Regional integration readiness of The Gambia: Empirical assessments of the optimality of the Sene-Gambia as a currency area and the trade facilitation effects of the Sene-Gambia Confederation on The Gambian economy

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Abstract

This thesis is an empirical assessment of the readiness of The Gambia for regional integration and is presented in two studies. The first is on the optimality of the Sene-Gambia sub-region as a currency area and the second is on trade facilitation effects of the Sene-Gambia Confederation on The Gambian economy. The first study uses three methods to determine the optimality of the Sene-Gambia as a currency area. The first method is a reduced VAR to examine the response of the Senegalese and The Gambian economies to external shocks emanating from France, the United Kingdom (UK) and United States of America (USA). The second method is a co-integration analysis on Generalized Purchasing Power Parity (GPPP) to determine the existence of a co-integrating relationship between the exchange rates of the Gambian dalasi and Senegalese CFA franc and their consumer price indices. The third method assesses the similarity between the two economies as countries wishing to form an optimal currency area should not be diametrically different in their economic structure or else the relationship would not be mutually beneficial and the resulting union may not be stable. The results support the optimality of Sene-Gambia as a currency area.

Given this optimality, the second study uses an error-corrected gravity model to determine the trade facilitation effects of the Sene-Gambia Confederation on The Gambian economy. It also looks at the significance of financial deepening, a proxy for supply-side constraints, to The Gambian economy. Credit to the private sector measures the level of financial sector deepening in The Gambia. The study finds that the Sene-Gambia Confederation had positive trade facilitation effects for The Gambia and that financial deepening is statistically a significant policy instrument for trade in The Gambia.

Résumé

Cette thèse est une évaluation empirique de l'aptitude de la Gambie à l'intégration régionale et se présente en deux études. La première concerne l'optimalité de la sous région Séné-Gambie en tant que zone monétaire et la seconde traite les effets de la Confederation Séné-Gambienne qui facilitent le commerce sur le marché économique Gambien. La première étude emploie trois méthodes pour déterminer l'optimisation de la Séné-Gambie comme une aire de devise. La première méthode est l'utilisation d'un VAR réduit pour déterminer les réactions des économies Sénégalaise. Cette méthode démontrera aussi les conséquences Gambienne face aux chocs externes provenant de la France, de la Grande-Bretagne et des Etats-Unis. La deuxième méthode est une analyse co-intégrée du *Generalised Purchasing Power Parity (GPPP)* pour repérer l'existence d'une relation co-intégrante entre les taux d'échanges de la Dalasi Gambienne et du franc CFA Sénégalais et leurs prix indices du consumateur. La troisième méthode évalue les ressemblances entre les deux économies comme pays souhaitant former une aire de devise optimale. Par contre, ces économies doivent se ressembler, respectivement a leurs structures, sinon la relation ne serait pas bénéfique aux deux régions causant un union d'instabilité. Les résultats des trois méthodes supportent l'optimisation de la Sénè-Gambie comme aire de devise.

Ayant présenté cette optimisation, la deuxième étude emploie une modèle de gravité à erreur corrigée pour déterminer les effets de la Confédération sur l'économie Gambienne. Des plus, l'étude observe l'importance de l'approfondissement financier, un intermédiaire pour les contraintes d'offre, sur l'économie Gambienne. Le crédit offert au secteur privé mesure le niveau d'approfondissement financier par secteur dans l'économie globale de la Gambie. L'étude découvre que la Confédération Séne-Gambie obtient des effets positifs par la facilitation des effets de marche pour la Gambie et que l'approfondissement financier est une politique statistiquement contribuable au meilleur fonctionnement économique en Gambie.

