0.578 respectively. Apart from the Ward's linkage, the other three methods all have CCC closer to 1. This means that the cluster information produced by the dendrograms of these methods is a good representation of the dissimilarities in the data. Although the Ward's method has the lowest CCC we still present its results in order to check the consistency and strength of our results. Using the two cluster stopping rules (CHI and DH) in appendix A.35 the optimal number of clusters for the centroid linkage (CL), single linkage (SL), complete linkage (COL) and Ward's linkage (WL) are 7, 7, 5 and 6 respectively. We have not shown the dendrograms for the other four methods, due to space, but the output results are on table 7.5. We see from the results that All the four alternative methods clustered the 8 WAEMU countries together just as cluster 1 of the baseline results. These 8 countries are in cluster 1 of the CL, cluster 4 of the SL, cluster 1 of the COL and clusters 1 and 2 of the WL. The four countries (Ghana, Guinea,

The Gambia and Sierra Leone) in cluster 2 of our baseline results are also in the same clusters for two of the alternatives: cluster 2 of the COL, and cluster 3 of the WL while in the other two alternative- CL and SL- three of these four countries are shown as singletons with the exception of The Gambia which is clustered in the WAEMU countries indicating closer similarities of this countries with the group of eight.

A number of findings are revealed from the clustering of the ECOWAS countries for the period 1998-2012. First, the eight WAEMU countries all belong to the same cluster and our sensitivity/robustness check does not change this result. This means that these eight countries shared many similarities in their macroeconomic features. The policy implication of this finding is that these eight countries are good candidates for monetary union and/or for a peg with the EU. Second, the non WAEMU countries, WAMZ and Cape Verde, do not form the same cluster with WAEMU neither within themselves although there is some evidence that four of the WAMZ countries- Ghana, Guinea, The Gambia and Sierra Leone- appeared to belong to a cluster of their own from the rest. Three of the non WAEMU countries- Liberia, Cape Verde and Nigeria- are all singletons (each of them on a cluster of their own). This finding, about the non WAEMU countries is insensitive even with our robustness check. This means that these seven countries in ECOWAS have many economic dissimilarities from their WAEMU counterpart leading us to the conclusion, from the OCA theory perspective, that a single monetary union is not only inappropriate for ECOWAS as a whole but also for the non WAEMU countries as such moves may have serious costs consequences. The results, however, provide evidence that only four countries- Ghana, Guinea, The Gambia and Sierra Leone- are good candidates for the formation of WAMZ, the ECOWAS second monetary zone, without the inclusion of Liberia and Nigeria. Although our empirical results support the formation of such a union its size, however, will cast doubt on the economic benefits to be derived from such a small monetary union which may make such a move inappropriate for these four countries. Whilst the current ECOWAS integration arrangement provides the option for Cape Verde to join either WAEMU or WAMZ, there is no evidence from our results supporting that it is a good candidate for any of the two zones.

Table 7.7 Hierarchical clustering results for- 1998-2002

Linkage method	Cluster number						
	1	2	3	4	5	6	7
Average Linkage (6 clusters) CCC=0.841	BEN BFA CIV GIN MLI NER SEN TGO	CPV GMB	LIB	GHA GNB	SLE	NGA	
Centroid Linkage (3 clusters) CCC=0.844	BEN BFA CIV CPV GHA GIN GMB GNB LIB MLI NER SEN TGO	SLE	NGA				
Single Linkage (7 clusters) CCC=0.783	NGA	GHA	LIB	BEN BFA CIV GIN MLI NER SEN TGO	CPV GMB	GNB	SLE
Complete Linkage (6 clusters) CCC=0.730	NGA	GHA GNB	BEN BFA CIV GIN MLI NER SEN TGO	LIB	CPV GMB	SLE	-
Ward's Linkage (5 clusters) CCC=0.60	BEN BFA CIV GIN MLI NER SEN TGO	CPV GMB	LIB	NGA	GHA GNB SLE	-	-

7.4.5 Hierarchical clustering results for the sub-periods

Next we turn to the clustering for the three sub-periods, 1998-2002, 2003-2007 and 2008-2012. The results of these clustering will enable us to see whether the grouping of ECOWAS countries have changed over time and if so how and also explore on possible reasons for such changes. Starting with period 1 (1998-2002) the cophenetic correlation

coefficients (CCC) of each of the dendrogram from the average linkage, centroid linkage, single linkage, complete linkage and the Ward's linkage are 0.841, 0.844, 0.783, 0.730 and 0.60 respectively. These are reasonably high, indicating that the cluster information generated by the dendrograms is a good representation of dissimilarities in the data. The CCC for the average linkage and the centroid linkage are the highest with only a difference of 0.003. Since the difference between these two is immaterial we continue to use the average linkage agglomerative algorithm as the baseline for our analysis and use the other four as robustness check.

The dendrogram for the average linkage method for the period 1998-2002 is shown in figure 7.4b. From this graph we see that Senegal and Togo are the first two countries merged at the shortest distance at level 1, Benin and Guinea merged at level 2, Burkina Faso and Mali at level 3, Cote d'Ivoire joined Senegal and Togo at a much higher distance at level 4. Niger at the centre joined other WAEMU countries on the left at a much higher distance at level 8 but still does so before any of the none-WAEMU countries first join the group at level 10 which is Cape Verde and The Gambia. What this means is that although Niger is much similar to the other WAEMU countries than non-WAEMU countries it features some degree of dissimilarities with the WAEMU countries. Also Cape Verde and the Gambia are the most similar countries to WAEMU than any other non-WAEMU countries. On the right side of the dendrogram are the none-WAEMU countries with Nigeria been the least to join the rest of the other countries. An inspection of the dendrogram in figure 7.4b and the cluster stopping rules (CHI and DH) in appendix A.35 suggest an optimal number of 6, 7, 6 and 5 clusters for the average linkage, single linkage, complete linkage and Ward's respectively. The clustering results for all the methods including the centroid are shown on table 7.7 and the variable means of each cluster on table 7.6. Cluster 1 of the average linkage (our baseline) consists of 8 countries, 7 of which are WAEMU and Guinea. Guinea Bissau, a WAEMU country, joins Ghana in cluster 4. The features of cluster 1 are mainly highest intra-ECOWAS trade (20%), lowest real exchange rate volatility, lowest inflation differential, third highest debt service requirement, fourth highest negative current account balance, low negative business cycle correlation and a low positive terms of trade correlation. A possible reason that might have brought Guinea to the WAEMU group during period 1 might be due to its lowest real exchange rate volatility (0.025) and low inflation differential (table 7.2) which are key features of these countries. Cape

Verde and The Gambia are in cluster two with the key features of Highest positive business cycle correlation (0.870), low intra-ECOWAS trade, low exchange rate volatility and inflation differential (next to cluster 1 in both cases), high negative fiscal balance, second highest DSR and fourth largest negative CAB. Clusters 3 (Liberia), 5 (Sierra Leone) and 6 (Nigeria) are all singletons. The key features of cluster 4 (Ghana and Guinea Bissau) include: high negative business cycle correlation, moderate intra-ECOWAS trade (12.5%) which is next to cluster 1, high exchange rate volatility (above ECOWAS average), highest inflation differential (12.98%), highest negative fiscal balance and second lowest CAB. The highest level of DSR (220.8%) for Sierra Leone, in period 1, is the key feature in addition to highest TOT correlation (0.704) that might have singled it out in cluster 5. For Liberia in cluster 3 the main features include: highest negative BUS correlation, second highest positive TOT correlation, lowest intra-ECOWAS trade (0.8%) and largest CAB. For Nigeria in cluster 6 it is the only cluster with a positive FIB, low intra-ECOWAS trade, the largest RER volatility (0.272). The centroid linkage with only 3 clusters is still consistent with the rest of the methods in showing Sierra Leone and Nigeria as singletons and the rest of the countries in cluster 1.

Considering the alternative methods we can see consistency in grouping of these countries. Clusters 4, 3 and 1 of the single linkage, complete linkage and Ward's linkage respectively all have the same 8 countries contained in cluster 1 of our baseline results. Liberia, Sierra Leone and Nigeria are all shown as singletons, just as our baseline results by the single linkage and the complete linkage which is the same for the Ward's linkage except that Sierra Leone is joined to Ghana and Guinea Bissau. Overall our finding for period 1 is that WAEMU countries are mainly in the same cluster, joined by Guinea, except Guinea Bissau which clustered with others outside the zone. Second we found that the 7 none-WAEMU are fragmented into different clusters with most of them as singletons which indicates a degree of dissimilarities among these countries. Our findings are insensitive to the type of agglomerative method used for merging the countries and that the findings for 1998-2002 are no different from the full period.

2003-2007

We consider the results for period 2 (2003-2007). The dendrogram showing the merging process, using the average linkage, for this period is shown in figure 7.4c. The

average linkage and centroid linkage both have the same CCC of 0.851 but for consistency we continue to use the former as the baseline for our analysis for period 2. The cophenetic correlation coefficients for the single linkage, complete linkage and the Ward's linkage are respectively 0.811, 0.823 and 0.656. From the far left of the dendrogram (figure 7.4c) Benin and Togo are the first two countries that are merged at the shortest distance at level 1 then joined by Mali at the second level. Cote d'Ivoire and Senegal are merged at level 3 then joined by Burkina Faso at level 4 and later by Guinea Bissau (level 7) and The Gambia (level 8). The group in the middle is then merged with the left group at a very small distance. This left-middle group is finally joined by the group on the right at a larger distance as indicated by the vertical line. The least country to join the rest of the group is Cape Verde after Ghana. This dendrogram has no clear separation between WAEMU and non-WAEMU countries especially in the middle and the far left. An inspection of the dendrogram and the cluster stopping rules (CHI and DH) in appendix A.35 indicates an optimal number of 6 clusters. Similarly the optimal number of clusters for the centroid linkage, single linkage, complete linkage and the Ward's linkage are 5, 5, 5 and 2 respectively. The clustering output results for the average linkage and the other four merging methods are shown on table 7.8. The variable means of each cluster reported on table 7.6.

The baseline results (average linkage) produced four singletons out of the six clusters: cluster 3 (Guinea), cluster 4 (Nigeria), cluster 5 (Ghana) and cluster 6 (Cape Verde), all of which are non-WAEMU countries with three of them been from WAMZ. The key features of cluster 3 are highest negative BUS and TOT correlations, second highest RER volatility and the highest inflation differential. For cluster 4 the main features include: highest positive (though still very low) TOT correlation, second lowest intra-ECOWAS trade and the highest and the only positive CAB. Cluster 5 is mainly characterised by highest positive BUS correlation (0.93), highest RER volatility, second highest inflation differential and highest negative FIB. Cluster 6's key features are high positive BUS correlation, highest negative TOT correlation, lowest intra-ECOWAS trade, highest DSR and high CAB. The WAEMU countries are split into 50% each into clusters 1 and 2 with 50% of the WAMZ countries included in these two clusters. Cluster 1 contains Benin, Liberia, Mali, Niger, Sierra Leone and Togo. The main features of cluster 1 are high positive BUS correlation, low RER volatility, low inflation differential, second highest positive FIB and second highest negative CAB. For cluster

2, main features include highest intra-ECOWAS trade (24.4), low RER volatility, second lowest inflation differential and second highest DSR. Despite the unusual grouping, we still see the WAEMU countries in only two clusters meaning they still group together as opposed to the WAMZ and Cape Verde which are spread into all the six clusters and four of which are singletons.

Table 7.8 Hierarchical clustering results for- 2003-2007

Linkage method	Cluster number						
	1	2	3	4	5	6	7
Average Linkage (6 clusters) CCC=0.851	BEN LIB MLI NER SLE TGO	BFA CIV GMB GNB SEN	GIN	NGA	GHA	CPV	
Centroid Linkage (5 clusters) CCC=0.851	BEN BFA CIV GMB GNB LIB MLI NER SEN SLE TGO	NGA	GHA	GIN	CPV		
Single Linkage (5 clusters) CCC=0.811	GIN	CPV	BEN BFA CIV GMB GNB LIB MLI NER SEN SLE TGO	NGA	GHA	-	-
Complete Linkage (5 clusters) CCC=0.823	GIN NGA	GHA	CPV	BEN BFA CIV GMB GNB SEN TGO	LIB MLI NER SLE		
Ward's Linkage (2 clusters) CCC=0.656	BEN BFA CIV GNB LIB MLI NER SEN SLE TGO	CPV GHA GIN GMB NGA					

Apart from some mergers of some of the clusters, our results from the other four merging methods do not change the results in any significant way. For instance the four singletons in our baseline method (Guinea, Nigeria, Ghana and Cape Verde) remained so in the centroid (clusters 2, 3, 4 and 5), single linkage (clusters 1, 2, 4 and 5), complete linkage (clusters 2, 3 and 1 which merges two of them). The Ward's linkage,

with only 2 clusters the four singletons into one cluster and brought The Gambia into it making it a cluster of 71% of non-WAEMU countries. The Ward's linkage has brought together in its cluster 1 the two clusters (1 and 2) of the baseline results that constitute the WAEMU countries. These clustering results continue to provide evidence in support of our earlier finding that the WAEMU countries are so similar that they always group together and despite of the events that may have affected these countries during the 2003-2007 period they have not suffered any serious fragmentation as compared to the WAMZ countries.

The slightly unusual grouping that we see in period 2 such as the 50:50 split of WAEMU countries and the mixing of the non-WAEMU countries in this split should attract our attention on some developments in the region that may help to explain these clustering results. Cote d'Ivoire, in 1999, saw the overthrown of her post-independence president with presidential elections in 2000 which was followed by violence. In 2002, armed rebellion splits the country into the rebel controlled north and government controlled south. In 2004, most of the conflicts ended but the country was still in a tense situation and elections held in 2010. In Senegal and The Gambia, there were several political instabilities at different times – for instance the Casamance rebels in Senegal, but the main one to mention here that involved both countries is the 2005 ferry tariffs dispute on the border that resulted to a transport blockade which led to the suffering of both economies (http://www.bbc.co.uk/news/world-africa-14093813). Guinea Bissau experienced a military coup in 1998 and two in 1999 with elections held in 2000 followed by political instability in 2001 and another military coup in 2003. Following elections in 2004 there were two failed coups in 2004 and 2009

(http://www.irinnews.org/printreport.aspx?reportid=95341). In 2000, Sierra Leone's decade of civil conflict came to an end with stability and recovery in early part of the decade and the situation is similar for Liberia. Mali's war began in the 1990s but not until 2007 when it gained a momentum with serious escalation in 2011 following the influx of arms from Libya after the Fall of Gadhafi. It appears that, in the average linkage method, those countries with conflicts either in an early or recovery stage (Liberia, Sierra Leone and Mali) are grouped together with Benin, Niger and Togo (relatively stable WAEMU countries) in cluster 1 where as those with more troubled conflicts especially close to or within the 2003-2007 period (Cote d'Ivoire, The Gambia,

Guinea Bissau and Senegal) are mainly in cluster two. This may suggest that the political instability in ECOWAS countries may partly be responsible for some of the asymmetries in the region and therefore might be obstacle to convergence.

Our finding for the period 2003-2007 is that countries in WAEMU and WAMZ are mixed in the two largest clusters although the fact that the WAEMU countries are more similar than the WAMZ countries and always group together is still not refuted. WAMZ countries still not grouping together which is an indication of the lack of similarities in their economic structures. We also found that conflicts and political instability could partly be responsible for the lack of homogeneity in ECOWAS countries.

2008-2012

The dendrogram for the average linkage for period 3 (2008-2012) is shown in figure 7.4d with a cophenetic correlation coefficient of 0.906 which is not only the highest for the agglomerative algorithms used in this period but for all the dendrograms produced in our analysis which continues to justify its use as our baseline for the analysis. The CCCs of the dendrograms for the centroid linkage, single linkage, complete linkage and the Ward's linkage are 0.837, 0.834, 0.881 and 0.689 respectively. The values of all the CCCs are reasonably high indicating that the clustering results produced by these dendrograms are a good representation of the data. Unlike the 2003-2007, the dendrogram for 2008-2012, just like all others in other periods showed a clear demarcation between WAEMU and WAMZ. Senegal and Togo are the first countries merged at the lowest distance at level 1 later joined by Burkina Faso (level 2) and Niger (level 3). Cote d'Ivoire and Guinea Bissau are both merged at level 4, Mali and The Gambia at level 5, Ghana and Guinea at level 6. The far right countries that joined the rest of the group at much higher distances are non-WAEMU countries with Liberia, Cape Verde and Nigeria been the least to join the rest of the countries. The dendrogram in figure 7.4d and the cluster stopping rules (CHI and DH) in appendix A.35 suggests an optimal number of 6 clusters for the average linkage and 5, 4, 6, 5 for the centroid, single linkage, complete linkage Ward's linkage respectively. The clustering results for all the five methods are shown in table 7.9 and the variable means for each of the clusters are in table 7.6. The average linkage method grouped all the 8 WAEMU countries, with the exception of Mali, in cluster 1 whose key features include: highest intra-ECOWAS trade (21.9%), low RER volatility and inflation differential. Cluster 2 is

made up of The Gambia and Mali with key features of highest positive TOT correlation, high intra-ECOWAS trade, low RER volatility and inflation differential and high DSR. Cluster 3 includes Ghana, Guinea and

Table 7.9 Hierarchical clustering results- 2008-2012

Linkage method	**Cluster number**					
	1	**2**	**3**	**4**	**5**	**6**
Average Linkage (6 clusters) CCC=0.906	BEN BFA CIV GNB NER SEN TGO	GMB MLI	GHA GIN SLE	LIB	CPV	NGA
Centroid Linkage (5 clusters) CCC=0.837	BEN BFA CIV GMB GNB MLI NER SEN TGO	GIN GHA SLE	LIB	CPV	NGA	
Single Linkage (4 clusters) CCC=0.834	NGA	LIB	BEN BFA CIV GHA GIN GMB GNB MLI NER SEN SLE TGO	CPV	-	-
Complete Linkage (6 clusters) CCC=0.881	NGA	LIB	BEN BFA CIV GNB NER SEN TGO	GMB MLI	GHA GIN SLE	CPV
Ward's Linkage (5 clusters) CCC=0.689	BEN BFA CIV GNB NER SEN TGO	GMB LIB MLI	NGA	GHA GIN SLE	CPV	-

Sierra Leone. The main features of cluster 3 are high BUS correlation, low RER volatility, high inflation differential and high negative FIB. Clusters 4, 5 and 6 are all singletons with Liberia, Cape Verde and Nigeria respectively. Cluster 4 has a high

negative BUS correlation, high positive TOT correlation, low RTI, and highest negative CAB. Cluster 5 is with the highest positive BUS correlation, highest negative TOT correlation, low RTI, high negative FIB, and Highest DSR. Finally cluster 6 has the highest RER volatility, second highest inflation differential, lowest DSR and highest and the only positive CAB.

The baseline clustering results are not different from the other four alternative methods. Nigeria and Cape Verde still are singletons in all the four alternatives and Liberia in three of them. Ghana, Guinea and Sierra Leone are consistently clustered together in three of the four alternatives (centroid, complete linkage and Ward's linkage). Like the baseline results, the 8 WAEMU countries with the exception of Mali are all in the same cluster in all the four alternatives. The singling out of Mali from the rest of the WAEMU countries in the 2008-2012 may be connected with the escalation of its conflict in 2007 and 2011 as already mentioned above. We observe no significant difference between the 2008-2012 results and the other three periods. The WAEMU countries are similar and form a single cluster whereas the WAMZ countries show a high degree of dissimilarities and therefore do not belong to the same clusters.

7.4.6 Hierarchical clustering results for OCA and convergence variables

The final stage of our analysis is a further check of our results with regard to two sets of variables. The first set is the Optimum currency area (OCA) criteria comprising of BUS, TOT, RTI, RER and INF. The second category is the ECOWAS convergence criteria including RER, INF, FIB, DSR and CAB. RER and INF are the two overlapping variables. This further analysis enables us to see whether there is any difference in our findings and any difference in grouping performance in terms of these two sets of variables. For the purpose of this particular analysis we only consider the full period (1998-2012). The clustering results are shown in appendix A.36 for the OCA variables, appendix A.37 for the convergence criteria variables. We further interrogate the data by asking whether the change of distance measure, such as the Euclidean distance used so far, will change our results. To answer this we use an alternative distance measure known as cityblock and the clustering results are shown in appendix A.38. In all these results we reported the cophenetic correlation coefficients which are reasonably high indicating the clustering information from these dendrograms are a good representation of the data (dendrograms not shown due to space). The number of clusters used to

generate the clusters is based on the two cluster stopping rules (CHI and DH). The average linkage method continues to have the highest CCC and therefore we continue to use it as our baseline.

For the OCA variables, the average linkage method grouped six of the WAEMU countries in cluster 1 plus The Gambia and the other two (Mali and Senegal) in cluster 2. This grouping is the same for the complete linkage method, which has a similar number of clusters to the average linkage. The Ward's method even have all the eight WAEMU countries plus The Gambia in cluster 1 and all the six non-WAEMU countries including five of WAMZ in cluster 2. Ghana, Liberia and Sierra Leone are in clusters 3 and 4 of the average linkage and complete linkage respectively. The single linkage only singled out Nigeria with all 14 others in one cluster. Our findings from the OCA variable grouping are that we have the WAEMU countries in the same clusters with more fragmentation of the non-WAEMU countries and that The Gambia is the only WAMZ countries that appeared to be similar to WAEMU countries as we can see it grouping in these countries. Therefore for the OCA criteria we conclude that WAEMU performs better than WAMZ which is consistent with earlier findings and conclusion.

The clustering results for the convergence criteria in appendix A.37 seem more overwhelming than the OCA. The eight WAEMU countries are all in clusters 1, 3 and 1 of the average linkage, single linkage and Ward's linkage respectively with the complete linkage having six of these countries in cluster 2 and 2 of them in cluster 1. The WAMZ countries and Cape Verde are fragmented into different groups with Liberia, Cape Verde and Nigeria as singletons in most of the cases. The Gambia and Guinea appeared to stick together in the same clusters for all the four methods. The clustering results of the ECOWAS convergence criteria still leave us with the conclusion that WAEMU countries are much more similar than their ECOWAS counterpart and much more dissimilarities among WAMZ and Cape Verde.

Finally, the change of distance measure from Euclidean to Cityblock appears not to change any of our findings so far. The average linkage, complete linkage and Ward's linkage clustering results in appendix A.38 grouped seven of the WAEMU countries in cluster 1, 2 and 1 respectively. In all three cases it is only Guinea Bissau that is not in the group which may be due to persistent and perennial conflicts and instability we discussed earlier. For the single linkage, all eight WAEMU countries plus The Gambia

are in cluster 2 with the rest of the five WAMZ and Cape Verde shown as singletons. Liberia, Cape Verde and Nigeria are singletons in all the 4 cases while Ghana, The Gambia and Sierra Leone appeared in the same cluster in 3 of the methods (average linkage, complete linkage and Ward's linkage) with Guinea being relatively unstable.

Chapter 8 Findings and Conclusion

8.1 Introduction

Since independence African countries have being following the path to economic integration with the objective of a united Africa, enhanced cooperation, improved trade flows between countries, and the alleviation of poverty on the continent. These objectives in mind led to the formation of the OAU in 1963 which was changed to the African Union in 2000 with a more strategic focus of African integration. With the formation of new RECs where they do not exist and the strengthening of existing ones, the aim on the continent is to form a monetary union and introduce the African single currency by 2021. The implementation of the African integration plan led to a number of overlapping regional economic community (RECs) being formed and virtually every African country belongs to one or more of these RECs. Examples include: Arab Maghreb Union (AMU), Common Market for Eastern and Southern Africa (COMESA), Southern Africa Development Community (SADC), Economic Community of Central African States (ECCAS), Economic Community of West African States (ECOWAS).

As part of Africa's post-independent economic integration plan, fifteen West African countries established the Economic Community of West African States (ECOWAS) in May 1975. The aims of ECOWAS are to promote co-operation and integration, leading to the establishment of an economic union in West Africa. Despite these common objectives, different monetary arrangements have existed since independence. The former British colonies moved from currency boards to floating exchange rates in the early 1970s, while, in 1945, after World War II, former French colonies and France set up a monetary arrangement in the form of the CFA franc (CFAF) zone. Two CFAs exist: Central African Economic and Monetary Community (CAEMC) and the West African Economic and Monetary Union (WAEMU). The former is not within the scope of this thesis.

In pursuit of its aims, ECOWAS has implemented a number of reforms over the years, as seen in the establishment of a common market through the channels of trade liberalisation, common trade policy and common external tariffs, removal of obstacles to the mobility of persons in order to foster intra-regional trade. With all these developments the hope of the ECOWAS to achieve a balanced and enhanced growth in

the region through larger and competitive market has fallen far below expectations (Okolo, 1988).

The purpose of this thesis therefore is to investigate three objectives in an attempt to answer the two research questions as stated in section 1.2 of chapter 1. The rest of the chapter is organised as follows: section 8.2 gives a brief background of theoretical framework and methodology, section 8.3 presents the findings and conclusions, we provide policy implications of our findings in section 8.4 and end with suggestions for further research in section 8.5.

8.2 Theoretical background and methodology

The existing literature on currency unions documents the costs and benefits of currency union. The main argument against floating exchange rates is the volatility of exchange rates which discourages international trade and investment. Monetary union is a collective way of countries fixing their exchange rates to avoid the risk caused by exchange rate volatility. The successful creation of the Euro in 1999 serves as additional incentive for other nations to continue or follow the path towards monetary union. The transaction costs saving arising from currency union come from the trade between union members. To join a monetary union countries have to relinquish their national currencies and central banks. This loss of monetary autonomy is what the literature described as the main cost of joining the monetary union. Mundell (1961) put forward the theory of optimum currency areas (OCA) which emphasises a number of criteria that countries should possessed to minimise the costs of monetary union.

McKinnon (1963) and Kenen (1969) extended the OCA theory by adding openness and product diversification respectively. In the sense of Mundell (1961), McKinnon (1963), and Kenen (1969), “an optimum currency area is defined as an area in which factor mobility is sufficiently great, or economic shocks are sufficiently common, that there is little need for relative price adjustment between different regions within the area” (Ching and Devereux, 2003:674). According to the OCA theory countries that possess the OCA characteristics are good candidates to form a currency union. The OCA theory, discussed in chapter 4, has since become widely used in empirical work on monetary union.

On the transaction costs saving side of monetary union the literature has emphasised the impact of currency union on trade between members. The seminal paper of Rose (2000a) opened up the debate on this topic when he found that countries in a currency union trade 3 times more than those not in a currency union. Following this finding a number of studies have been conducted with different results. Similarly the impact of exchange rate volatility on trade has attracted the attention of researchers since the collapse of the fixed exchange rate regime (Bretton Woods) in early 1970s. A study on this was pioneered by Hooper and Kohlhagen (1978). The literature on exchange rate volatility is much more volatile than the impact of currency union on trade. We reviewed the literature on the impact of exchange rate volatility and currency union on trade in chapter 4 together with the benefits and other costs.

To address the research questions of the thesis we adopt a three track approach. First in chapter 5 we applied the OCA and political criteria (labour mobility (Mundell, 1961); trade openness (McKinnon, 1963); product diversification (Kenen, 1969); similarity of inflation; fiscal transfers; homogeneous preferences; and solidarity vs nationalism) discussed in chapter 4 to assess the suitability of ECOWAS countries for currency union using EU12 as a benchmark. The second track in chapter 6 involved using panel data methodology to estimate an augmented gravity model of international trade, in both triple and double index form, in order to examine the impact of currency union and exchange rate volatility on ECOWAS bilateral trade. We estimate the model for the sample period 1980-2012. We conduct a sensitivity analysis with different exchange rate volatility measures to check the robustness of our results. In the third track we applied a cluster analysis methodology in chapter 7 in order to assess the degree of similarity/dissimilarity of ECOWAS countries in macroeconomic terms. For this analysis we used eight variables chosen from the OCA criteria and the ECOWAS convergence criteria. The variables include: Synchronisation in the business cycle, trade openness, terms of trade synchronisation, convergence of inflation, volatility in the real exchange rate, government/Fiscal balance, debt servicing requirement, and current account balance. According to the OCA theory the more similar the countries are in macroeconomic terms the lower the costs for them when they lose their individual monetary policies and the better they are for currency union. While the analysis in chapter 5 help us to know on country by country and variable by variable basis whether they satisfy the criteria, cluster analysis as a multivariate technique puts all the variables

together and classifies the countries into groups/cluster according to their degree of similarity/dissimilarity. We grouped the ECOWAS countries for the full period 1998-2012, and three sub-periods 1998-2002, 2003-2007, and 2008-2012. We applied hierarchical clustering to merge the countries with the agglomerative algorithm having the highest cophenetic correlation coefficient. As a robustness check we grouped the countries with a different distance measure and different agglomerative algorithms.

We used data from international data bases- IMF, World Bank, Pen world table- accessed via the UK data service.

8.3 Findings and conclusions

8.3.1 Findings

This section presents a summary of findings from our analysis.

I. Trade openness/Regional trade integration (RTI)

Theory suggests that the reduction of exchange rate uncertainty through the formation of a monetary union reduces transaction costs with the subsequent effect of increased cross-border trade. Also the OCA theory as argued by McKinnon (1963) that openness is an important characteristic for countries in a monetary union or contemplating the formation of one. We considered the openness criterion for ECOWAS in both chapters 5 and 6 and our findings depend on the measure of openness.

When trade openness is measured by the ratio of trade with the rest of the world to GDP we found ECOWAS to be highly open and in some cases even more than some of the EU12 countries. With this measure, excluding Liberia, the highest ratio was 151.5% (Benin) and lowest is 21.1% (Burkina Faso). With the exception of Nigeria and Cote d'Ivoire we found that greater proportion of total trade to GDP ratio is accounted for by imports and this finding is consistent with the trade deficit of the ECOWAS countries exhibited in chapter 3. Most of the exports to GDP ratios for these countries are in single digits. This could be explained by the overreliance on primary produce with adverse terms of trade.

However, when we measure countries' openness as a ratio of intra-ECOWAS trade to GDP we found ECOWAS countries' openness to be consistently far below the EU12. For the period under consideration from 1981-2011, the range of the ECOWAS ratio is

0.6-22.5% (or 0.6-20.9% without Liberia) as compared to the EU12 range of 15.8-128.4% (or 15.8-94.5% without Belgium). Liberia's ratios, especially imports, are extraordinarily large in the period 1993 and beyond which we explained in chapter 5 may have been caused by the civil war that broke out in 1991. Nigeria, the largest economy, has the smallest intra-ECOWAS imports to GDP ratio for all the five years considered. In terms of total intra-ECOWAS trade, Nigeria's ratio is only 0.9% in 1981, 4.3% in 1993 and by 2011 the ratio declined to 2.2%. Strikingly, by this measure of openness we found the least open economy in EU12, Greece (15.8-20.2%), to be even more open than almost all ECOWAS countries. While some countries show small increases over time, others show a decline even after the implementation of trade liberalisation which seems to suggest that ECOWAS trade benefits very little, if at all, from the trade liberalisation scheme that was intended to boost trade flows within ECOWAS. The lack of increase in trade from trade liberalisation has some support in the gravity model estimation in chapter 6 where in most of the estimations (exports, imports or total trade) the free trade agreement (FTA) has mixed results which are mostly negative significant, negative not significant, and positive not significant.

For our third openness measure (the ratio of intra-ECOWAS trade to total trade) we found, over the period under consideration, that the minimum ratio of 38.5% for the EU12 to be even higher than the maximum ratio of 33.2% for ECOWAS. This indicates the low level of trade among ECOWAS countries. Another finding with this measure of openness for ECOWAS is that the degree of openness is not only low for all countries and for all years under consideration but also the increase from one period to another is very small making these countries incomparable with the level of trade flows among the EU12 countries.

We also found that intra-ECOWAS trade in WAEMU countries is distinctively higher than the WAMZ countries in the full period and three sub-periods considered in chapter 7 (cluster analysis). WAMZ show hardly any improvement over time. Despite the relative difference between the two zones the overall intra-ECOWAS trade performance appears inadequate to yield significant benefits that justify the formation of currency union. Our findings in these different trade measures are similar to Masson and Patillo (2005); Masson (2008). In the 2008 paper, Masson found that intra-ECOWAS exports as a percentage of total exports was only 9.1% as compared 37.2 and 49.3% to

European Union and the rest of the world respectively. He described the intra-ECOWAS exports as being relatively unimportant relative to its total exports.

We conclude from the trade openness criterion that ECOWAS countries are very open to the rest of the world as indicated by the high level of extra-ECOWAS trade. As the level of trade among ECOWAS countries is low our results therefore provide no supporting evidence that the countries are open to each other. We argued that since the ECOWAS proposal is not for a single currency with the rest of the world but only for the fifteen member states what really matters most from the transaction costs savings argument of monetary union is the level of trade among the union members. Therefore our conclusion for the trade openness criterion is that the level of trade within ECOWAS is too small to justify the formation of a currency union.

II. Product diversification

According to the OCA theory, Kenen (1969) argued from the law of large number perspective that countries with a wide range of products in their trading portfolio can better smooth out the effects of shocks on trading commodities. Such countries can rely less on monetary policy to fine tune their economies and therefore feel less concerned about the loss of their national monetary policy to a common central bank. We examined ECOWAS countries in chapter five and found a lack of diversification in ECOWAS countries exports commodities. Six (40%) of the ECOWAS countries, Nigeria included, have 75% or more of their total exports dominated by the top three exports. These countries represent on average 76% of the ECOWAS GDP. The finding show a skewed distribution of this percentage among the three products with some countries showing high domination by one or two products (86.3% out of 93.8% from oil for Nigeria, 92.2% out of 92.2% from cashew nuts for Guinea Bissau, 70.5% out of 94.3% from natural uranium for Niger). We found Sierra Leone and Senegal to be exceptionally different from the rest of the ECOWAS countries in terms of the number of products in their top three exports as percentage of total exports being 41.8% and 38.3% respectively and the number of exports accounting for 75% of total exports is 22 for Sierra Leone and 19 for Senegal. Cape Verde, the country closest to these countries has only 9 exports accounting for 75% of total exports. However, further analysis revealed that Sierra Leone and Senegal are not significantly different from the rest despite the large number of exportables since most of them are either from agriculture

or mining which all belong to the group of primary produce. A price shock in primary produce may affect these countries in the same way it affects others and, as such, their range of exports cannot provide the shock absorbers advocated by Kenen.

Kenen concluded his argument that less developed countries, being less diversified and less well equipped with policy instruments, should make more frequent changes or perhaps resort to full flexibility of exchange rates. The lack of product diversification by ECOWAS countries implies, by this criterion, that they are not suitable candidates for monetary union.

III. Similarity of inflation (INF)

The study found a distinctive difference in inflation performance between WAEMU and WAMZ countries both before and after using the euro as anchor. Virtually all WAEMU countries have inflation below 5% bringing them closer to EU inflation rates. With EU as a benchmark WAEMU inflation differential is very low compared to WAMZ indicating that the former's inflation rates are not only similar but also converged to the euro area inflation. Cape Verde's inflation record is similar to WAEMU. The inflation rates of WAMZ countries for all the four periods considered in chapter 7 are consistently in double digits with very limited improvements. The rates are high and fragmented showing no sign of convergence with the ECOWAS criterion or EU's inflation rates. It appears that the euro peg of WAEMU and Cape Verde's currencies is yielding credibility benefit to these countries as argued in the literature. With this lack of similarity in inflation performance putting all ECOWAS countries together in a one-size-fits all monetary policy could have severe costs implications.

IV. Real exchange rate volatility (RERV)

For the exchange rate volatility we found that for all the four periods we considered: the full period (1998-2012) and the sub-periods (1998-2002, 2003-2007, 2008-2012) the exchange rate volatility in WAMZ countries is much higher than WAEMU countries and Cape Verde. Nigeria is found to have the most volatile currency in ECOWAS. As with the inflation case the euro peg appears to provide currency stability for the 8 WAEMU countries and Cape Verde meaning that these countries may be benefiting from the peg.

Putting all ECOWAS countries together in a single currency has a number of implications for monetary policy as we discussed in the policy implication section.

V. Business cycle (BUS) and terms of trade (TOT) synchronisation

For both BUS and TOT we used EU as an anchor to measure the correlation between the individual ECOWAS countries and EU as a measure of the degree of convergence with EU. It is argued that the more similar the business cycle or terms of trade as measured by their degree of synchronisation the better the countries are to form a monetary union or to peg against the anchor country. We found a lack of convergence with the EU12 countries in all ECOWAS countries for both business cycle and terms of trade. The results show either low positive or negative correlations. The lack of convergence in business cycle and terms of trade in ECOWAS means that asymmetric shocks exist which may cause difficulties for an ECOWAS central bank in designing and implementing a monetary policy that will fits all these countries in times shocks whether symmetric or asymmetric.

VI. Factor mobility: Labour and capital mobility

Mundell (1961) argued in his pioneering OCA theory that labour and capital mobility within a region are important characteristics for those countries to be good candidates for monetary union. On labour mobility we found that:

Intra-ECOWAS migration is higher in the periods prior to the ECOWAS liberalisation to allow free movement of persons, residence and establishment. This suggests the lack of evidence that the removal of restrictions on labour mobility mainly in the 1980s and 1990s is having any positive effects on ECOWAS economies.

Another finding on labour mobility is that intra-ECOWAS migration is higher than the intra-EU12 migration, although the former declines whilst the latter increases over time. However, the higher intra-ECOWAS migration is found to be caused mainly by wars and instability and the result of this migration is violence between migrants and citizens arising from competition for the limited jobs available, which fuels conflicts in other areas as some of the migrants become a source of recruitment for militants.

We argue that this kind of migration or labour mobility could play a little role as adjustment mechanism especially in the absence of jobs for the youth of the host countries. We saw in chapter 3 that youth unemployment and underemployment is a common problem for ECOWAS countries. Unless ECOWAS countries can create employment opportunities the free movement of persons with the right of residence and establishment policy will continue to cause violence, fiscal difficulties for host countries

and possible tension between countries in the region. This will not only fail the liberalisation objectives but even threaten ECOWAS unity and cooperation.

Capital mobility requires well established and integrated stock markets with cross border security trading (bonds and equities). This should be supported with an integrated banking sector with an effective payment system. Not all ECOWAS countries have stock markets and those that have may not have well diversified investors either nationally or across other ECOWAS countries. It may also be possible that only a few privileged wealthy individuals, institutional investors or international investors outside ECOWAS or Africa that hold securities in these markets due to poverty, low income or lack of investment awareness of ECOWAS citizens. Although not much analysis has been done in this area due to the data availability the information we considered does not seem to provide any evidence that the ECOWAS financial system (stock market and banking) is developed and integrated in the sense that can make capital mobility to be able to serve the purpose of adjustment when shocks happen in a monetary union.

VII. Fiscal transfers

Fiscal transfer is a form of risk sharing where payments can be made to people in an area that is adversely affected by a shock. It works best in a centrally coordinated fiscal system where a central authority collects and disburses tax revenue from member states. Such a system is not in existence in ECOWAS and it is very doubtful whether it will be, given the current level of disagreement in the establishment and implementation of a common external tariff. Although a fiscally federated system does not exist in the Euro zone, the existence of European budget and welfare systems that pay benefits to support people in difficulties could partly help solve the problem. We found no such system in existence in ECOWAS countries.

VIII. Other criteria

A number of other economic characteristics included in our analysis are: government/Fiscal balance, debt servicing requirement, current account balance. In all these three characteristics we found disparity in ECOWAS countries. The political criterion solidarity vs. nationalism which is the feeling of a sense of common destiny by member states is usually tested when the currency union is in action. However the experience of the euro has not provided any evidence that the sense of common destiny works in reality. The negative experiences of ECOWAS with migrants and the host

countries may also be an early indication that this criterion may not work for ECOWAS and therefore cannot be relied on as a risk sharing mechanism.

IX. Findings from cluster analysis

The cluster analysis in chapter 7 revealed a number of findings:

- We found the eight WAEMU countries all belong to one cluster and this is consistently so over all the four periods under consideration although Guinea Bissau appears to be economically uncomfortable on some occasions. We interpret this togetherness as a sign of similarity in macroeconomic characteristics that the OCA literature considered as one of the conditions countries should fulfil in order to be suitable for currency union if the cost of joining are to be minimised.
- We found a high degree of dissimilarity among the WAMZ countries with hardly any common characteristics which makes it difficult to see all of these countries in the same cluster.
- Three of the non-WAEMU countries, Liberia, Cape Verde and Nigeria, appeared as singletons i.e. each of them form an independent cluster from the rest. We interpret this as a lack of similarity of each of these three countries with the rest of ECOWAS countries.
- Ghana, Guinea, The Gambia and Sierra Leone appeared to belong to one cluster although over time they are not consistently together. This may imply that a WAMZ which includes Liberia, Nigeria and Cape Verde may have potential economic difficulties. However, the formation of a monetary union by only four countries may cast doubt on its economic benefit especially when these countries trade little with each other. This finding is similar to Bénassy-Quéré and Coupet (2005) whose study supports the creation of WAMZ with a limited sense connecting the Gambia, Ghana, and Sierra Leone to the WAEMU. They found no evidence supporting the inclusion of Nigeria in this monetary zone.
- Our findings are consistent for the full period and the three sub periods. We observe a slight difference in grouping for the sub-period 2003-2007. During this period we found a little fragmentation of WAEMU countries although not as much as the one we observed for WAMZ. WAEMU and WAMZ are mixed in the two largest clusters. However, the fact that the WAEMU countries are more similar than the WAMZ countries and always group together is still not wholly refuted. We

investigated the possible reasons for the distortion in the clustering results of this period and we observed that it is likely due to conflicts and political instability in the region, a problem that similarly distorts the trade statistics of Liberia.