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Acronyms

BCEAO	Banque Centrale d'Afrique l'ouest
CET	Common External Tariff
CFA	Communite Franco Africaine
CFAF	Communitie Franco Africaine franc
ECOWAS	Economic Community of West African States
ERP	Economic Recovery Programme
FF	French franc
GDP	Gross Domestic Product
HIPC	Heavily Indebted Poor Countries
IMF	International Monetary Fund
MDGs	Millennium Development Goals
NA	Needs Assessment
PRGF	Poverty Reduction Growth Facility
PRSP	Poverty Reduction Strategy Paper
SAP	Structural Adjustment Programme
UEMOA	Union Economique et Monetaire d'Afrique de l'Ouest
UNMP	United Nations Millennium Project
UN	United Nations
WB	World Bank

CHAPTER 1

Overview of Gambian and Senegalese Economies

1.0 Introduction

The resurgence of regional integration and the effects of globalization have reawakened interest in currency areas and their optimality. The Gambia has been involved in economic integration efforts at both the sub-regional level, with Senegal, and at the regional level with other members of the Economic Community of West African States (ECOWAS). In the mid-1970s, The Gambia along with her neighbours recognized three facts: their individual economies are characterized by smallness; they lack static competitiveness and still do; and large trading blocks are increasingly characterizing world trade. As a result, they formed ECOWAS with the ultimate objective of creating an economic block with a single market. However it was not until 1999 when this desire assumed an element of urgency, catalysed by the election of Olusegun Obasango as President of Nigeria, who found in Jerry Rawlins, the then President of Ghana, an ally to carry this vision forward. The drive to form this monetary union then intensified with renewed vigor.

When ECOWAS finally agreed in 1999 to form the monetary union, one already existed between nine countries¹ using the CFA franc as a unit of currency. Cognizant of this fact, it was agreed that the monetary integration of all 15 members would be implemented in two stages: first a second union would be formed consisting of the six non-CFA countries²; then the two unions would merge in 2011. Senegal is already a member of the CFA zone and The Gambia would be a member of the second group, so the optimality of Sene-Gambia is assumed to reflect that of merging the two groups.

The Gambia has always enjoyed a close relationship with Senegal even prior to independence because they have the same ethnic composition, and they have always had the desire to form a

¹Benin, Burkina Faso, Cape Verde, Cote D'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo

² The Gambia, Guinea Conakry, Nigeria, Ghana, Liberia and Sierra Leone.

political union. On July 30 1981, a coup attempt in The Gambia, when President Jawara was attending the wedding of Prince Charles and Diana Spencer created the opportunity for the Senegalese to intervene and reinstate him. This then set in motion the formation of a political and economic union in the form of the Sene-Gambia Confederation in 1982. However, due to personal differences between the two Presidents, the Confederation was dissolved in 1989 without achieving its objective. The Sene-Gambia Confederation was an experience assumed to be similar to what The Gambia can expect to undergo during ECOWAS integration. Thus, an assessment of The Gambia experience can help policy formulation as this integration deepens. The results of chapter three therefore complements those of chapter two and lends weight to the policy recommendation that The Gambia advocates for and joins the ECOWAS monetary union because of the potential benefits.

It can be argued that the ultimate aim of economic integration is to find ways of developing their economies to address the challenges of poverty. Therefore economic integration is expected to also create the fiscal space for government to address these challenges. The expectation is that with regional integration would come increased trade and with it, employment creation and increased tax revenue resulting in increased fiscal space. Therefore, the conviction that benefits of regional economic integration are crucial in helping boost poverty reduction efforts in developing countries is still as strong today as it was in 1975 when ECOWAS was formed. As the countries experimented over the years with different povertyreducing policy regimes, the importance of trade and economic integration has always been acknowledged but never fully mainstreamed. The Structural Adjustment Programmes (SAPs), criticized for lacking the 'human face'', and Poverty Reduction Strategy Papers (PRSPs³), with relatively greater emphasis on poverty, had concentrated more on opening the African economies to international trade than prepare them to compete in it. This was apparent in the