- We carry out sensitivity analysis using different agglomerative methods of merging the countries (centroid linkage, single linkage, complete linkage and Wards' linkage) we found our results to be robust.

  Overall, putting all ECOWAS countries into one monetary union while it may be politically feasible it may be economically problematic due to the high degree of heterogeneity in macroeconomic characteristics especially among the WAMZ countries. Our findings are consistent with those of Tsangarides and Qureshi (2008), summarised in section 6.2. In their twenty sub-Saharan country study including 14 ECOWAS countries they found a significant lack of homogeneity in their sample with the highest degree of dissimilarities among WAMZ countries which have little in common with WAEMU. They also found WAEMU countries to belong to the same cluster just as our results revealed. With a fractional integration and cointegration methods Alagidede et al. (2012) also found significant heterogeneities in behaviour among WAMZ countries. Most importantly, the inclusion of Nigeria either in WAMZ or ECOWAS monetary union is not supported in our analysis as well as the findings of Tsangarides and Qureshi (2008) and Bénassy-Quéré and Coupet (2005).

X. Trade, currency union and exchange rate volatility findings

To examine the impact of currency union and real exchange rate volatility (RERV) on trade we estimate the gravity model, in chapter 6, using panel data methodology with different trade measures. Whatever trade measure we used (exports, imports, total trade) the effect of currency union on trade, using the OLS estimator, is positive and statistically significant both before and after controlling for zero trade. In some cases the effect is equal or close to the triple effect predicted by Rose. The size of the effect is however significantly reduced after accounting for the dynamic effect of trade (i.e. LDV). The statistical effect remained unaffected even after controlling for CSD.

With the FE estimator and after controlling for CSD our findings are significantly different from the OLS:

- Currency union has a negative and significant effect on exports before but negative and not significant after controlling for zero trade.
- Currency union has a negative but not significant effect on imports both before and after controlling for zero trade.
- Currency union has a positive but not significant effect on total trade before controlling for zero trade but it becomes negative and statistically significant after.

What is common in all the three trade measures as a dependent variable is that, there is no evidence to support the trade creation argument of currency union in the decades of WAEMU existence both before and after controlling for zero trade. This finding does not change even after including LDV in the regressors.

For real exchange rate volatility it has:

- a negative significant effect on exports and imports before controlling for zero trade and negative not significant after wards.
- a negative significant effect on total trade before but positive not significant effect after controlling for zero trade.

Our findings are similar to Pakko and Wall (2001). They replicated Rose's data and used gravity model and panel data to investigate the impact of common currency and free trade agreement on bilateral trade. They found that with pooled cross section without controlling for the fixed effects the trade creating effect of currency union is very similar to that of Rose i.e. common currency members trade 3.2 times more than when they have their separate currencies and for FTA trade is 2.5 times. With fixed effects model that accounts for individual heterogeneity, they found that currency union members trade 69% less than when they have their separate currencies (i.e. CU coefficient of -0.378) and for FTA trade is 0.08% less. Their conclusion was that CU reduces trade rather than increasing it when country-pair fixed effects (heterogeneity) are properly controlled for in the model. Another replication of Rose's data that provides similar findings to ours is the study by Persson (2001). He found a much smaller effect of currency union on trade ranging from 13 to 65 percent but the estimates are not significantly different from zero. Similar to our findings is also a study by Fountas and Aristotelous (1999) on the four largest EU economies, (Germany, France, Italy and UK). They investigate whether the ERM period coincides with an increase in intra-EU exports. They found that the EMS dummy variable is not

statistically significant for any of the four countries in the sample. They concluded that the creation of the ERM has not led to an increase in intra-EU exports either directly or indirectly. Our findings are also similar to Masson (2008), Masson and Patillo (2005) although the 2008 paper approached the problem from a welfare perspective. They found intra-African trade to be very low compared to the rest of the world. They also found that proposed African currency areas would not be welfare improving for all or even most of their potential members.

A general conclusion from our findings is that the existing currency union (WAEMU) in ECOWAS has no significant positive effect on bilateral trade of its members. On a specific trade basis the CU has a negative significant effect on exports, negative but not significant effect on imports and positive not significant effect on total trade.

We provide a possible explanation for the lack of trade creating effect of the WAEMU currency union. We saw in chapter 3 that Nigeria alone is 70% of ECOWAS economy and this country is a non-WAEMU member. When we add the other six non-WAEMU members' GDP to Nigeria the non-members of the existing currency union account for 80.9% of the ECOWAS GDP leaving only 19.1% for the eight WAEMU countries. With such a small market even if the currency union members decide to discriminate by diverting trade to members, which is not clearly supported in our trade diversion dummy, they can hardly make any significant trade boost for the union. It appears that due to the large size of non-WAEMU countries as compared to WAEMU members the latter's trade with the former may be significantly higher than the trade within their small market. This explanation reconciles the findings from the gravity model with our earlier finding that WAEMU countries' intra-ECOWAS trade is higher than the WAMZ's. What it really means is that putting ECOWAS as a whole the relative trade of WAEMU within ECOWAS is higher but within themselves trade is too small to create a positive impact due to the small size of their market.

8.3.2 Conclusions

ECOWAS countries' openness measured by the extent of trade within each other is low meaning less benefit could be derived from monetary union. The existing currency union in ECOWAS has not created trade for its members. The exports portfolio of all ECOWAS countries is made up of largely primary produce either from agriculture or mining which indicates a lack of product diversification. The ECOWAS countries

exhibit high level of inflation differences and for WAMZ countries their inflation rates are virtually all in double digits. While WAEMU countries and Cape Verde have stable currencies due to their euro peg the other ECOWAS countries suffered from volatile currencies. There is a high degree of dissimilarities in the business cycles and terms of trade of ECOWAS countries. The type of migration in ECOWAS may not be relevant to the labour mobility expectation of what the theory suggest. The financial systems are less developed and perhaps concentrated and not integrated to serve the objective of risk sharing and adjustment mechanism in monetary union when shocks occur. ECOWAS countries are highly heterogeneous especially WAMZ and therefore lack the economic characteristics of belonging to a one-size-fits all monetary policy that operates in a monetary union.

Based on our findings, the thesis therefore concludes firstly that the existing trade flows within ECOWAS is inadequate to yield economic benefits that should justify the formation of a currency union. Secondly, ECOWAS is not an optimum currency area which means that the fifteen countries together do not exhibit the characteristics that should qualify them to be good candidates for a currency union.

8.4 Policy implications

The findings and conclusion of this thesis have a number of implications for ECOWAS. The lack of inflation similarity in ECOWAS means relative prices between countries change and therefore a one-size-fit all monetary policy will be inappropriate for these countries. Both differences in inflation rates and exchange rate volatility may cause a dilemma for the ECOWAS central bank as we discussed in the adjustment mechanisms in chapter 4. In the event of a country's or countries' specific shock the common central bank has no option that will remedy the problem satisfactorily for all the affected and unaffected countries.

The size and the exports structure of Nigeria posed a special problem for ECOWAS. Nigeria has the most volatile currency in ECOWAS, it is one of the ECOWAS countries with high inflation rates and also over 80% of exports come from a single primary commodity, oil, whose price is highly vulnerable in world market. Assuming the ECOWAS central bank adopts a no bail out policy similar to the ECB, will Nigeria be considered too big to fail? Two possible difficult options are available for ECOWAS. First no bail out for Nigeria even the situation gets worse. With 70% of the ECOWAS

economy this option will have a negative impact on the ECOWAS currency. The second option is to bail out Nigeria either by consent or by using its position to influence monetary policy. This will cause discontent to other nations especially the smaller ones who may feel marginalised. Such discontentment may be a potential threat to the membership of the union and the unity of ECOWAS which subsequently will undermine the objectives of ECOWAS. Another serious problem that may face ECOWAS is that: can ECOWAS bailout Nigeria at all? These are important issues that need consideration.

If exchange rate volatility and the differences between the ECOWAS countries are caused by the use of exchange rate as a policy instrument by all or some of the countries to manage economic shocks then losing exchange rates by adopting a common currency implies the loss of an important adjustment mechanism which could be costly for these countries. In monetary union countries no longer have the flexibility of devaluing their currencies to remedy their specific problems. It is the authority of the common central bank to devalue the common currency in relation to the rest of the world. Common central banks are more willing to do so if the shock affects all or most of its members.

The current economic structure of ECOWAS especially the high reliance on primary produce for exports and the small and undeveloped manufacturing sector is a main source for the low trade within the region. ECOWAS countries export primary produce at cheap prices and import expensive items such as plant and machinery, equipment refined oil and many more leading to persistent trade deficit due to unfavourable terms of trade. Each country needs these capital items for development and none of the ECOWAS countries can offer them to others through local production. As each country looks for better prices and deals for their primary produce ECOWAS countries become competitors in industrialised countries who buy their raw materials. Unless there is a change in the current state of ECOWAS economic structures the potential to increase trade within the sub-region even with a monetary union is very limited.

Different sources have documented a number of factors hindering Africa’s economic integration and development. These include political instability, poor governance and mismanagement of resources, lack of political will and commitment, lack of the necessary infrastructures (telecommunication, roads, energy, manufacturing etc), lack of civil and private sector involvement and others. Monetary union cannot be a substitute for these important fundamentals and no monetary union will succeed without them.

To improve the quality of research in order to inform policy making, more investment and commitment is needed on the compilation, processing and storage of data. Data availability and quality is one of the obstacles for research in Africa.

8.5 Suggestions for further research

1. One of the limitations of this study is the quality of data especially trade data. There are many missing data for both exports and imports for all ECOWAS countries even during periods when there are no conflicts. Replication of this study with data sources that provide full data or fewer gaps is therefore recommended.
2. A study on the effectiveness of monetary policy in ECOWAS countries in effecting the economy especially the transmission mechanisms. This will help us to know the extent of loss by these countries if they are to abandon their national monetary policies to join the single currency.
3. ECOWAS stock markets integration and the composition of security holders. Studies of this kind will provide information on the possible existence of capital mobility for the risk sharing advocated in the OCA literature.
4. Our study has not provided any evidence that the current monetary union (WAEMU) in ECOWAS has any trade creating effect for its members. There is some evidence suggesting that WAEMU members may be benefiting from the credibility argument as indicated by their low inflation rates and stable currency. We also found high volume of trade between ECOWAS countries and the rest of the world. To further examine the trade creating effect of the CFA franc zone monetary union as a measure of benefit, we suggest further researches that broaden the sample to include the two CFAs, WAEMU and CAEMC, Euro countries and other trading partners. Since the CFA is pegged to the euro such studies should consider the CFA and euro countries to be in a monetary union.

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Appendix A. 1 African Integration and solidarity treaties

Treaty/Year	Establishment	Objectives
1963	Organisation of African Unity (OAU)	
Lagos (1980)	Lagos Plan of Action (LPA) and the Final Act of Lagos	Programmes and strategies for self-reliant development and cooperation among African countries
Nairobi (1981)	The African Charter on Human and People's Rights and Human Rights Commission	The promotion of human and people's rights in the continent.
1985	Africa's Priority Programme for Economic Recovery (APPER)	Emergence programmes to address the development needs of the 1980s following protracted drought and famine in the continent and the crippling effect of Africa's external indebtedness
1990	OAU declaration on the Political Socio-Economic Situation in Africa and global fundamental changes	Africa's resolve to determine its destiny and to address the challenges to peace, democracy and security.
1990	The Charter on Popular Participation	Renewed determination of the OAU to place African citizens at the centre of development and decision-making.
Abuja (1991)	African Economic Community (AEC)	Using the Regional Economic Communities (RECs) as building blocks, the treaty seeks to create the AEC through six stages. The treaty came into force in 1994.
1993	The Mechanism for conflict Prevention, Management and Resolution	African leadership determination to find solutions to conflicts, promote peace, security and stability in Africa.
Cairo (1995)	Cairo Agenda for Action	The re-launching of Africa's political, economic and social development.
1997	African common position on Africa's external debt crisis	To address the continent external debt crisis
Sirte (1999)	The Sirte Extraordinary session	The decision to establish an African Union
Lome (2000)	The Constitutive Act of the African Union	The Act with the aim of changing the OAU into an African union was adopted in Lome in 2000 and came into force in 2001.
Lome (2000)	Lome Declaration on the framework for an OAU response to unconstitutional changes	To respond to unconstitutional changes of governments in the continent. This declaration was triggered by the unconstitutional change of government in Algiers in 1999.
2000	Solemn Declaration on the conference on security, stability, development and cooperation	The establishment of fundamental principles for the promotion of democracy and good governance in Africa.
Lusaka (2001)	The Lusaka Summit	Drew the road map for the implementation of the AU
Durban (2002)	The Durban Summit	The launch of the AU and convened the first assembly of the Heads of States of the AU.

Source: African Union website, www.au.int/en

Appendix A. 2 Membership of African RECS

SADC	Angola, Botswana, Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe.
COMESA	Angola, Burundi, Comoros, Congo (DRC), Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Rwanda, Seychelles, Somalia, Sudan, Swaziland, Tanzania, Uganda, Zambia, Zimbabwe
CEN-SAD	Benin, Burkina Faso, Central African Republic, Chad, Côte d'Ivoire, Djibouti, Egypt, Eritrea, Gambia, Ghana, Guinea Bissau, Liberia, Libya, Mali, Morocco, Niger, Nigeria, Senegal, Sierra Leone, Somali, Sudan, Togo, Tunisia

Source: (AU website, accessed 27/10/12)..

Appendix A. 3 Macroeconomic Convergence Programme for ECOWAS

WAEMU		WAMZ		ECOWAS	
Criteria	Targets	Criteria	Targets	Criteria	Targets
Primary Criteria					
Fiscal balance/GDP	≥ 0%	Fiscal balance/GDP	≥ -4%	Fiscal balance/GDP	≥ -4%
Price inflation	≤ 3%	Inflation rate (end period)	≤ 10%	Inflation rate (end period)	≤ 5%
Total debt/GDP	≤ 70%	Gross reserves in months of imports	≥3 months	Gross reserves in months of imports	≥6 months
Change in domestic arrears	≤ 0	Central Bank financing of budget deficit in relation to previous year's tax revenue	≤ 10%	Central Bank financing of budget deficit in relation to previous year's tax revenue	≤ 10%
Change in external arrears	≤ 0	-	-	-	-
Secondary Criteria					
Wages and salaries	≤ 35%	Change in domestic arrears	≤ 0 by 2003	Change in domestic arrears	≤ 0 by 2003
Current account balance, excl. grants	≥ -5%	Ratio of tax revenue to GDP	≥ 20%	Ratio of tax revenue to GDP	≥ 20%
Fiscal revenue/GDP	≥ 17%	Wage bill/Tax revenue	≤ 35%	Wage bill/Tax revenue	≤ 35%
Capital expenditure domestically financed/Fiscal rev	≥ 20%	Domestically financed investment/Domestic revenue	> 20	Domestically financed investment/Domestic revenue	> 20
		Nominal exchange rate	Within +/- 15% of WAMZ-ERM central rate	Nominal exchange rate	Stable exchange rates
		Real interest rate	> 0	Real interest rate	> 0

Source: African Development Bank (2011)

Appendix A. 4 ECOWAS Common features

Country	Code	Income Level1	Currency	Land area (Sq km)2	Indepen-dence3	Coloniser3	Official Language3	Neighbouring Countries3	Capital city3
Benin	BEN	LI	CFA Franc	110,620	1/8/1960	France	French	NER, NGA, TGO, BFA	Porto-Novo
Burkina Faso	BFA	LI	CFA Franc	273,600	5/8/1960	France	French	MLI, NER, BEN, GHA, CIV, TGO	Ouagadougou
Cape Verde	CPV	LMI	Escudo	4,030	5/7/1975	Portugal	Portuguese	Island	Praia
Cote d'Ivoire	CIV	LMI	CFA Franc	318,000	7/8/1960	France	French	GIN, LBR, GHA, BFA, MLI	Yamoussoukro
Gambia	GMB	LI	Dalasi	10,000	18/2/1965	UK	English	SEN	Banjul
Ghana	GHA	LMI	Cedi	227,540	6/3/1957	UK	English	CIV, BFA, TGO	Accra
Guinea	GIN	LI	Guinean franc	254,720	2/10/1958	France	French	GNB, SEN, MLI, CIV	Conakry
Guinea-Bissau	GNB	LI	CFA Franc	28,120	24/9/1973 10/9/1974	Portugal	Portuguese	SEN, GIN	Bissau
Liberia	LBR	LI	Liberian $	96,320	26/7/1847	USA	English	SLE, GIN, CIV	Monrovia
Mali	MLI	LI	CFA Franc	1,220,190	22/9/1960	France	French	GIN, SEN, MRT, DZA, NER, BFA, CIV	Bamako
Niger	NER	LI	CFA Franc	1,266,700	3/8/1960	France	French	BFA, MLI, DZA, LBY, TCD, NGA, BEN	Niamey
Nigeria	NGA	LMI	Naira	910,770	1/10/60	UK	English	BEN, NER, TCD, CMR	Abuja
Senegal	SEN	LMI	CFA Franc	192,530	4/4/1960	France	French	GNB, GIN, MRT, MLI, GMB	Dakar
Sierra Leone	SLE	LI	Leone	71,620	27/4/1961	UK	English	GIN, LBR	Freetown
Togo	TGO	LI	CFA Franc	54,390	27/4/1960	France	French	GHA, BFA, BEN	Lome

Mauritania (MRT), Algeria (DZA), Chad (TCD), Libya (LBY), Cameroon (CMR)

Source: 1. World Bank, Africa Development Indicators (Jan 2009), 2. World Bank, World Development Indicators (April 2012),

3. CIA website

Appendix A. 5 ECOWAS GDP by sector 2006-2011

Sector	BEN		BFA		CPV		CIV		GMB		GHA		GIN		GNB
	2006	2011	2006	2011	2006	2011	2006	2011	2006	2009	2006	2010	2006	2011	2006
Agriculture, forestry, fishing & hunting	36	36.1	39.2	35.4	9.4	8.2	25.3	31.2	23.1	28.8	30.4	29.9	23.8	26	43.6
Mining and quarrying	0.3	0.3	0.8	12.6	3.5	3.5	6	4.7	2.4	1.8	2.8	1.8	23.8	17.5	0
Primary sector	**36.3**	**36.4**	**40**	**48**	**12.9**	**11.7**	**31.3**	**35.9**	**25.5**	**30.6**	**33.2**	**31.7**	**47.6**	**43.5**	**43.6**
Secondary sector/Manufacturing	**8.4**	**8.6**	**11.7**	**9.3**	**3.7**	**3.4**	**16.4**	**12.8**	**7.5**	**5.7**	**10.2**	**6.8**	**6.2**	**7.5**	**12.4**
Electricity, gas, and water	1.3	1.2	1.2	1.1	0.4	0.2	1.3	2.7	1.2	1.6	2.1	1.5	0.4	0.5	0.5
Construction	4.5	4.7	4.8	5.1	10.5	10.7	2.6	4.4	4.9	3.7	5.7	8.6	9.5	11.7	0.9
Wholesale and retail trade, hotels and restaurants	14.7	18.4	11.7	12.6	23.7	26	13.1	14.1	33.6	30	11.4	12.3	15.9	17.8	20.8
Transport, storage and communication	8.8	9	4.4	3.7	23.8	23.6	8.1	3.9	13.2	11.1	15.9	12.5	5.6	5.9	4.7
Finance, real estate and business services	11.9	10.4	6.9	4.5	7.6	7.2	14.7	11	7.6	8.9	7.8	9.7	0	0	0.2
General government services	14.1	11.3	19.5	15.6	14.5	13.9	7.3	8.9	2.8	4	4.8	7.0	12	10.2	11.1
Other services	0	0	0	0	2.9	3.3	5.2	6.2	3.8	4.3	8.8	9.9	2.7	2.8	5.8
Tertiary sector	**55.3**	**55.0**	**48.5**	**42.6**	**83.4**	**84.9**	**52.3**	**51.2**	**67.1**	**63.6**	**56.5**	**61.5**	**46.1**	**48.9**	**44.0**

Sector	GNB	LBR		MLI		NER		NGA		SEN		SLE		TGO	
	2011	2006	2011	2006	2011	2006	2011	2006	2011	2006	2010	2006	2011	2006	2011
Agriculture, forestry, fishing & hunting	40.3	68.6	72	36.7	41.1	46.2	43.1	32	35.2	15	17.4	54.2	61.5	40.3	45.9
Mining and quarrying	0	0.8	1.3	8.3	7.6	2.3	6.8	37.8	33.5	1.2	2.2	4.1	1.8	3.1	3.2
Primary sector	**40.3**	**69.4**	**73.3**	**45**	**48.7**	**48.5**	**49.9**	**69.8**	**68.7**	**16.2**	**19.6**	**58.3**	**63.3**	**43.4**	**49.1**
Secondary sector/Manufacturing	**10.7**	**6.7**	**6.7**	**9**	**5.4**	**5.8**	**5.4**	**2.6**	**2.2**	**14.4**	**14**	**2.3**	**2**	**10.2**	**8.6**
Electricity, gas, and water	0.4	0	0	2.1	2.2	1.4	1.2	0.2	0.2	2.7	3.1	0.3	0.3	3.4	3.4
Construction	1.4	3.1	3.1	5	5.7	2.7	2.8	1.3	1.3	5.5	4.4	1.9	1.5	3.6	3.8
Wholesale and retail trade, hotels and restaurants	19.3	11.8	6	14.5	15.6	15.5	15.3	15.1	16.4	20.9	19.6	10.1	8.5	12.6	9.7
Transport, storage and communication	5.2	6.3	6.4	5.4	5.9	7	6.4	3.3	2.7	12.4	11.6	7.5	7	6.6	6.9
Finance, real estate and business services	8.4	0	0	0.4	0.3	5.8	5.5	6	6.3	13	12.7	4.5	3	8.5	7.7
General government services	10	2.8	4.5	11.2	9.2	9.4	10.4	0.7	0.8	7	7.1	4.9	3.5	9.2	8.6
Other services	4.2	0	0	7.4	7.1	3.9	3.2	1.1	1.3	7.8	7.9	10	10.8	2.6	2.2
Tertiary sector	**48.9**	**24.0**	**20.0**	**46.0**	**46.0**	**45.7**	**44.8**	**27.7**	**29**	**69.3**	**66.4**	**39.2**	**34.6**	**46.5**	**42.3**

Source: African Economic Outlook (http://www.africaneconomicoutlook.org/fileadmin/uploads/aeo/PDF/Regional_Edition/AEO12-West-African-Economies.pdf)

Appendix A. 6 ECOWAS GDP by sector 2006-2014

Sector	BEN		BFA		CPV		CIV		GMB		GHA		GIN		GNB
	2014	Ave	2014	Ave	2014	Ave	2014	Ave	2013	Ave	2014	Ave	2014	Ave	2014
Agriculture, forestry, fishing & hunting	35.7	35.9	34.4	36.3	9.4	9.0	26.1	27.5	24	24.0	20.7	20.7	18.0	34.0	18.0
Mining and quarrying	0.2	0.3	8.4	7.3	0.4	2.5	7.2	6.0	3.5	3.5	9.5	9.5	16.9	5.6	16.9
Primary sector	**35.9**	**36.2**	**42.8**	**43.6**	**9.8**	**11.5**	**33.3**	**33.5**	**27.5**	**27.5**	**30.2**	**30.2**	**34.9**	**39.6**	**34.9**
Secondary sector/Manufacturing	**8.2**	**8.4**	**5.1**	**8.7**	**6.5**	**4.5**	**15**	**14.7**	**6**	**6.0**	**6.2**	**6.2**	**8.6**	**10.6**	**8.6**
Electricity, gas, and water	1.1	1.2	0.9	1.1	2.3	1.0	0.6	1.5	1.3	1.3	1.1	1.1	0.6	0.5	0.6
Construction	4.5	4.6	9.1	6.3	10.4	10.5	3.2	3.4	5	5.0	12.8	12.8	15.4	5.9	15.4
Wholesale and retail trade, hotels and restaurants	17.9	17.0	8.9	11.1	20.8	23.5	13.1	13.4	27.7	27.7	10.3	10.3	23.8	21.3	23.8
Transport, storage and communication	11.5	9.8	3.5	3.9	15.5	21.0	7.1	6.4	16.9	16.9	13.9	13.9	6.2	5.4	6.2
Finance, real estate and business services	10.1	10.8	6.3	5.9	17.9	10.9	17.6	14.4	10.5	10.5	6.7	6.7	4.1	4.2	4.1
General government services	10.7	12.0	23.5	19.5	16.8	15.1	9.8	8.7	2.4	2.4	8.5	8.5	6.5	9.2	6.5
Other services	0	0.0	0	0.0	0	2.1	0.3	3.9	2.8	2.8	10.4	10.4	0.0	3.3	0.0
Tertiary sector	**55.8**	**55.4**	**52.2**	**47.8**	**83.7**	**84.0**	**51.7**	**51.7**	**66.6**	**66.6**	**63.7**	**63.7**	**56.6**	**49.8**	**56.6**

Sector	GNB	LBR		MLI		NER		NGA		SEN		SLE		TGO	
	Ave	2013	Ave	2014	Ave	2013	Ave	2013	Ave	2014	Ave	2014	Ave	2014	Ave
Agriculture, forestry, fishing & hunting	34.0	35.3	58.6	40.7	39.5	40.7	43.3	21.0	29.4	15.9	16.1	50.5	55.4	46.7	44.3
Mining and quarrying	5.6	12.4	4.8	5.9	7.3	10.2	6.4	13.0	28.1	1.9	1.8	20.2	8.7	3.7	3.3
Primary sector	**39.6**	**47.7**	**63.5**	**46.6**	**46.8**	**50.9**	**49.8**	**34.0**	**57.5**	**17.8**	**17.9**	**70.7**	**64.1**	**50.4**	**47.6**
Secondary sector/Manufacturing	**10.6**	**7.3**	**6.9**	**5.6**	**6.7**	**6.4**	**5.9**	**9.0**	**4.6**	**12.5**	**13.6**	**1.6**	**2.0**	**6.7**	**8.5**
Electricity, gas, and water	0.5	0.6	0.2	3.3	2.5	1.1	1.2	0.7	0.4	2.6	2.8	0.3	0.3	3.4	3.4
Construction	5.9	5.3	3.8	3.9	4.9	2.7	2.7	3.3	2.0	5.1	5.0	0.9	1.4	5.9	4.4
Wholesale and retail trade, hotels and restaurants	21.3	14.1	10.6	17.3	15.8	14.3	15.0	17.9	16.5	19.6	20.0	7.7	8.8	9.2	10.5
Transport, storage and communication	5.4	4.8	5.8	9.1	6.8	6.9	6.8	11.7	5.9	13.1	12.4	3.8	6.1	5.6	6.4
Finance, real estate and business services	4.2	9.6	3.2	5.3	2.0	5.3	5.5	15.2	9.2	13.1	12.9	2.4	3.3	7.7	8.0
General government services	9.2	6.2	4.5	8.9	9.8	9.5	9.8	3.0	1.5	7.8	7.3	4.4	4.3	9.2	9.0
Other services	3.3	4.4	1.5	0	4.8	3	3.4	5.1	2.5	8.4	8.0	8.2	9.7	1.8	2.2
Tertiary sector	**49.8**	**45.0**	**29.7**	**47.8**	**46.6**	**42.8**	**44.4**	**56.9**	**37.9**	**69.7**	**68.5**	**27.7**	**33.8**	**42.8**	**43.9**

Source: African Economic Outlook (http://www.africaneconomicoutlook.org/en/country-notes/)

Appendix A. 7 Intra-ECOWAS Migration- % of total population

	1960			1970			1980			1990			2000			2010			
	ECO	WAEM	WAM	ECO	WAEM	WAM	ECO	WAEM	WAM	ECO	WAEM	WAM	ECO	WAEM	WAM	ECO	WAEM	WAM	Ave
Benin	3.9	2.8	1.1	4.7	3.4	1.3	10.0	3.1	7.0	4.8	2.8	2.1	4.8	2.3	2.5	4.7	1.9	2.7	5.5
Burkina Faso	9.3	9.3	0.04	13.5	11.6	1.9	12.4	11.8	0.5	10.3	10.0	0.3	11.1	10.8	0.4	8.4	8.3	0.1	10.8
Cape Verde	0.1	0.1	0.01	0.3	0.1	0.2	1.6	0.1	1.5	0.8	0.3	0.5	0.9	0.2	0.7	2.9	2.0	0.9	1.1
Cote d'Ivoire	3.3	2.4	0.9	2.2	1.8	0.3	1.7	1.6	0.1	2.0	1.9	0.1	3.1	3.0	0.1	4.7	4.7	0.1	2.8
Gambia	0.1	0.1	0.04	0.1	0.1	0.1	0.2	0.04	0.1	0.1	0.1	0.1	0.1	0.05	0.04	0.1	0.03	0.04	0.1
Ghana	2.0	1.6	0.4	2.7	2.0	0.7	7.3	2.4	4.8	4.6	3.1	1.5	3.5	1.8	1.7	4.1	2.1	2.0	4.0
Guinea	47.7	23.9	23.9	49.6	24.8	24.8	42.0	21.0	21.0	48.7	24.4	24.4	37.7	18.8	18.8	31.2	15.6	15.6	42.8
Guinea-Bi	10.4	9.1	1.3	8.5	4.8	3.7	5.8	3.7	2.1	5.6	4.6	1.0	4.5	3.3	1.2	3.1	1.5	1.6	6.3
Liberia	1.2	0.4	0.8	1.1	0.4	0.7	1.7	0.3	1.4	2.7	0.4	2.3	7.1	1.7	5.4	7.7	1.9	5.8	3.6
Mali	4.8	4.4	0.4	6.2	5.6	0.6	8.3	6.2	2.1	6.6	5.8	0.8	6.3	5.3	1.0	5.0	3.9	1.1	6.2
Niger	2.3	1.5	0.9	2.3	1.5	0.7	3.2	1.4	1.8	1.8	1.3	0.5	1.9	1.3	0.6	1.9	1.3	0.6	2.2
Nigeria	0.4	0.1	0.3	0.2	0.1	0.1	0.1	0.1	0.01	0.1	0.1	0.01	0.1	0.1	0.01	0.1	0.1	0.003	0.2
Senegal	1.8	1.1	0.7	1.7	1.0	0.7	1.8	0.9	0.9	1.7	0.7	1.0	1.6	0.5	1.1	2.0	0.4	1.5	1.8
Sierra Leone	0.5	0.04	0.4	0.4	0.04	0.4	0.7	0.04	0.7	1.2	0.1	1.1	2.8	0.1	2.7	3.0	0.04	3.0	1.4
Togo	13.0	1.4	11.6	8.5	1.4	7.1	7.1	1.4	5.7	4.0	1.8	2.1	4.5	2.0	2.5	4.4	2.5	2.0	6.9
Average	6.7	3.9	2.8	6.8	3.9	2.9	6.9	3.6	3.3	6.3	3.8	2.5	6.0	3.4	2.6	5.6	3.1	2.5	6.4

ECO is ECOWAS, WAEM is WAEMU, WAM is WAMZ, Ave is average

Source: World Bank data base

Appendix A. 8 Intra EU12 Migration- % of total population

	1960	1970	1980	1990	2000	2010	Average
Belgium	1.2	2.4	2.5	2.5	1.8	3.0	2.2
Denmark	0.7	0.5	1.9	1.0	1.3	1.5	1.2
France	0.5	0.6	0.9	0.9	1.1	1.5	0.9
Germany	0.8	0.8	0.9	1.1	1.2	1.4	1.0
Greece	1.1	4.0	4.1	3.3	3.9	4.9	3.5
Ireland	4.2	25.8	18.8	17.8	22.3	10.7	16.6
Italy	1.3	3.3	2.9	2.5	2.2	2.8	2.5
Luxembourg	3.7	4.0	6.8	6.1	4.7	9.7	5.8
Netherlands	1.5	1.6	1.8	1.7	2.0	3.2	2.0
Portugal	1.7	5.3	9.0	8.1	4.0	12.1	6.7
Spain	0.7	3.3	2.2	1.8	1.1	1.6	1.8
UK	0.4	0.5	0.8	1.0	1.1	2.1	1.0
Average	1.48	4.34	4.38	3.98	3.91	4.53	3.77

Source: World Bank data base

Appendix A. 9 ECOWAS trade with the World as % of GDP

	Exports					Imports					Exports + Imports				
	1981	1993	2005	2010	2011	1981	1993	2005	2010	2011	1981	1993	2005	2010	2011
Benin	2.4	6.5	7.0	10.1	11.8	41.9	16.4	20.8	109.3	139.7	44.3	22.9	27.8	119.4	151.5
Burkina Faso	4.1	2.7	5.2	7.1	7.7	18.9	18.5	20.2	21.6	21.5	23.0	21.1	25.3	28.7	29.2
Cape Verde	2.1	2.5	1.8	2.8	3.6	50.9	38.6	44.5	44.8	55.6	53.0	41.1	46.3	47.6	59.2
Côte d'Ivoire	30.0	24.1	44.3	44.8	46.0	28.4	18.9	35.9	35.5	27.8	58.4	43.0	80.2	80.4	73.9
Gambia	15.2	12.9	4.4	6.0	11.9	51.5	49.9	98.7	79.6	103.1	66.7	62.7	103.1	85.6	115.0
Ghana	24.8	19.2	22.6	14.0	21.8	29.9	34.8	55.2	40.0	43.1	54.7	54.0	77.9	53.9	65.0
Guinea		16.6	45.1	46.1	43.4		22.9	65.2	86.4	103.6		39.4	110.3	132.5	147.0
Guinea-Bissau	10.2	13.3	19.0	22.7	35.8	33.4	55.2	37.2	32.1	36.2	43.5	68.4	56.2	54.8	72.0
Liberia	62.5	226.6	198.6	85.8	58.9	56.4	3223.5	1053.0	1771.4	1662.7	118.9	3450.1	1251.6	1857.2	1721.6
Mali	7.1	8.2	4.8	3.2	4.1	19.2	27.5	39.1	36.8	37.0	26.4	35.7	43.8	40.0	41.1
Niger	21.4	13.7	8.7	3.9	9.0	24.6	19.2	24.4	29.3	27.0	46.0	33.0	33.2	33.3	36.0
Nigeria	32.1	54.3	38.8	39.5	45.1	31.1	35.6	21.9	24.2	25.0	63.2	89.9	60.6	63.8	70.2
Senegal	15.7	11.8	16.6	15.2	16.6	33.9	18.5	36.9	34.0	37.3	49.6	30.3	53.5	49.2	53.9
Sierra Leone	13.5	15.4	15.8	15.1	16.0	29.4	32.5	49.1	51.9	70.4	42.9	47.8	64.9	67.0	86.4
Togo	21.6	15.9	17.2	20.1	32.5	45.0	51.6	28.2	31.4	102.1	66.6	67.5	45.4	51.5	134.7
Min	2.1	2.5	1.8	2.8	3.6	18.9	16.4	20.2	21.6	21.5	23.0	21.1	25.3	28.7	29.2
Max	62.5	226.6	198.6	85.8	58.9	56.4	3223.5	1053.0	1771.4	1662.7	118.9	3450.1	1251.6	1857.2	1721.6
Max-Lib	32.1	54.3	45.1	46.1	46.0	51.5	55.2	98.7	109.3	139.7	66.7	89.9	110.3	132.5	151.5

Source: Author's computation from IMF DOTS, GDP data from World Bank Data bank (Accessed 02/04/13)

Appendix A. 10 EU12 trade with the world as % of GDP

	Exports					Imports					Exports + Imports				
	1993	1998	2003	2010	2011	1993	1998	2003	2010	2011	1993	1998	2003	2010	2011
Belgium	56.7	69.8	80.3	85.0	90.0	51.5	63.9	72.2	82.9	90.2	108.2	133.7	152.5	167.9	180.2
Denmark	25.5	27.6	31.0	29.9	32.3	21.0	26.4	26.5	25.8	28.2	46.5	54.0	57.4	55.8	60.5
France	16.7	20.7	21.9	20.1	21.1	15.6	19.8	22.2	23.5	25.5	32.4	40.4	44.1	43.6	46.6
Germany	18.1	24.8	30.6	36.4	38.7	16.4	21.3	24.6	31.7	34.4	34.6	46.1	55.2	68.2	73.2
Greece	8.8	7.9	6.9	7.3	10.7	19.5	21.3	23.3	21.6	20.8	28.2	29.2	30.2	28.9	31.6
Ireland	57.4	73.2	58.3	54.6	55.7	42.4	49.9	33.9	29.3	30.5	99.8	123.1	92.2	83.9	86.2
Italy	16.4	19.8	19.8	21.6	23.5	14.4	17.6	19.7	22.4	24.1	30.8	37.5	39.5	44.0	47.6
Luxembourg	37.3	40.0	45.7	37.6	36.8	48.7	51.3	55.5	47.7	49.4	86.0	91.3	101.2	85.3	86.3
Netherlands	39.2	42.0	55.0	73.4	78.4	34.6	39.4	49.2	66.2	71.0	73.8	81.4	104.2	139.6	149.4
Portugal	16.4	19.7	19.6	21.6	25.0	25.9	30.0	29.2	34.1	34.6	42.4	49.7	48.8	55.7	59.5
Spain	12.3	17.9	17.6	18.1	20.3	16.1	21.6	23.6	23.5	25.3	28.4	39.5	41.2	41.6	45.6
UK	18.4	18.3	16.5	17.0	18.9	20.9	21.2	20.7	25.2	26.2	39.3	39.5	37.2	42.2	45.1
Min	8.8	7.9	6.9	7.3	10.7	14.4	17.6	19.7	21.6	20.8	28.2	29.2	30.2	28.9	31.6
Max	57.4	73.2	80.3	85.0	90.0	51.5	63.9	72.2	82.9	90.2	108.2	133.7	152.5	167.9	180.2

Source: as in appendix A.9

Appendix A. 11 Intra-ECOWAS trade as a % of GDP

	Exports					Imports					Exports + Imports				
	1981	1993	2005	2010	2011	1981	1993	2005	2010	2011	1981	1993	2005	2010	2011
Benin	0.5	0.4	1.5	1.7	1.9	2.3	0.8	5.2	6.9	6.6	2.8	1.1	6.7	8.6	8.5
Burkina Faso	1.5	1.2	1.2	1.0	0.9	4.9	5.2	5.7	7.4	6.8	6.5	6.4	6.9	8.4	7.7
Cape Verde		0.1				0.9	2.5	0.8	0.6	0.5	0.9	2.6	0.8	0.6	0.5
Côte d'Ivoire	3.8	5.1	11.0	11.1	9.7	1.8	3.8	9.2	9.6	7.2	5.6	8.9	20.3	20.7	16.9
Gambia	6.4	1.6	0.4	0.3	0.4	3.4	3.7	20.5	10.5	11.1	9.8	5.3	20.9	10.8	11.5
Ghana	0.2	2.6	1.5	1.1	1.0	9.3	6.8	11.0	8.2	6.5	9.5	9.4	12.6	9.3	7.5
Guinea		0.2	0.6	0.6	0.5		3.2	5.1	3.3	4.1		3.3	5.6	3.9	4.6
Guinea-Bissau	0.8	0.2	3.5	7.1	6.4	2.5	2.1	8.5	6.1	5.9	3.3	2.3	12.0	13.2	12.4
Liberia	1.2	0.7	2.4	2.3	3.9	1.1	3.8	17.7	7.5	18.7	2.3	4.5	20.0	9.8	22.5
Mali	2.3	0.5	0.1	0.2	0.2	7.0	5.8	9.4	9.1	7.4	9.3	6.3	9.4	9.3	7.6
Niger	3.7	3.4	2.3	3.0	3.1	5.1	5.4	4.6	5.7	6.1	8.8	8.8	6.9	8.7	9.2
Nigeria	0.8	3.5	2.3	2.0	1.7	0.1	0.8	0.7	0.6	0.5	0.9	4.3	3.0	2.6	2.2
Senegal	3.9	1.5	5.6	6.5	5.9	2.0	2.1	5.5	4.5	5.0	6.0	3.6	11.1	11.0	11.0
Sierra Leone			0.4	0.3	0.3	7.3	5.2	6.8	3.4	4.8	7.3	5.2	7.1	3.7	5.1
Togo	3.4	3.1	11.7	11.5	10.9	2.2	12.8	3.4	3.5	4.9	5.6	15.9	15.1	15.1	15.8
Min	0.2	0.1	0.1	0.2	0.2	0.1	0.8	0.7	0.6	0.5	0.9	1.1	0.8	0.6	0.5
Max	6.4	5.1	11.7	11.5	10.9	9.3	12.8	20.5	10.5	18.7	9.8	15.9	20.9	20.7	22.5