³ In 1999, the WB Executive Board approved the formulation and implementation of PRSPs by heavily indebted poor countries to enable them benefit from debt relief. This became the HIPC initiative. Correspondingly, the IMF Executive Board also approved the Poverty Reduction and Growth Facility (PRGF) to support these strategies. In the end the PRGF contained the triggers for accession to HIPC completion point, at which point a country then

large and growing trade deficits that both The Gambia and Senegal are currently experiencing as are many other African countries. However the centrality of trade and economic integration is not lost on the United Nations who propagated the Millennium Development Goals (MDGs) of which the eighth goal – developing global partnerships - addresses the issue of trade among others. The MDGs are the set of eight globally agreed goals aimed at tackling poverty, education, gender inequality, maternal and child health, HIV/AIDS, environmental sustainability and global partnerships by 2015. They are the result of the UN Millennium Summit⁴ and are monitorable through 18 targets and at least 48 indicators (See Annex A for MDGs, Targets and Indicators). At the 2005 Millennium Summit +5, countries agreed to develop, by December 2006, MDG-based national development strategies using a Needs Assessment (NA) methodology developed by the UN Millennium Project (UN MP)⁵. These strategies are anchored on the long-term framework of the MDGs and therefore enable countries to relax binding constraints in the long run, such as lack of skilled personnel (doctors or teachers). Under the MDG-based National Development Strategies, a 10-year framework is developed from 2015 MDG targets, from which the five-year development strategies are formulated. Within the 10-year framework, the critical mass of medical personnel or teachers can be trained and then integrated into the economy to help reach the goals by 2015. This is not possible with the three-year PRSPs.

Although the central recommendation of the UN MP report is that the MDGs should be implemented at the country level through MDG-based poverty reduction strategies, it acknowledges that many developing countries cannot achieve these goals solely through country level investments, debt relief and trade reform. They also require increased

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benefits from debt relief. Over the years reaching this point has proved a challenge to many countries until 2005 when a number of countries were finally approved and Senegal is one of them.

⁴ In September 2000, 191 members of the United Nations convened at the Millennium summit in New York to discuss ways of addressing world poverty. At the end of the Summit, the Millennium declaration was signed, an out of which came the MDGs.

⁵ The Millennium Project is an independent advisory body commissioned by the UN Secretary General to propose the best strategies to meeting the MDGs when it was clear that attaining the goals by developing countries would remain a challenge. Prof. Jeffery Sachs, Special Advisor to the Secretary General on MDGs, heads the project. In January 2005 they launched the report: *Investing in Development: A practical plan to achieve the Millennium Development Goals.*

investments in regional and global public goods. In this regard countries should promote regional economic cooperation to overcome the constraints of small market size and to reap the full benefits of economic specialization. Similarly World Bank (2001) argues that since developing countries tend to export more to distant developed countries, the potential for regional integration among developing countries is tremendous.

The thesis comprises of two studies (chapters 2 and 3) presented in four chapters. Chapter one provides the introduction, the aims and objectives, followed by the justifications for the study, and concludes with overview information on ECOWAS and the Gambian and Senegalese economies. Chapter two assesses the optimality of the Sene-Gambia sub-region as a currency area using three methods: a structural vector autoregression model; a generalized purchasing power parity model; and six other criteria for testing optimality of currency areas. Chapter 3 assesses the trade facilitation effects of the Sene-Gambia Confederation on The Gambian economy using an error-corrected gravity model in which the Confederation is modeled in the deterrence function as a dummy variable. In addition, the gravity model also assesses the significance of supply-side constraints to trade in The Gambia, also modeled in the deterrence function of the model. The data, problems and research methodology of each study is presented in the respective chapter. Chapter four contains the summary, conclusion and policy recommendations.

1.1 Rationale for the study

To date, little has been documented on economic integration between The Gambia and Senegal, despite the emerging body of literature on economic integration in West Africa. This study is the first of its kind to specifically address the economic impact of the Confederation on The Gambian economy. It is therefore expected to add to this body of literature, and thereby help close the information gap that exists on the Sene-Gambia Confederation. By modeling supply-side constraints into the trade model, the results of the study could also help facilitate strategic trade policy formulation in The Gambia. There is now a growing consensus that increased and aggressive participation in international trade, i.e. developing aggressive and outward-oriented trade policies that could increase exports create employment and, in the end, increase incomes appreciably is key to development in Africa.