Source: as in appendix A.9

Appendix A. 12 Intra-EU12 trade as a % of GDP

	Exports					Imports					Exports + Imports				
	1993	1998	2003	2010	2011	1993	1998	2003	2010	2011	1993	1998	2003	2010	2011
Belgium		55.1	62.0	63.5	66.7		46.6	53.2	57.7	61.7		101.7	115.2	121.2	128.4
Denmark	17.3	19.5	21.4	20.1	21.8	14.7	19.8	19.8	18.5	20.2	31.9	39.2	41.2	38.6	42.0
France	10.3	13.5	14.5	12.5	13.0	9.8	12.5	15.6	16.4	17.5	20.1	26.0	30.1	28.9	30.5
Germany	11.3	16.0	19.8	23.0	24.3	9.8	13.2	15.2	20.3	22.1	21.0	29.3	35.1	43.3	46.4
Greece	6.3	5.3	4.5	4.7	5.5	12.4	14.9	13.5	11.2	10.9	18.7	20.2	18.0	15.8	16.4
Ireland	41.1	50.7	36.4	32.9	33.4	25.3	27.4	20.7	19.3	20.7	66.5	78.0	57.1	52.2	54.1
Italy	10.0	12.3	12.3	12.5	13.3	8.9	11.6	12.5	13.1	13.6	19.0	23.9	24.8	25.6	26.9
Luxembourg		34.3	40.2	31.1	29.6		46.1	42.9	38.4	40.6		80.4	83.1	69.5	70.2
Netherlands	30.4	33.3	44.2	57.2	61.4	21.9	23.0	26.9	31.0	33.1	52.3	56.3	71.1	88.2	94.5
Portugal	13.2	16.2	15.9	16.2	18.4	19.3	23.4	23.2	26.1	25.6	32.5	39.6	39.1	42.3	44.0
Spain	8.8	13.1	13.2	12.5	13.6	10.4	14.9	16.4	14.0	14.5	19.3	27.9	29.5	26.5	28.1
UK	9.9	10.1	9.3	9.4	10.1	10.7	10.6	11.3	12.6	13.1	20.6	20.8	20.6	22.0	23.2
Min	6.3	5.3	4.5	4.7	5.5	8.9	10.6	11.3	11.2	10.9	18.7	20.2	18.0	15.8	16.4
Max	41.1	55.1	62.0	63.5	66.7	25.3	46.6	53.2	57.7	61.7	66.5	101.7	115.2	121.2	128.4

Source: as in appendix A.9

Appendix A. 13 Intra-ECOWAS trade as a % of total trade

	Exports					Imports					Exports + Imports				
	1981	1993	2005	2010	2011	1981	1993	2005	2010	2011	1981	1993	2005	2010	2011
Benin	1.1	1.7	5.5	1.4	1.3	5.2	3.3	18.6	5.8	4.4	6.3	5.0	24.0	7.2	5.6
Burkina Faso	6.7	5.7	4.8	3.4	3.2	21.4	24.8	22.5	25.9	23.3	28.1	30.5	27.3	29.3	26.5
Cape Verde		0.3			0.1	1.6	6.1	1.8	1.3	0.8	1.6	6.4	1.8	1.3	0.9
Côte d'Ivoire	6.4	11.9	13.8	13.9	13.2	3.2	8.8	11.5	11.9	9.8	9.6	20.7	25.3	25.8	22.9
Gambia	9.5	2.6	0.4	0.4	0.3	5.1	5.8	19.9	12.2	9.6	14.7	8.4	20.3	12.6	10.0
Ghana	0.4	4.9	2.0	2.0	1.5	16.9	12.6	14.2	15.3	10.0	17.4	17.5	16.2	17.3	11.6
Guinea		0.5	0.5	0.4	0.4		8.0	4.6	2.5	2.8		8.5	5.1	2.9	3.2
Guinea-Bissau	1.8	0.3	6.3	12.9	8.9	5.9	3.1	15.1	11.2	8.2	7.7	3.4	21.4	24.1	17.2
Liberia	1.0		0.2	0.1	0.2	0.9	0.1	1.4	0.4	1.1	1.9	0.1	1.6	0.5	1.3
Mali	8.5	1.4	0.1	0.4	0.5	26.7	16.2	21.3	22.8	18.0	35.3	17.5	21.5	23.3	18.5
Niger	8.1	10.3	6.9	9.1	8.7	11.0	16.3	13.8	17.0	16.9	19.2	26.6	20.8	26.1	25.5
Nigeria	1.3	3.9	3.8	3.2	2.5	0.2	0.8	1.2	0.9	0.7	1.4	4.8	4.9	4.1	3.2
Senegal	8.0	4.9	10.5	13.2	11.0	4.1	6.8	10.3	9.1	9.4	12.0	11.8	20.8	22.3	20.4
Sierra Leone			0.5	0.4	0.3	16.9	10.8	10.4	5.1	5.6	16.9	10.8	11.0	5.5	5.9
Togo	5.1	4.6	25.7	22.4	8.1	3.3	19.0	7.5	6.9	3.6	8.4	23.6	33.2	29.2	11.7
Min	0.4	0.3	0.1	0.1	0.1	0.2	0.1	1.2	0.4	0.7	1.4	0.1	1.6	0.5	0.9
Max	9.5	11.9	25.7	22.4	13.2	26.7	24.8	22.5	25.9	23.3	35.3	30.5	33.2	29.3	26.5

Source: as in appendix A.9

Appendix A. 14 Intra- EU 12 trade as a % of total trade

	Exports					Imports					Exports + Imports				
	1993	1998	2003	2010	2011	1993	1998	2003	2010	2011	1993	1998	2003	2010	2011
Belgium		41.2	40.7	37.8	37.0		34.9	34.9	34.4	34.2		76.1	75.5	72.2	71.3
Denmark	37.1	36.0	37.2	36.1	36.0	31.5	36.6	34.4	33.2	33.4	68.6	72.6	71.7	69.3	69.3
France	31.7	33.4	32.9	28.6	28.0	30.4	31.0	35.3	37.6	37.5	62.1	64.4	68.2	66.2	65.5
Germany	32.6	34.8	35.9	33.8	33.2	28.3	28.7	27.6	29.8	30.2	60.8	63.5	63.5	63.6	63.4
Greece	22.3	18.1	14.9	16.1	17.3	43.8	51.2	44.8	38.6	34.6	66.1	69.3	59.7	54.7	51.8
Ireland	41.2	41.2	39.5	39.3	38.8	25.4	22.2	22.4	23.0	24.0	66.6	63.4	61.9	62.2	62.8
Italy	32.5	32.9	31.3	28.5	28.0	29.0	31.0	31.6	29.7	28.6	61.6	63.8	62.9	58.2	56.6
Luxembourg		37.5	39.7	36.5	34.4		50.5	42.4	45.0	47.0		88.0	82.1	81.5	81.4
Netherlands	41.2	40.9	42.4	41.0	41.1	29.7	28.3	25.8	22.2	22.2	71.0	69.1	68.3	63.2	63.2
Portugal	31.2	32.6	32.6	29.1	30.9	45.5	47.1	47.5	46.9	43.0	76.7	79.7	80.1	76.0	73.9
Spain	31.1	33.1	31.9	30.1	29.9	36.8	37.6	39.8	33.6	31.8	67.9	70.7	71.7	63.7	61.7
UK	25.1	25.6	25.1	22.4	22.3	27.2	26.9	30.3	29.8	29.0	52.3	52.5	55.5	52.2	51.4
Min	22.3	18.1	14.9	16.1	17.3	25.4	22.2	22.4	22.2	22.2	52.3	52.5	55.5	52.2	51.4
Max	41.2	41.2	42.4	41.0	41.1	45.5	51.2	47.5	46.9	47.0	76.7	88.0	82.1	81.5	81.4

Source: as in appendix A.9

Appendix A. 15 ECOWAS top three exports and their share in exports

Country	Products (percentage share of total exports) in ranking order	Top three exports-% of total exports	No of exports accounting for 75% of total exports
Benin	Cashew nuts, in shells (29.5%); Cotton, not carded or combed (28.7%); Copper waste and scrap (6%)	64.2	6
Burkina Faso	Cotton, not carded or combed (52.1%); Gold, semi manufactured (19.6%); Sesame seeds (9.1%)	80.8	3
Cape Verde	Tunas, yellow fin (16.4%); Fish, whole or pieces (13.5%); Men's and boys' trousers and shorts, of cotton not knitted (10.4%)	40.3	9
Cote d'Ivoire	Cocoa beans, whole or broken, raw or roasted (36.3%); Petroleum oils and oils from bituminous, crude (14.6%); Cocoa paste, not defatted (8%)	58.9	7
Gambia	Cashew nuts, in shells (44.5%); Petroleum oils and oils from bituminous, crude (14.3%); Titanium ores and concentrates (12.3%)	71.1	4
Ghana	Cocoa beans, whole or broken, raw or roasted (49.7%); Manganese ores and concentrates (8.5%); Cocoa butter, fat and oil (5.6%)	63.8	7
Guinea	Aluminium ores and concentrates (62.9%); Aluminium oxide (11.2%); Coffee, not roasted, not decaffeinated (4%)	78.1	3
Guinea-Bissau	Cashew nuts, in shells (92.2%)	92.2	1
Liberia	Cargo vessels and other vessels for transport of goods or persons (42.1%); Tankers (19.3%); Petroleum oils and oils from bituminous, crude (13.3%);	74.7	4
Mali	Cotton, not carded or combed (39.3%); Mineral or chemical fertilizers containing nitrogen, phosphorus, potassium (12.5%); Sesame seeds (8.1%)	59.9	8
Niger	Natural uranium and its compounds (70.5%); Light oils and preparations (23.8%);	94.3	2
Nigeria	Petroleum oils and oils from bituminous, crude (86.3%); Liquefied natural gas (7.5%);	93.8	1
Senegal	Phosphoric and polyphosphoric acids (25.5%); Fish, fresh and chilled (6.8%); Fish, frozen (6%)	38.3	19
Sierra Leone	Diamonds, nonindustrial, unworked or simply sawn or cleaved (21.5%); Titanium ores and concentrates (11.8%); Cocoa beans, whole or broken, raw or roasted (8.5%)	41.8	22
Togo	Cocoa beans, whole or broken, raw or roasted (47.1%); Ground [nuts] (8.3%); Gold, unwrought, nonmonetary (7.7%)	63.1	5
Africa	Petroleum oils and oils from bituminous, crude (44.8%); Liquefied natural gas (3.9%); Natural gas, in gaseous state (3.7%)	52.4	40

Source: Adapted from World Bank, Africa Development Indicators (ADI) 2011, pp. 70-71

Appendix A. 16 ECOWAS Commodity and Industrial Structure

	Agricultural raw materials exports (% of merchandise exports)	Agricultural raw materials imports (% of merchandise imports)	Food exports (% of merchandise exports)	Food imports (% of merchandise imports)	Manufactures exports (% of merchandise exports)	Manufactures imports (% of merchandise imports)	Agriculture, value added (% of GDP	Manufacturing, value added (% of GDP)	Fuel imports (% of merchandise imports)
Benin	44.9	3.2	44.8	24	9	58.7	36.2	8.9	12.9
Burkina Faso	47.4	1.7	42.2	18	9.5	62.8	31.8	15.6	16.2
Cape Verde	0.5	1.8	54.9	33.9	36.6	54.2	12.5	9	9.2
Cote d'Ivoire	15.2	0.7	53.7	16.3	12.7	58.5	28.9	16.8	20.8
Gambia	1.3	1.4	89.3	31.7	7.3	63.2	29.9	5.2	11.6
Ghana	7.7	1.7	65.8	14.4	11.9	67.2	43.9	9.9	14.2
Guinea	2.6	0.8	6.8	20	21.1	39.1	20.3	4.3	13.4
Guinea-Bissau	4.5	0.3	94.3	39.3	0.7	46	51.4	13.4	13.6
Liberia	21.4	0.3	5.4	16.5	1.7	64.4	-	-	16.5
Mali	58.5	1.3	31.1	20.6	8.7	55.9	50.2	6.2	21
Niger	3	3.2	42.3	24.7	9.3	56.7	51.1	5.5	11.8
Nigeria	1.8	0.9	10	11.9	1.9	82.3	32.8	2.8	2.2
Senegal	2.4	2.0	46.1	25.8	28.2	51.4	18.5	14.3	19.1
Sierra Leone	0.8	2.5	21.8	26.5	32	48.5	43.9	5	21
Togo	9.2	1.6	27.8	18	32.5	64.1	37.4	8.4	14.9
World	3.3	3.1	10.4	9.6	68.4	64.8	5.4	19.8	15.5
SSA	5.4	1.5	18.9	10.8	24.9	69.4	16.5	15.3	12.8

Source: Author's calculation from World Bank, World Development Indicators and Global Development Finance, 2012. The averages are computed for 9 years: 1960, 1970, 1975, 1980, 1990, 2000, 2005, 2010 and 2011. SSA stands for Sub-Saharan Africa

Appendix A. 17 ECOWAS Consumer price inflation

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Ave
Benin	2.5	1.5	0.9	5.4	3.8	1.3	7.9	2.2	2.3	2.7	3.0
Burkina Fa.	2.2	2.0	-0.4	6.4	2.3	-0.2	10.7	2.6	-0.8	2.8	2.8
Cape Ver.	1.9	1.2	-1.9	0.4	5.4	4.4	6.8	1.0	2.1	4.5	2.6
Cote d'Iv	3.1	3.3	1.4	3.9	2.5	1.9	6.3	1.0	1.7	4.9	3.0
Gambia	8.6	17.0	14.2	4.8	2.1	5.4	4.5	4.6	5.0	4.8	7.1
Ghana	14.8	26.7	12.6	15.1	10.9	10.7	16.5	19.3	10.7	8.7	14.6
Guinea				31.4	34.7	22.8	18.4	4.7	15.5	21.4	21.3
Guinea-B	3.3	-3.5	0.9	3.3	2.0	4.6	10.5	-1.7	2.5	5.0	2.7
Liberia	14.2	10.3	7.8	10.8	7.3	11.4	17.5	7.4	7.3	8.5	10.3
Mali	5.0	-1.3	-3.1	6.4	1.5	1.4	9.2	2.2	1.1	2.9	2.5
Niger	2.6	-1.6	0.3	7.8	0.04	0.1	11.3	4.3	0.8	2.9	2.9
Nigeria	12.9	14.0	15.0	17.9	8.2	5.4	11.6	11.5	13.7	10.8	12.1
Senegal	2.2	0.0	0.5	1.7	2.1	5.9	5.8	-1.1	1.3	3.4	2.2
Sierra Leo						11.6	14.8	9.3	16.6	16.2	13.7
Togo	3.1	-1.0	0.4	6.8	2.2	1.0	8.7	2.0	1.8	3.6	2.9
Min	1.9	-3.5	-3.1	0.4	0.04	-0.2	4.5	-1.7	-0.8	2.7	2.2
Max	14.8	26.7	15.0	31.4	34.7	22.8	18.4	19.3	16.6	21.4	21.3
Spread	12.9	30.2	18.1	31.0	34.7	23.1	13.9	20.9	17.4	18.6	19.1
STDEV	4.9	9.0	6.3	8.1	8.8	6.2	4.4	5.4	5.8	5.5	6.0
Average	5.9	5.3	3.7	8.7	6.1	5.8	10.7	4.6	5.4	6.9	6.9

Appendix A. 18 EU12 Consumer price inflation (2002-2011)

Country Name	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Ave
Belgium	1.6	1.6	2.1	2.8	1.8	1.8	4.5	-0.1	2.2	3.5	2.2
Denmark	2.4	2.1	1.2	1.8	1.9	1.7	3.4	1.3	2.3	2.8	2.1
France	1.9	2.1	2.1	1.7	1.7	1.5	2.8	0.1	1.5	2.1	1.8
Germany	1.4	1.0	1.7	1.6	1.6	2.3	2.6	0.3	1.1	2.3	1.6
Greece	3.6	3.5	2.9	3.5	3.2	2.9	4.2	1.2	4.7	3.3	3.3
Ireland	4.7	3.5	2.2	2.4	3.9	4.9	4.1	-4.5	-0.9	2.6	2.3
Italy	2.5	2.7	2.2	2.0	2.1	1.8	3.4	0.8	1.5	2.7	2.2
Luxembourg	2.1	2.0	2.2	2.5	2.7	2.3	3.4	0.4	2.3	3.4	2.3
Netherlands	3.3	2.1	1.2	1.7	1.2	1.6	2.5	1.2	1.3	2.4	1.8
Portugal	3.5	3.3	2.4	2.3	2.7	2.8	2.6	-0.8	1.4	3.7	2.4
Spain	3.1	3.0	3.0	3.4	3.5	2.8	4.1	-0.3	1.8	3.2	2.8
UK	1.3	1.4	1.3	2.0	2.3	2.3	3.6	2.2	3.3	4.5	2.4
Min	1.3	1.0	1.2	1.6	1.2	1.5	2.5	-4.5	-0.9	2.1	1.6
Max	4.7	3.5	3.0	3.5	3.9	4.9	4.5	2.2	4.7	4.5	3.3
Spread	3.4	2.5	1.9	2.0	2.8	3.4	2.0	6.6	5.7	2.4	1.7
STDEV	1.0	0.8	0.6	0.6	0.8	0.9	0.7	1.7	1.3	0.7	0.5
Average	2.6	2.4	2.0	2.3	2.4	2.4	3.4	0.1	1.9	3.0	2.3

Appendix A. 19 Sensitivity analysis results for RERV2 (TIM)

VAR	(1) OLS	(2) OLS_1	(3) OLS_1t	(4) FE	(5) FE_1	(6) FE_1t
gdpi	1.11***	0.23***	0.22***	0.45	0.45	-0.47
	(0.03)	(0.03)	(0.03)	(0.78)	(0.43)	(0.81)
gdpj	0.59***	0.12***	0.11***	2.64***	1.30***	0.41
	(0.03)	(0.02)	(0.02)	(0.72)	(0.39)	(0.57)
gdpci	-0.13	-0.06	-0.04	-0.14	-0.32	0.61
	(0.08)	(0.05)	(0.05)	(0.80)	(0.44)	(0.83)
gdpcj	-0.43***	-0.09**	-0.09*	-2.47***	-1.23***	-0.34
	(0.07)	(0.05)	(0.05)	(0.77)	(0.41)	(0.59)
dist	-0.67***	-0.12***	-0.13***			
	(0.06)	(0.04)	(0.04)			
cu	0.83***	0.20***	0.19***	-0.69***	-0.21*	-0.23*
	(0.05)	(0.03)	(0.03)	(0.19)	(0.12)	(0.12)
rerv2	-1.44***	-0.36*	-0.21	-0.52	-0.36*	-0.13
	(0.26)	(0.19)	(0.23)	(0.34)	(0.21)	(0.22)
sim	-0.20***	-0.02	-0.02	0.03	0.05	0.09
	(0.06)	(0.03)	(0.03)	(0.12)	(0.07)	(0.08)
rlf	0.18***	0.03	0.04*	0.06	0.05*	0.06**
	(0.03)	(0.02)	(0.02)	(0.04)	(0.03)	(0.03)
div	0.27***	0.09***	0.09***	-0.25	0.01	-0.01
	(0.05)	(0.03)	(0.03)	(0.16)	(0.09)	(0.09)
lang	0.26***	0.05	0.05*			
	(0.05)	(0.03)	(0.03)			
fta	-0.04	0.02	0.12*	-0.13*	-0.08**	0.15
	(0.03)	(0.02)	(0.07)	(0.07)	(0.04)	(0.19)
bor	0.44***	0.07***	0.07***			
	(0.04)	(0.02)	(0.02)			
lalis	-0.46***	-0.11***	-0.11***			
	(0.04)	(0.03)	(0.03)			
trade1l		0.81***	0.82***		0.53***	0.53***
		(0.01)	(0.01)		(0.03)	(0.03)
Con	2.07***	0.40*	0.26	2.05***	0.70**	2.02**
	(0.35)	(0.22)	(0.23)	(0.62)	(0.31)	(0.84)
No of obs	4,418	3,992	3,992	4,418	3,992	3,992
R-sq	0.43	0.81	0.81	0.16	0.43	0.44
Ad R-sq	0.424	0.810	0.812			
F-test	225.3	921.2	351			
No of ind				198	185	185
Rho				0.853	0.684	0.692

Notes: In this table the dependent variable is logarithm of real exports- trade 1. All other definitions are as in table 6.3

Appendix A. 20 Sensitivity analysis results for RERV3 (TIM)

VAR	(1) OLS	(2) OLS_1	(3) OLS_1t	(4) FE	(5) FE_1	(6) FE_1t
gdpi	1.10***	0.23***	0.22***	0.55	0.48	-0.50
	(0.03)	(0.03)	(0.03)	(0.78)	(0.44)	(0.82)
gdpj	0.59***	0.12***	0.11***	2.62***	1.31***	0.41
	(0.03)	(0.02)	(0.02)	(0.73)	(0.39)	(0.57)
gdpci	-0.07	-0.05	-0.05	-0.21	-0.34	0.64
	(0.08)	(0.05)	(0.05)	(0.81)	(0.44)	(0.83)
gdpcj	-0.41***	-0.09*	-0.09*	-2.43***	-1.23***	-0.34
	(0.07)	(0.05)	(0.05)	(0.77)	(0.41)	(0.59)
dist	-0.68***	-0.13***	-0.13***			
	(0.06)	(0.04)	(0.04)			
cu	0.85***	0.20***	0.19***	-0.69***	-0.21*	-0.24**
	(0.05)	(0.03)	(0.03)	(0.19)	(0.12)	(0.12)
rerv3	0.00	-0.01	-0.01	-0.00	-0.01	-0.01*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
sim	-0.21***	-0.02	-0.03	0.03	0.05	0.09
	(0.06)	(0.03)	(0.03)	(0.12)	(0.07)	(0.08)
rlf	0.17***	0.03	0.04*	0.05	0.04	0.05**
	(0.03)	(0.02)	(0.02)	(0.04)	(0.03)	(0.03)
div	0.28***	0.09***	0.09***	-0.24	0.01	-0.02
	(0.05)	(0.03)	(0.03)	(0.16)	(0.09)	(0.09)
lang	0.26***	0.05	0.05*			
	(0.05)	(0.03)	(0.03)			
fta	-0.04	0.02	0.12	-0.14**	-0.08**	0.16
	(0.03)	(0.02)	(0.07)	(0.07)	(0.04)	(0.19)
bor	0.43***	0.07***	0.07***			
	(0.04)	(0.02)	(0.02)			
lalis	-0.45***	-0.11***	-0.10***			
	(0.04)	(0.03)	(0.03)			
trade1l		0.82***	0.82***		0.53***	0.53***
		(0.01)	(0.01)		(0.03)	(0.03)
Con	1.79***	0.34	0.24	1.85***	0.55*	2.00**
	(0.35)	(0.22)	(0.23)	(0.61)	(0.30)	(0.84)
No of obs	4,421	3,993	3,993	4,421	3,993	3,993
R-sq	0.42	0.81	0.81	0.16	0.43	0.44
Ad R-sq	0.420	0.810	0.812			
F-test	222.2	921.7	352			
No of ind				198	185	185
Rho				0.849	0.684	0.697

Notes: In this table the dependent variable is logarithm of real exports- trade 1. All other definitions are as in table 6.3

Appendix A. 21 Sensitivity analysis results for RERV4 (TIM)

VAR	(1) OLS	(2) OLS_1	(3) OLS_1t	(4) FE	(5) FE_1	(6) FE_1t
gdpi	1.12***	0.23***	0.22***	0.36	0.41	-0.52
	(0.03)	(0.03)	(0.03)	(0.78)	(0.43)	(0.81)
gdpj	0.59***	0.12***	0.11***	2.68***	1.32***	0.41
	(0.03)	(0.02)	(0.02)	(0.72)	(0.39)	(0.57)
gdpci	-0.13	-0.06	-0.04	-0.04	-0.27	0.67
	(0.08)	(0.05)	(0.05)	(0.80)	(0.44)	(0.82)
gdpcj	-0.44***	-0.10**	-0.09*	-2.51***	-1.24***	-0.34
	(0.07)	(0.05)	(0.05)	(0.76)	(0.41)	(0.59)
dist	-0.67***	-0.12***	-0.13***			
	(0.06)	(0.04)	(0.04)			
cu	0.84***	0.20***	0.19***	-0.69***	-0.20*	-0.23*
	(0.05)	(0.03)	(0.03)	(0.19)	(0.12)	(0.12)
rerv4	-1.70***	-0.41**	-0.28	-0.73*	-0.42*	-0.24
	(0.25)	(0.19)	(0.23)	(0.41)	(0.24)	(0.22)
sim	-0.19***	-0.02	-0.02	0.05	0.06	0.10
	(0.06)	(0.03)	(0.03)	(0.12)	(0.07)	(0.08)
rlf	0.18***	0.03	0.04*	0.06	0.05*	0.06**
	(0.03)	(0.02)	(0.02)	(0.04)	(0.03)	(0.03)
div	0.28***	0.09***	0.09***	-0.25	0.01	-0.01
	(0.05)	(0.03)	(0.03)	(0.16)	(0.09)	(0.09)
lang	0.26***	0.05	0.05*			
	(0.05)	(0.03)	(0.03)			
fta	-0.05	0.02	0.12	-0.12*	-0.08**	0.16
	(0.03)	(0.02)	(0.07)	(0.07)	(0.04)	(0.19)
bor	0.44***	0.07***	0.07***			
	(0.04)	(0.02)	(0.02)			
lalis	-0.46***	-0.11***	-0.11***			
	(0.04)	(0.03)	(0.03)			
trade1l		0.81***	0.82***		0.53***	0.53***
		(0.01)	(0.01)		(0.03)	(0.03)
Con	2.09***	0.40*	0.25	2.09***	0.70**	2.05**
	(0.35)	(0.22)	(0.23)	(0.62)	(0.31)	(0.84)
No of obs	4,417	3,991	3,991	4,417	3,991	3,991
R-sq	0.43	0.81	0.81	0.16	0.43	0.44
Ad R-sq	0.425	0.810	0.812			
F-test	227.9	922.7	355.1			
No of ind				198	185	185
Rho				0.857	0.689	0.702

Notes: In this table the dependent variable is logarithm of real exports- trade 1. All other definitions are as in table 6.3

Appendix A. 22 Sensitivity analysis results for RERV2 (DIM)

VAR	(1) OLS	(2) OLS_1	(3) OLS_1t	(4) FE	(5) FE_1	(6) FE_1t
gdp2	0.92***	0.15***	0.15***	1.65***	0.76***	1.28**
	(0.03)	(0.02)	(0.02)	(0.16)	(0.12)	(0.57)
gdpc2	-0.17***	-0.04	-0.04	-1.55***	-0.72***	-1.30**
	(0.07)	(0.04)	(0.04)	(0.19)	(0.12)	(0.58)
dist	-0.66***	-0.10**	-0.09**			
	(0.07)	(0.04)	(0.04)			
cu	0.99***	0.17***	0.16***	0.07	0.07	0.08
	(0.06)	(0.03)	(0.03)	(0.17)	(0.08)	(0.09)
rerv2	-1.28***	-0.45	-0.47	-0.16	-0.33	-0.32
	(0.38)	(0.31)	(0.38)	(0.24)	(0.25)	(0.34)
sim	-0.16**	-0.00	-0.00	0.15	0.07	0.09
	(0.07)	(0.03)	(0.03)	(0.16)	(0.08)	(0.09)
rlf	0.12***	0.02	0.02	-0.05	-0.01	-0.01
	(0.04)	(0.02)	(0.02)	(0.05)	(0.03)	(0.03)
div	0.43***	0.08**	0.08**	0.06	0.08	0.07
	(0.06)	(0.04)	(0.04)	(0.17)	(0.07)	(0.07)
lang	0.28***	0.02	0.02			
	(0.06)	(0.03)	(0.03)			
fta	-0.05	0.00	0.01	-0.17**	-0.07*	-0.51
	(0.04)	(0.02)	(0.10)	(0.07)	(0.04)	(0.40)
bor	0.56***	0.08***	0.08***			
	(0.05)	(0.02)	(0.02)			
lalis	-0.47***	-0.07**	-0.07**			
	(0.05)	(0.03)	(0.03)			
trade7l		0.84***	0.84***		0.55***	0.54***
		(0.02)	(0.02)		(0.05)	(0.05)
Con	1.30***	0.30	0.27	3.23***	1.38***	1.15
	(0.42)	(0.22)	(0.24)	(0.86)	(0.39)	(0.91)
No of obs	2,534	2,334	2,334	2,534	2,334	2,334
R-sq	0.53	0.87	0.87	0.21	0.49	0.51
Ad R-sq	0.527	0.866	0.869			
F-test	225.6	754.2	282.9			
No of ind				103	99	99
Rho				0.819	0.610	0.767

Notes: In this table the dependent variable is log(real exports + real imports)- trade 7. All other definitions are as in table 6.3

Appendix A. 23 Sensitivity analysis results for RERV3 (DIM)

VAR	(1) OLS	(2) OLS_1	(3) OLS_1t	(4) FE	(5) FE_1	(6) FE_1t
gdp2	0.92***	0.15***	0.15***	1.66***	0.78***	1.28**
	(0.03)	(0.02)	(0.02)	(0.16)	(0.12)	(0.56)
gdpc2	-0.14**	-0.03	-0.03	-1.56***	-0.73***	-1.29**
	(0.07)	(0.03)	(0.03)	(0.19)	(0.12)	(0.57)
dist	-0.66***	-0.10**	-0.10**			
	(0.07)	(0.04)	(0.04)			
cu	1.00***	0.16***	0.16***	0.06	0.07	0.07
	(0.06)	(0.03)	(0.03)	(0.17)	(0.08)	(0.09)
rerv3	-0.00	-0.02	-0.02*	-0.02	-0.02	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
sim	-0.17**	-0.01	-0.01	0.15	0.07	0.09
	(0.07)	(0.03)	(0.03)	(0.16)	(0.08)	(0.09)
rlf	0.12***	0.01	0.01	-0.05	-0.01	-0.01
	(0.04)	(0.02)	(0.02)	(0.05)	(0.03)	(0.03)
div	0.43***	0.08**	0.08**	0.06	0.08	0.07
	(0.06)	(0.04)	(0.04)	(0.17)	(0.07)	(0.07)
lang	0.27***	0.02	0.02			
	(0.06)	(0.03)	(0.03)			
fta	-0.04	0.00	-0.01	-0.17***	-0.07*	-0.53
	(0.04)	(0.02)	(0.10)	(0.07)	(0.04)	(0.41)
bor	0.55***	0.07***	0.07***			
	(0.05)	(0.02)	(0.02)			
lalis	-0.46***	-0.06**	-0.06**			
	(0.05)	(0.03)	(0.03)			
trade7l		0.84***	0.85***		0.55***	0.54***
		(0.02)	(0.02)		(0.05)	(0.05)
Con	1.05**	0.21	0.21	3.19***	1.28***	1.10
	(0.42)	(0.21)	(0.23)	(0.86)	(0.37)	(0.87)
No of obs	2,538	2,338	2,338	2,538	2,338	2,338
R-sq	0.53	0.87	0.87	0.21	0.49	0.51
Ad R-sq	0.523	0.866	0.869			
F-test	219.6	752.1	282.5			
No of ind				103	99	99
Rho				0.820	0.615	0.768

Notes: In this table the dependent variable is log(real exports + real imports)- trade 7. All other definitions are as in table 6.3

Appendix A. 24 Sensitivity analysis results for RERV4 (DIM)

VAR	(1) OLS	(2) OLS_1	(3) OLS_1t	(4) FE	(5) FE_1	(6) FE_1t
gdp2	0.92***	0.15***	0.15***	1.63***	0.76***	1.27**
	(0.03)	(0.02)	(0.02)	(0.17)	(0.12)	(0.57)
gdpc2	-0.17**	-0.04	-0.03	-1.54***	-0.71***	-1.28**
	(0.07)	(0.04)	(0.03)	(0.20)	(0.12)	(0.58)
dist	-0.66***	-0.10**	-0.09**			
	(0.07)	(0.04)	(0.04)			
cu	1.00***	0.17***	0.17***	0.07	0.07	0.08
	(0.06)	(0.03)	(0.03)	(0.17)	(0.09)	(0.09)
rerv4	-1.34***	-0.33	-0.24	-0.34	-0.30	-0.11
	(0.36)	(0.39)	(0.49)	(0.31)	(0.18)	(0.24)
sim	-0.15**	-0.00	-0.00	0.16	0.08	0.10
	(0.07)	(0.03)	(0.03)	(0.16)	(0.08)	(0.09)
rlf	0.12***	0.01	0.02	-0.05	-0.01	-0.01
	(0.04)	(0.02)	(0.02)	(0.05)	(0.03)	(0.03)
div	0.44***	0.08**	0.08**	0.06	0.08	0.07
	(0.06)	(0.04)	(0.04)	(0.17)	(0.07)	(0.07)
lang	0.28***	0.02	0.02			
	(0.06)	(0.03)	(0.03)			
fta	-0.06	-0.00	0.00	-0.17**	-0.07*	-0.50
	(0.04)	(0.02)	(0.10)	(0.07)	(0.04)	(0.39)
bor	0.57***	0.08***	0.08***			
	(0.05)	(0.02)	(0.02)			
lalis	-0.47***	-0.07**	-0.06**			
	(0.05)	(0.03)	(0.03)			
trade7l		0.84***	0.84***		0.55***	0.54***
		(0.02)	(0.02)		(0.05)	(0.05)
Con	1.29***	0.27	0.22	3.27***	1.35***	1.11
	(0.42)	(0.23)	(0.24)	(0.86)	(0.37)	(0.89)
No of obs	2,533	2,333	2,333	2,533	2,333	2,333
R-sq	0.53	0.87	0.87	0.21	0.49	0.51
Ad R-sq	0.527	0.866	0.868			
F-test	226.6	753.9	283.6			
No of ind				103	99	99
Rho				0.818	0.609	0.764

Notes: In this table the dependent variable is log(real exports + real imports)- trade 7. All other definitions are as in table 6.3

Appendix A. 25 Regression results-country pair (TIM)

VAR	(1) OLS	(2) OLS_CU	(3) OLS_1t	(4) FE	(5) OLS_1CP	(6) OLS_1CPT
gdpi	1.11***	-0.06***	0.22***	0.40	0.41	-0.52
	(0.03)	(0.01)	(0.03)	(0.78)	(0.35)	(0.59)
gdpj	0.59***	0.00	0.11***	2.68***	1.33***	0.42
	(0.03)	(0.01)	(0.02)	(0.72)	(0.33)	(0.43)
gdpci	-0.11	0.13***	-0.04	-0.07	-0.28	0.66
	(0.08)	(0.02)	(0.05)	(0.81)	(0.34)	(0.59)
gdpcj	-0.43***	0.03	-0.09*	-2.50***	-1.25***	-0.34
	(0.07)	(0.02)	(0.05)	(0.76)	(0.33)	(0.44)
dist	-0.67***	0.07***	-0.13***		5.96***	2.58
	(0.06)	(0.02)	(0.04)		(1.71)	(2.03)
cu	0.83***		0.19***	-0.69***	-0.20*	-0.23**
	(0.05)		(0.03)	(0.19)	(0.11)	(0.11)
rerv1	-1.66***	-0.17**	-0.27	-0.59	-0.42**	-0.22
	(0.25)	(0.08)	(0.22)	(0.37)	(0.20)	(0.22)
sim	-0.19***	0.24***	-0.02	0.05	0.06	0.10
	(0.06)	(0.01)	(0.03)	(0.12)	(0.07)	(0.07)
rlf	0.18***	-0.04***	0.04*	0.06	0.05*	0.06**
	(0.03)	(0.01)	(0.02)	(0.04)	(0.03)	(0.03)
div	0.27***	-0.46***	0.09***	-0.25	0.01	-0.01
	(0.05)	(0.01)	(0.03)	(0.16)	(0.07)	(0.08)
lang	0.26***	0.14***	0.05*		-0.67*	0.20
	(0.05)	(0.02)	(0.03)		(0.37)	(0.46)
fta	-0.05	0.05***	0.12	-0.12*	-0.08**	0.54*
	(0.03)	(0.01)	(0.07)	(0.07)	(0.04)	(0.30)
bor	0.44***	0.05***	0.07***		-0.08	-0.11
	(0.04)	(0.01)	(0.02)		(0.15)	(0.15)
lalis	-0.46***	0.22***	-0.11***		3.29***	1.78*
	(0.04)	(0.01)	(0.03)		(0.80)	(0.93)
trade1l			0.82***		0.53***	0.53***
			(0.01)		(0.02)	(0.02)
ltrade1		0.07***				
		(0.00)				
Con	2.05***	-0.29***	0.25	2.01***	-19.14***	-7.28
	(0.35)	(0.10)	(0.23)	(0.62)	(5.62)	(6.85)
No of obs	4,417	4,263	3,991	4,417	3,991	3,991
R-sq	0.43	0.60	0.81	0.16	0.85	0.85
Ad R-sq	0.425	0.603	0.812		0.838	0.839
F-test	227.1	771.8	354.9			
No of ind				198		
Rho				0.856		

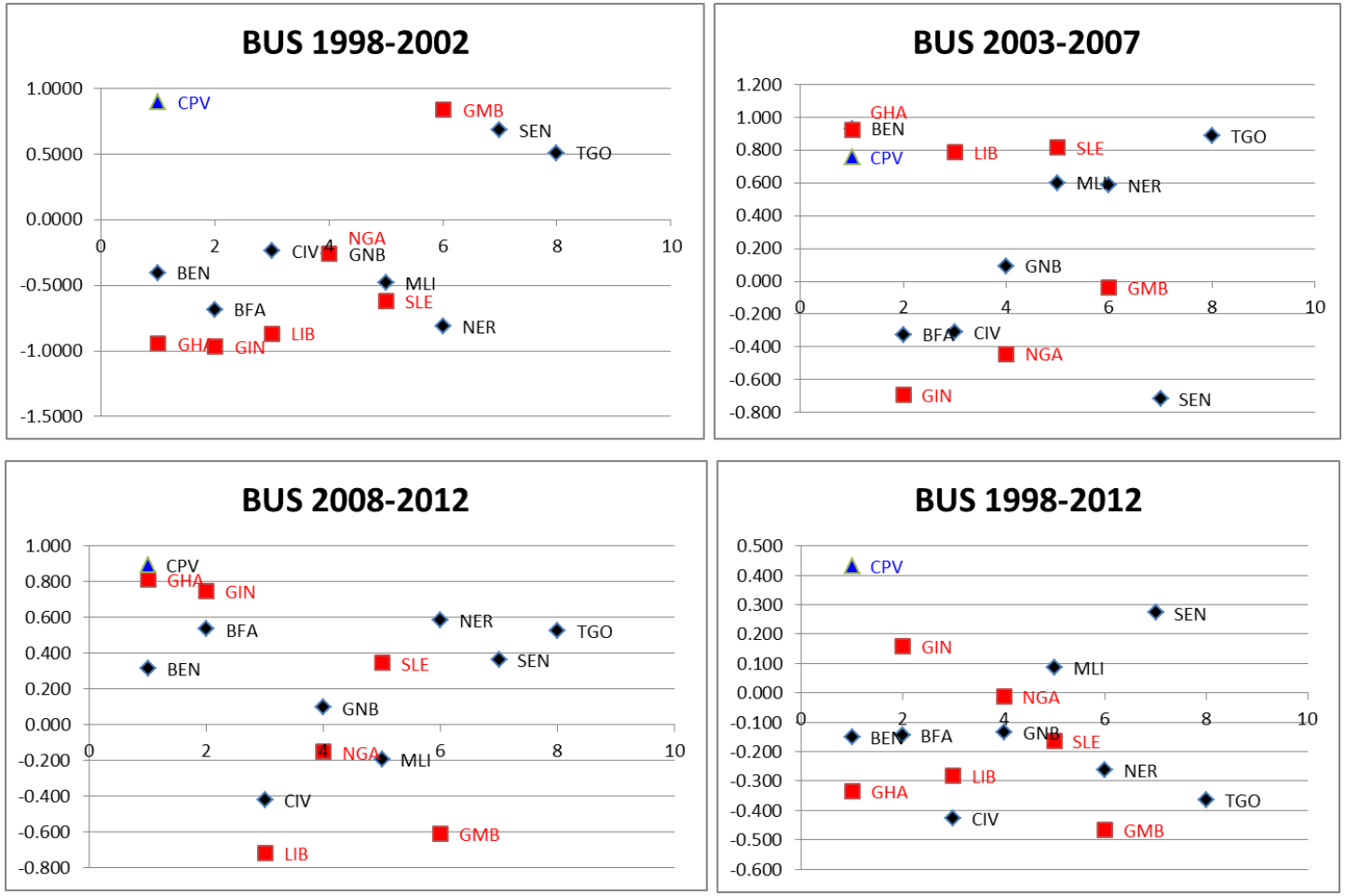
Notes: In this table the dependent variable is logarithm of real exports- trade 1 except for column 2 where the dependent variable is the currency union dummy, OLS_1CP means OLS with country pair dummies and LDV included as explanatory variables, OLS_1CPT means OLS with country pair, time dummies and LDV included. All other definitions are as defined in table 6.3

Appendix A. 26 Regression results- country pair (DIM)

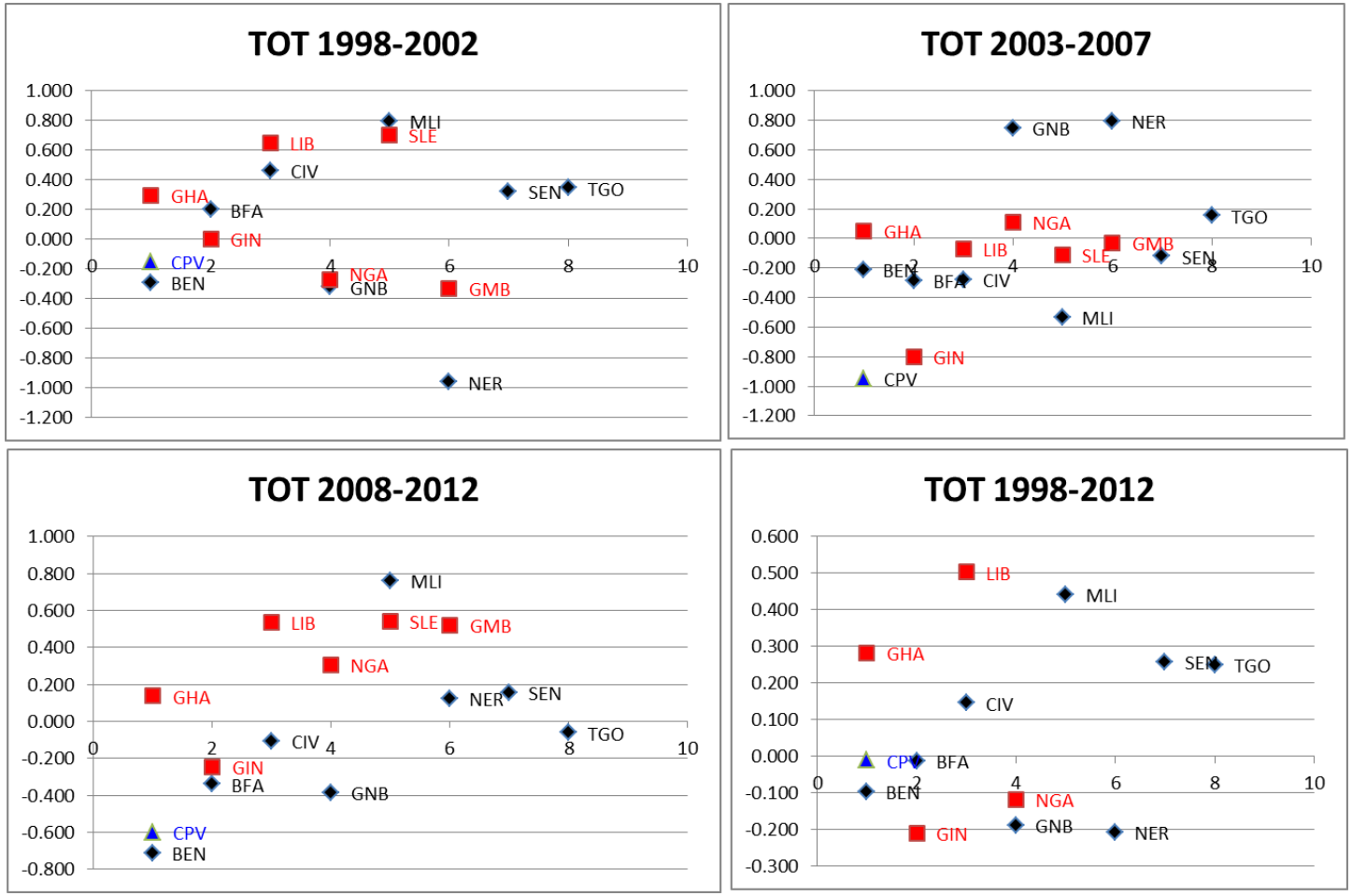
VAR	(1) OLS	(2) OLS_CU	(3) OLS_1t	(4) FE	(5) OLS_1CP	(6) OLS_1CPT
gdp2	0.92***	-0.04***	0.15***	1.64***	0.76***	1.27***
	(0.03)	(0.01)	(0.02)	(0.17)	(0.09)	(0.41)
gdpc2	-0.16**	0.05**	-0.03	-1.54***	-0.71***	-1.27***
	(0.07)	(0.02)	(0.03)	(0.20)	(0.10)	(0.41)
dist	-0.66***	0.11***	-0.10**		4.08***	6.02***
	(0.07)	(0.02)	(0.04)		(1.08)	(1.85)
cu	0.99***		0.17***	0.07	0.07	0.08
	(0.06)		(0.03)	(0.17)	(0.07)	(0.07)
rerv1	-1.53***	-0.17*	-0.29	-0.30	-0.31	-0.15
	(0.37)	(0.10)	(0.50)	(0.29)	(0.36)	(0.44)
sim	-0.15**	0.24***	-0.00	0.16	0.08	0.10
	(0.07)	(0.02)	(0.03)	(0.16)	(0.06)	(0.06)
rlf	0.12***	-0.05***	0.02	-0.05	-0.01	-0.01
	(0.04)	(0.01)	(0.02)	(0.05)	(0.03)	(0.03)
div	0.44***	-0.43***	0.08**	0.06	0.08	0.07
	(0.06)	(0.02)	(0.04)	(0.17)	(0.06)	(0.06)
lang	0.28***	0.10***	0.02		2.24***	3.31***
	(0.06)	(0.02)	(0.03)		(0.56)	(0.99)
fta	-0.06	0.05***	0.00	-0.17**	-0.07*	-0.51*
	(0.04)	(0.01)	(0.10)	(0.07)	(0.04)	(0.30)
bor	0.57***	0.03	0.08***		5.64***	7.84***
	(0.05)	(0.02)	(0.02)		(1.23)	(2.04)
lalis	-0.48***	0.20***	-0.07**		-6.01***	-8.85***
	(0.05)	(0.01)	(0.03)		(1.30)	(2.49)
trade7l			0.84***		0.55***	0.54***
			(0.02)		(0.03)	(0.03)
ltrade7		0.10***				
		(0.01)				
Con	1.28***	-0.31**	0.23	3.24***	-12.50***	-18.86***
	(0.42)	(0.13)	(0.24)	(0.86)	(3.62)	(6.35)
No of obs	2,533	2,446	2,333	2,533	2,333	2,333
R-sq	0.53	0.56	0.87	0.21	0.89	0.90
Ad R-sq	0.528	0.553	0.868		0.888	0.891
F-test	228.4	310.1	283.8			
No of ind				103		
Rho				0.818		

Notes: In this table the dependent variable is log(real exports + real imports)- trade 7 except for column 2 where the dependent variable is the currency union dummy. All other definitions are as defined in table 6.3 and appendix A.25

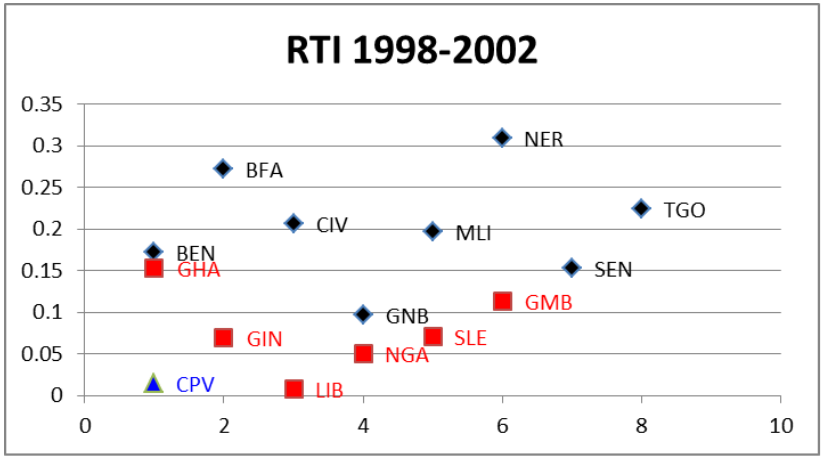
Appendix A. 27 Business cycle correlation (BUS) for all periods

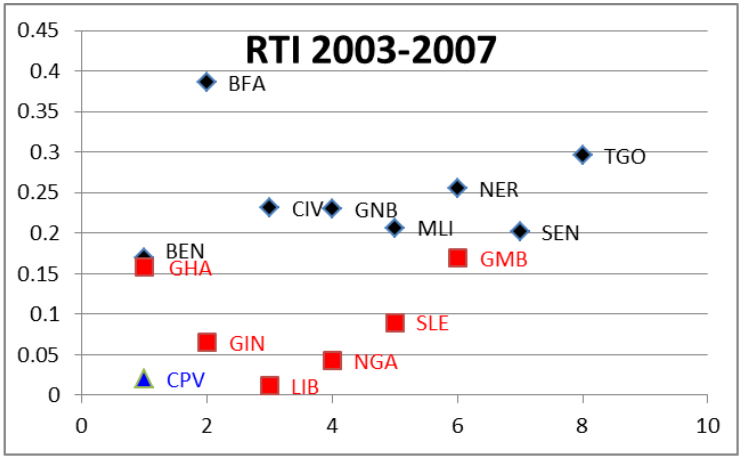


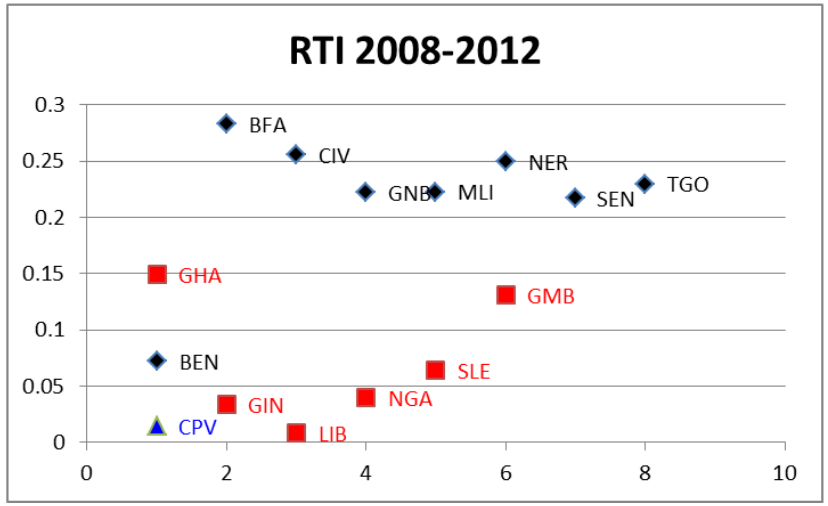
Appendix A. 28 Terms of trade synchronisation (TOT) for all periods

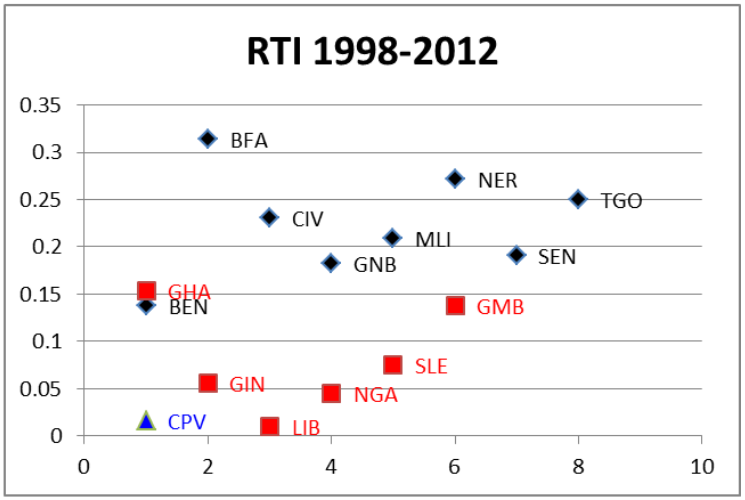


Appendix A. 29 Regional trade integration (RTI) for all periods

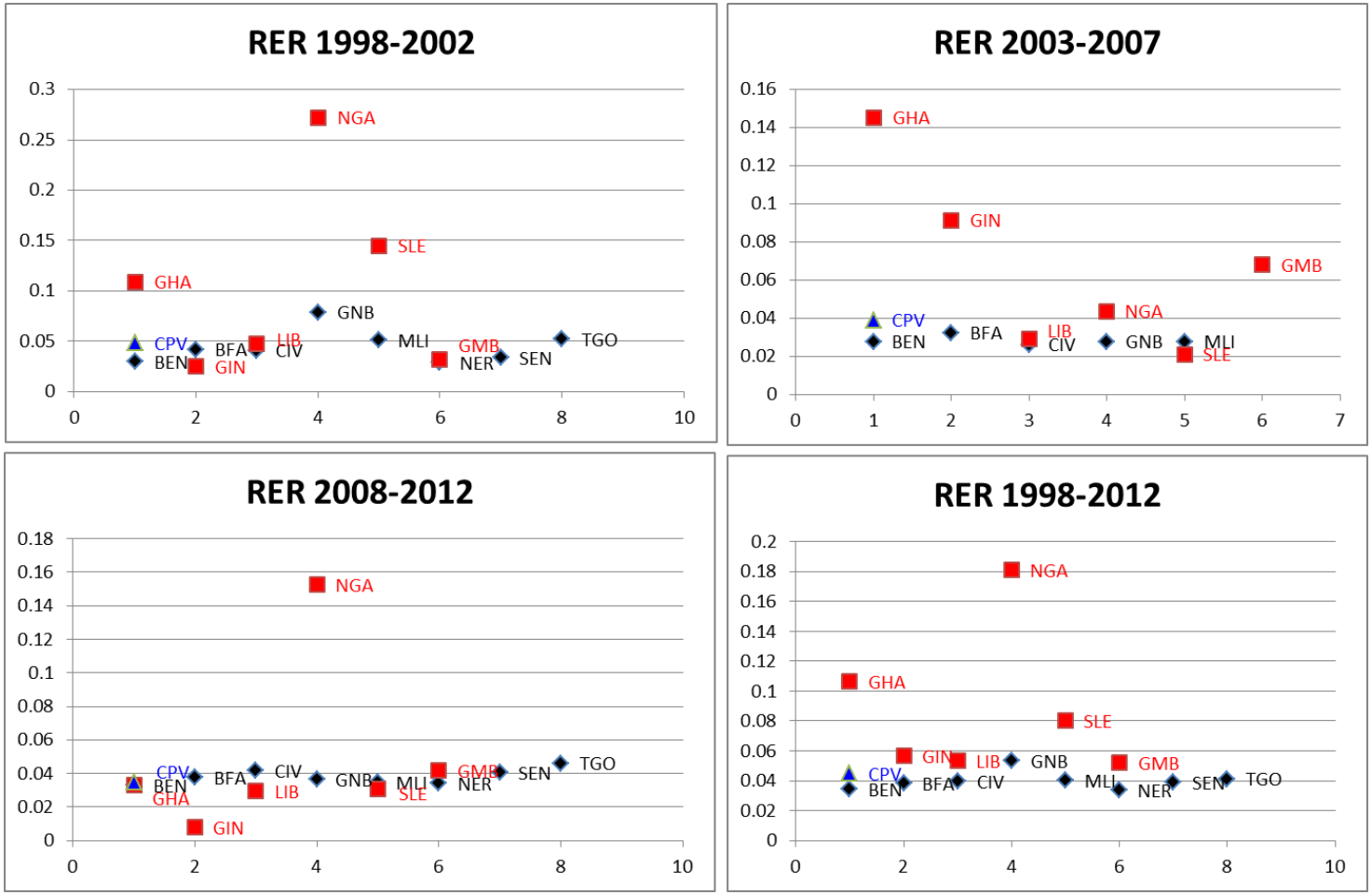




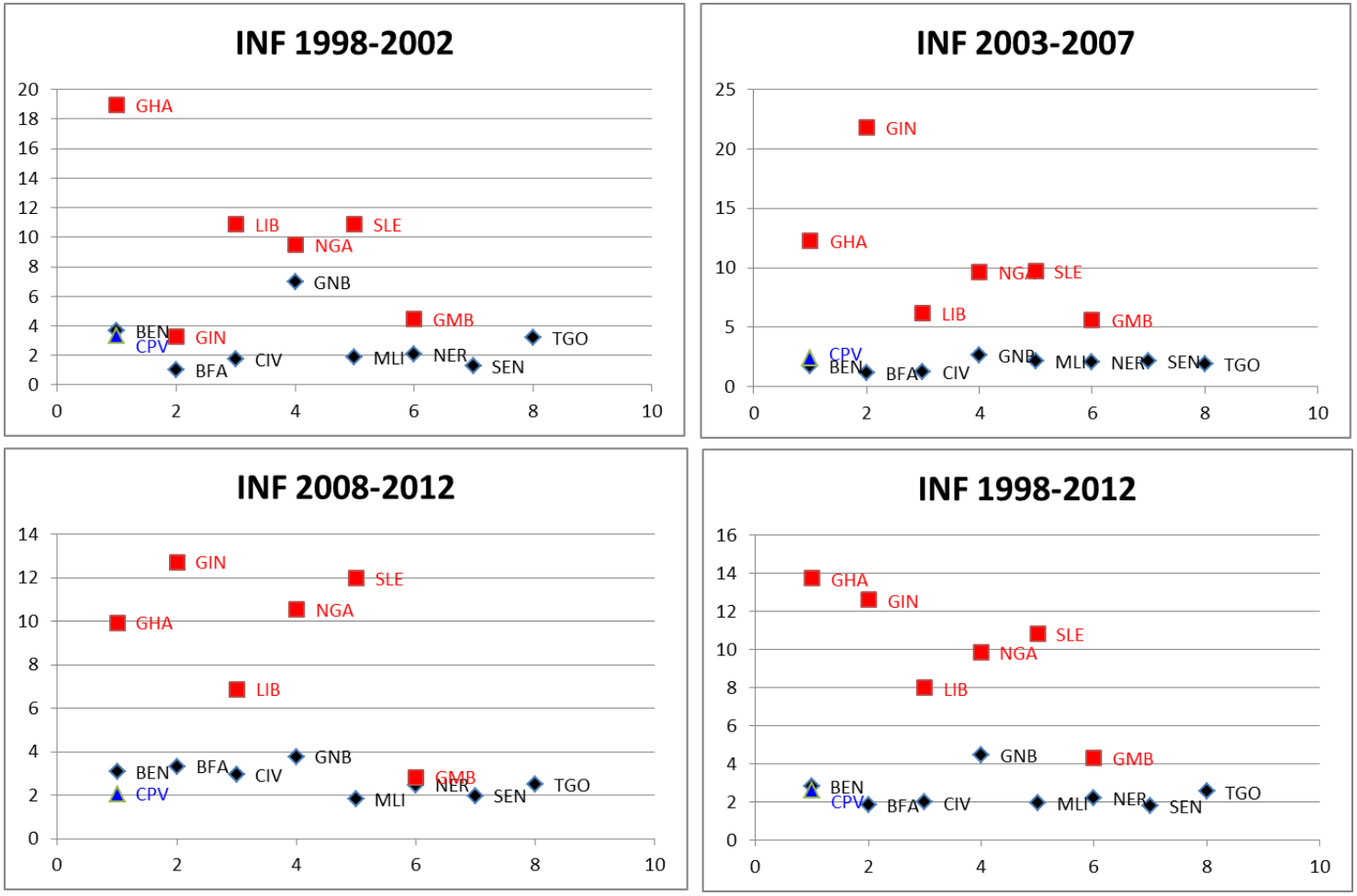




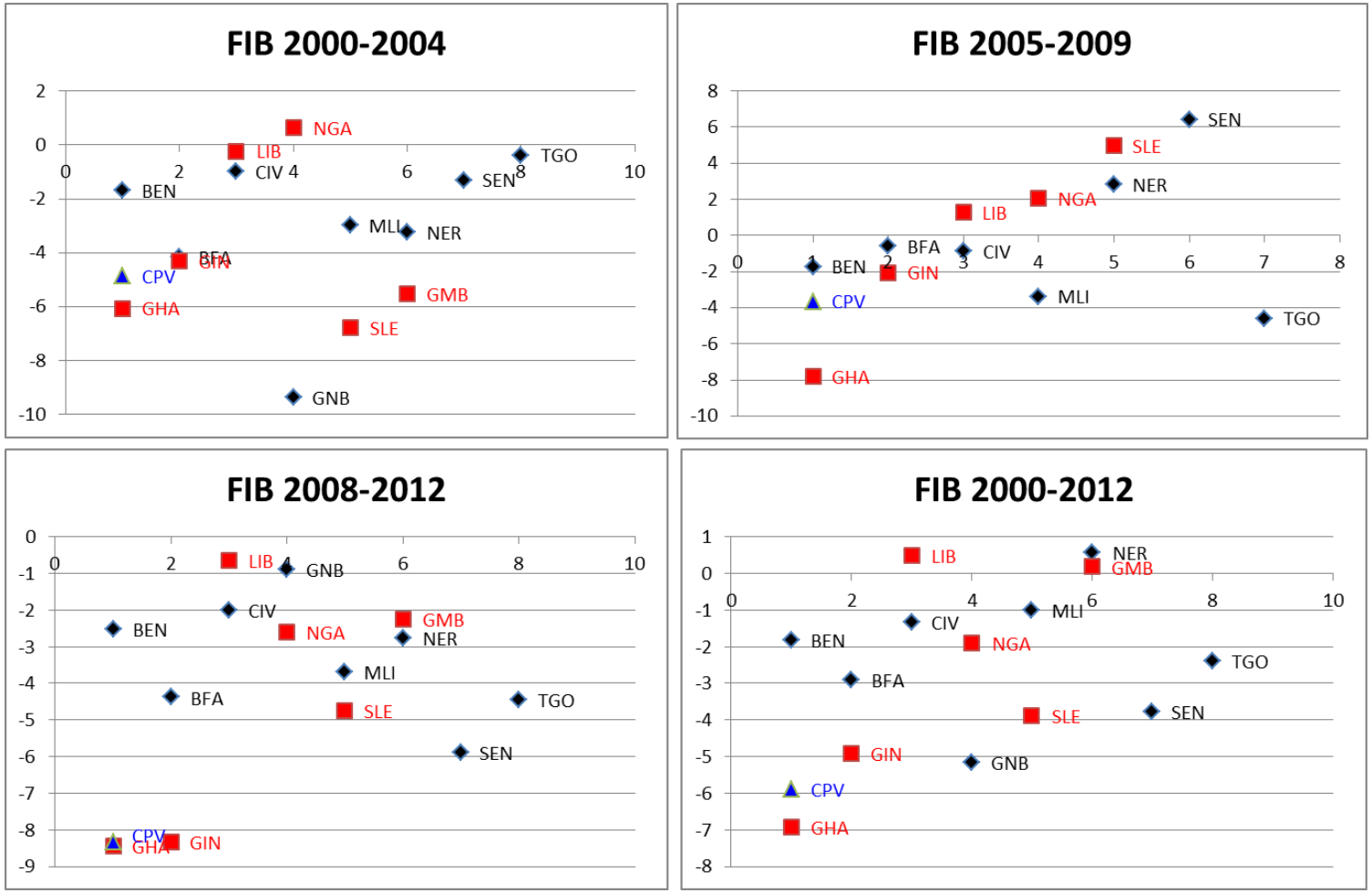
Appendix A. 30 Real exchange rate (RER) for all periods



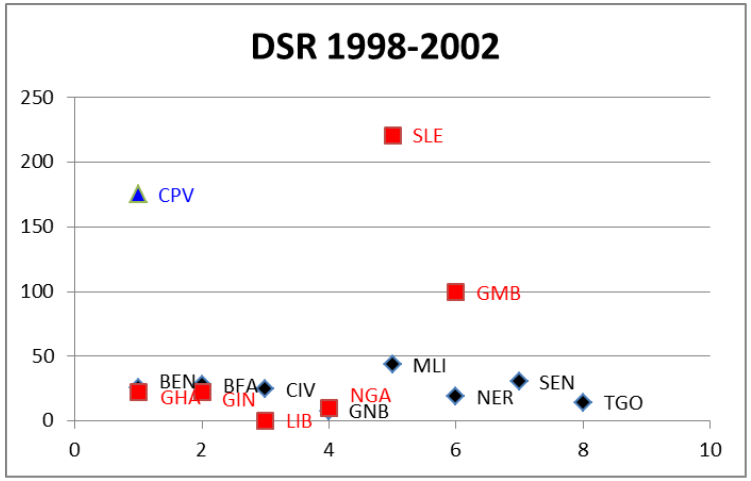
Appendix A. 31 Convergence in inflation (INF) for all periods

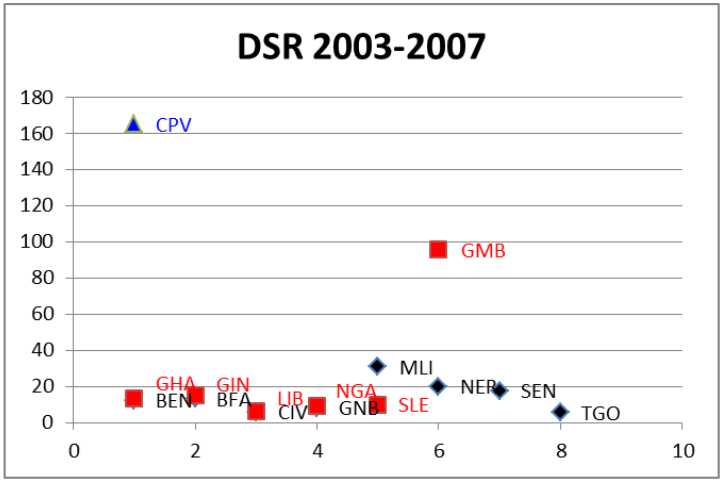


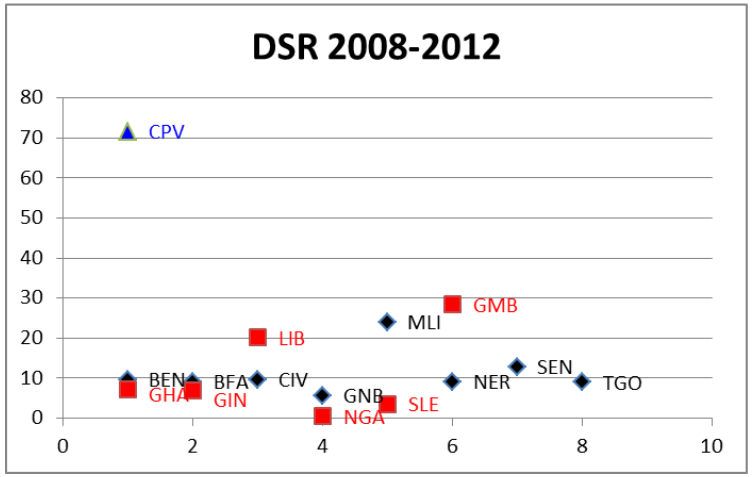
Appendix A. 32 Fiscal balance (FIB) for all periods

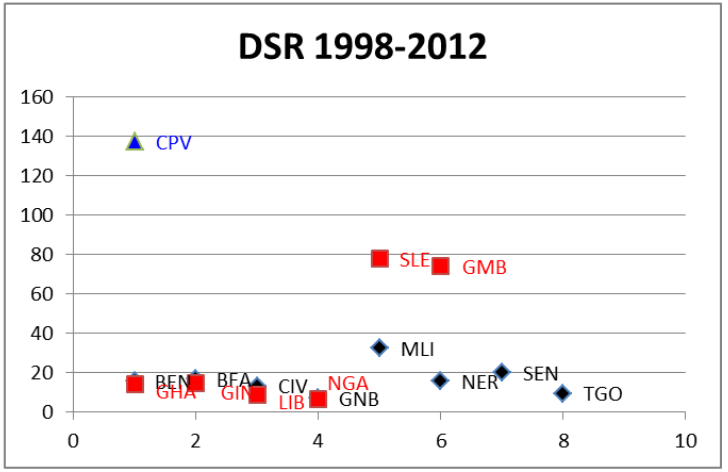


Appendix A. 33 Debt service requirement (DSR) for all periods

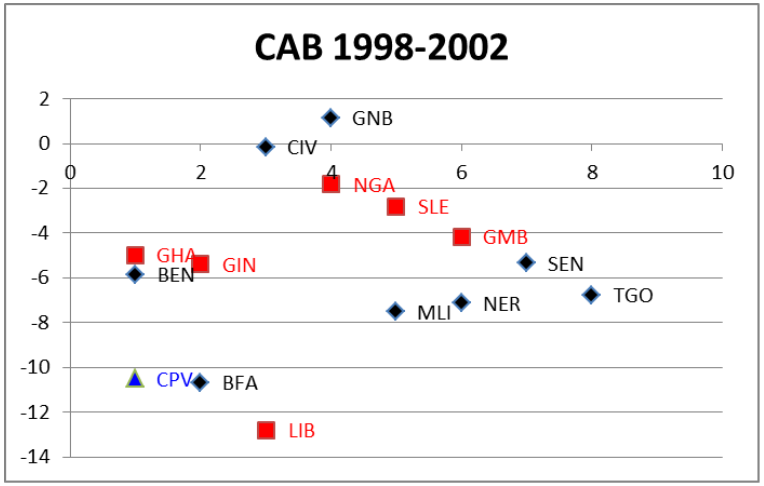


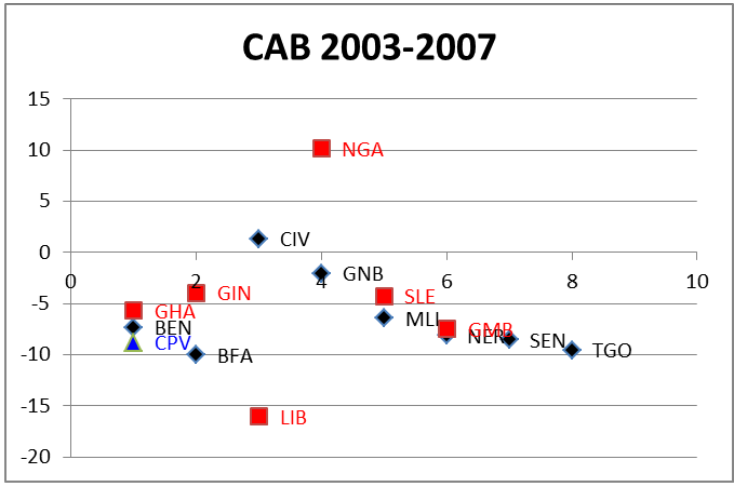


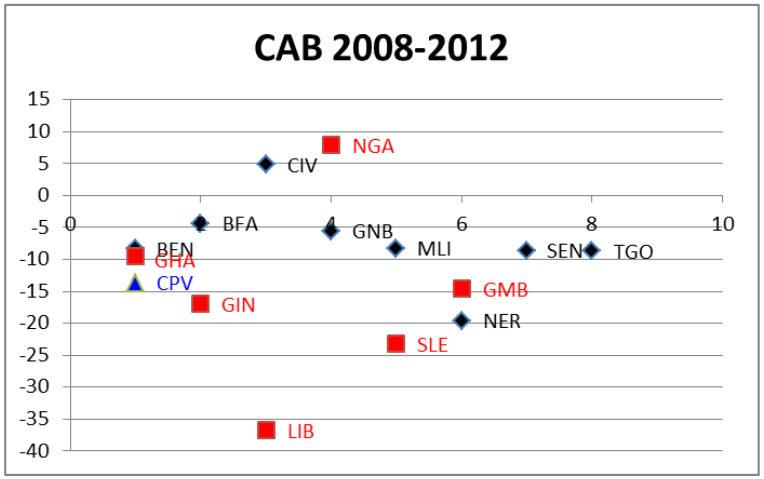


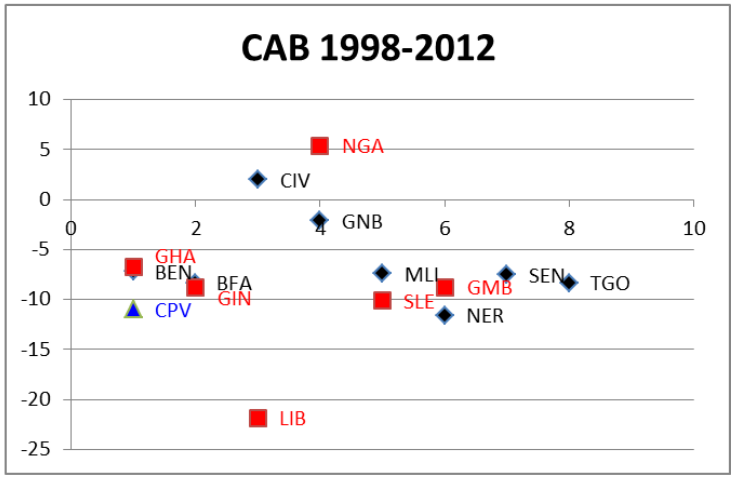


Appendix A. 34 Current account balance (CAB) for all periods









Appendix A. 35 Calinski Harabasz and DH cluster stopping rules

		Average linkage			Single linkage			Complete linkage			Ward's linkage		
	NoC[1]		Duda/Hart			Duda/Hart			Duda/Hart			Duda/Hart	
		CHP[2]	JJ[3]	PTS[4]	CHP[2]	JJ[3]	PTS[4]	CHP[2]	JJ[3]	PTS[4]	CHP[2]	JJ[3]	PTS[4]
1998-2012 all variables	1		0.8105	3.04		0.8105	3.04		0.8105	3.04		0.7636	4.03
	2	3.04	0.7962	3.07	3.04	0.7962	3.07	3.04	0.7962	3.07	4.03	0.6848	2.30
	3	3.33	0.8114	2.56	3.30	0.8114	2.56	3.30	0.6906	4.93	4.22	0.6318	2.33
	4	3.34	0.6652	5.03	3.34	0.8106	2.34	4.56	0.5985	2.01	4.56	0.5985	2.01
	5	4.68	0.5548	1.60	3.39	0.7774	2.58	4.68	0.5548	1.60	4.68	0.6432	3.33
	6	4.54	0.3065	2.26	3.66	0.7707	2.38	4.54	0.6432	3.33	4.73	0.5234	1.82
	7	4.52	0.6432	3.33	3.91	0.7990	1.76	4.98	0.3065	2.26	5.12	0.0000	.
	8	5.44	0.7230	1.53	3.92	0.6432	3.33	5.44	0.7230	1.53	5.44	0.6824	1.86
	9	5.37	0.0000	.	4.99	0.6824	1.86	5.37	0.5803	2.17	5.63	0.5225	1.83
	10	5.13	0.5803	2.17	5.42	0.5225	1.83	5.87	0.3275	2.05	5.87	0.000	.
1998-2002 all variables	1		0.8534	2.23		0.8534	2.23		0.8520	2.26		0.7896	3.46
	2	2.23	0.7551	3.89	2.23	0.8400	2.29	2.26	0.6629	4.58	3.46	0.7171	1.97
	3	3.31	0.7854	2.46	2.37	0.8480	1.97	3.21	0.4827	2.14	3.51	0.6602	1.54
	4	3.18	0.4173	1.40	2.36	0.8124	2.31	3.41	0.3495	1.86	3.63	0.0000	.
	5	2.99	0.6375	4.55	2.56	0.8051	2.18	3.58	0.1983	4.04	3.88	0.6728	2.92
	6	3.99	0.0000	.	2.73	0.6375	4.55	3.99	0.6832	2.78	3.88	0.4173	1.40
	7	3.93	0.6832	2.78	3.93	0.0000	.	4.25	0.0000	.	4.31	0.0000	.
	8	4.52	0.6319	2.91	3.37	0.6832	2.78	4.52	0.6319	2.91	4.60	0.5559	2.40
	9	5.32	0.4220	2.74	4.05	0.7036	2.11	5.32	0.4220	2.74	5.32	0.4220	2.74
	10	6.09	0.0000	.	4.50	0.4638	3.47	6.09	0.0000	.	6.09	0.1844	4.42
2003-2007 all variables	1		0.8412	2.45		0.8499	2.30		0.7853	3.55		0.7652	3.99
	2	2.45	0.8272	2.51	2.30	0.8184	2.66	3.55	0.5240	1.82	3.99	0.6036	1.97
	3	2.62	0.7112	4.47	2.63	0.7660	3.36	3.83	0.3999	1.50	3.89	0.7202	3.11
	4	3.74	0.0000	.	3.22	0.7845	2.75	3.74	0.7244	3.42	3.60	0.3999	1.50
	5	3.48	0.7040	3.78	3.48	0.8521	1.56	4.08	0.0000	.	3.93	0.0000	.
	6	4.32	0.6682	1.99	3.25	0.8600	1.30	4.14	0.5012	1.99	3.97	0.6743	2.42
	7	4.22	0.6348	1.73	3.02	0.7833	1.94	4.04	0.7460	1.70	4.20	0.4758	2.20
	8	4.20	0.5374	1.72	3.17	0.6951	2.63	4.02	0.6138	2.52	4.20	0.0000	.
	9	4.13	0.5245	2.72	3.75	0.5751	2.22	4.48	0.3701	1.70	4.48	0.2276	3.99
	10	4.90	0.0000	.	4.28	0.4472	1.24	4.55	0.2276	3.39	4.52	0.3701	1.70
2008-2012 all variables	1		0.8094	3.06		0.8094	3.06		0.8132	2.99		0.7661	3.97
	2	3.06	0.7775	3.43	3.06	0.7775	3.43	2.99	0.7739	3.51	3.97	0.6854	4.13
	3	3.53	0.7894	2.94	3.53	0.7894	2.94	3.53	0.7894	2.94	4.15	0.3035	4.59
	4	3.71	0.5620	7.79	3.71	0.8541	1.71	3.71	0.5620	7.79	5.20	0.2374	6.42
	5	6.45	0.6030	4.61	3.39	0.5798	6.52	6.45	0.6030	4.61	7.35	0.5765	3.67
	6	7.77	0.6964	2.18	5.52	0.6030	4.61	7.77	0.6598	2.58	7.20	0.1516	5.60
	7	7.57	0.3329	2.00	7.27	0.0000	.	7.86	0.3895	4.70	8.58	0.3329	2.00
	8	7.59	0.4527	4.84	6.23	0.6964	2.18	8.86	0.3329	2.00	8.87	0.2677	2.74
	9	10.25	0.0000	.	6.76	0.4527	4.84	10.25	0.0000	.	10.25	0.0000	.
	10	10.20	0.4470	2.47	10.20	0.0000	.	10.20	0.4470	2.47	10.20	0.4470	2.47

Notes: 1 Number of cluster, 2 Calinski/Harabasz Pseudo-F indexe, 3 JJ stands for Je(2)/Je(1) index, and 4 stands for Pseuda T-Squared, DH stands for Duda Hart

Appendix A. 36 H. clustering results-1998-2012(OCA variables)

Linkage method	Cluster number					
	1	2	3	4	5	6
Average Linkage (6 clusters) CCC=0.858	BEN BFA CIV GMB GNB NER TGO	MLI SEN	GHA LIB SLE	CPV	GIN	NGA
Single Linkage (2 clusters) CCC=0.814	BEN BFA CIV CPV GHA GIN GMB GNB LIB MLI NER SEN SLE TGO	NGA	-	-	-	-
Complete Linkage (5 clusters) 0.781	BEN BFA CIV GMB GNB NER TGO	MLI SEN	CPV GIN	GHA LIB SLE	NGA	-
Ward's Linkage (2 clusters) 0.70	BEN BFA CIV GMB GNB MLI NER SEN TGO	CPV GHA GIN LIB NGA SLE	-	-	-	-
Centroid 2&5 clusters CCC=0.777						

Note: H stands for Hierarchical

Appendix A. 37 H. clustering results-1998-2012 Convergence criteria

Linkage method	Cluster number					
	1	2	3	4	5	6
Average Linkage (6 clusters) CCC=0.904	BEN BFA CIV GNB MLI NER SEN TGO	GMB SLE	LIB	GHA GIN	CPV	NGA
Single Linkage (6 clusters) 0.847	LIB	CPV	BEN BFA CIV GMB GNB MLI NER SEN TGO	SLE	GHA GIN	NGA
Complete Linkage (5 clusters) 0.771	LIB MLI NER	BEN BFA CIV GNB SEN TGO	CPV GMB SLE	GHA GIN	NGA	-
Ward's Linkage (5 clusters) 0.63	BEN BEN BFA CIV GNB MLI NER TGO	CPV GMB SLE	LIB	GHA GIN	NGA	-
Centroid 2 and 3 clusters CCC=0.894						

Note: H stands for Hierarchical

Appendix A. 38 H. clustering results-1998-2012 Cityblock distance

Linkage method	Cluster number						
	1	2	3	4	5	6	7
Average Linkage (6 clusters)	BEN BFA CIV MLI NER SEN TGO	GIN GNB	GHA GMB SLE	LIB	CPV	NGA	
Single Linkage (7 clusters)	GIN	BEN BFA CIV GMB GNB MLI NER SEN TGO	SLE	GHA	LIB	CPV	NGA
Complete Linkage (5 clusters)	GHA GIN GMB GNB SLE	BEN BFA CIV MLI NER SEN TGO	LIB	CPV	NGA		
Ward's Linkage (5 clusters)	BEN BFA CIV MLI NER SEN TGO	GHA GIN GMB GNB SLE	LIB	CPV	NGA		

Note: H stands for Hierarchical