Significant work has been done on West Africa (see Fielding and Shields (1999), Ricci (1997)), but this search uncovered a research gap on the optimality of the Sene-Gambia region as a currency area. Furthermore a research gap also exists on what effects the Sene-Gambia Confederation had on The Gambian economy. The justification for this study is the fulfillment of these research gaps.

1.2 Aim and objectives of study

The aim of this thesis is to empirically assess the monetary and regional integration readiness of The Gambia as she prepare for the proposed ECOWAS monetary union in 2011. This is accomplished through two studies. The first is an assessment of the optimality of the Sene-Gambia as a currency area using three methodologies – structural vector autoregression model (VAR), the theory of generalized purchasing power parity (GPPP), and a number of other criteria used in the literature on other countries (chapter 2). The second draws from its experience during the Sene-Gambia Confederation by assessing the effects of the Confederation on The Gambian economy (chapter 3).

Consequently, the objectives of this study are: firstly to fill the research gap and policy space that exist in The Gambia on economic integration which also add to the literature on the optimality of Sene-Gambia as a currency area; secondly to empirically inform public policy in The Gambia about her benefits from the Sene-Gambia Confederation. The results of the study also help identify the significance of financial deepening to trade expansion in The Gambia, a proxy for supply side constraints to trade.

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1.3 Background information

1.3.1 Overview of economic convergence in ECOWAS

Convergence criteria have been agreed to by ECOWAS members for the formation of this monetary union. This is expected to facilitate trade in the region and could lay the basis of a customs union of all 15 members. To ensure that these formations are stable, the optimality of the region as a currency area is very crucial. Hence the stipulation of the convergence criteria listed below.

If the ECOWAS monetary union materializes in 2011, it will fulfill the arch-ambition of the founding fathers that in 1975, aspired for a prosperous region unified in the mutual drive for growth and development. To set this in motion, a trade liberalization scheme with two broad objectives of establishing a customs union among member states and the establishment of an ECOWAS common external tariff was embarked upon in 1990. The union would result in the total elimination of customs duties and taxes having equivalent effect, the removal of non-tariff barriers, and the establishment of a common external tariff (CET). The CET will remove all non-tariff barriers of a monetary nature within the context of a monetary cooperation programme intended to achieve, in the medium- to long-term, the convertibility of West African currencies and the creation of a single ECOWAS currency. Two and a half decades later, this remains an illusion. The countries are still far from forming a customs union and reaching a common external tariff, which will negatively affect countries that rely on re-exports, such as The Gambia. Hence the reason for the re-emergence of the debate for closer economic integration of ECOWAS members

As in all monetary unions, convergence criteria were agreed upon to ensure the stability of the resulting union, and these are grouped into two categories: primary and secondary.

Primary criteria

As primary criteria, ECOWAS agreed that member states adhere strictly to the following five conditions⁶ for macroeconomic stability, and to achieve internal and external balance before 2005. These are:

- 1. Ratio of budget deficit (excluding grants) to GDP should be lower than 4%.
- 2. Inflation rate should be less than 5% per annum.
- Central Bank financing of budget deficit limited to no more than 10% of previous year's tax revenue.
- 4. Gross external reserves of six months of import cover should be attained.
- 5. An exchange rate fluctuation margin should be not more than 5%

Secondary criteria

Member states were also to adhere to secondary criteria that are designed to sustain the primary criteria and facilitate achievement of the convergence targets.

They are as follows:

a. New domestic arrears prohibited and all existing arrears liquidated;

b. Tax revenue/GDP ratio to be equal to or less than 35%;

c. Wage bill/tax revenue to be equal to or less than 35%;

d. Real exchange rate stability maintained;

e. Countries must maintain positive real interest rates; and

f. Public capital expenditure/tax revenue ratio of at least 20%.

However the path to achieving the above has been fraught with difficulties, including political instability in many of its member countries; weakness of the national economies; insufficient diversification; the absence of good infrastructure; inadequate economic policies; the multiplicity of organizations for regional integration with the same objective; and the failure to include civil society and the private sector in the process of integration.

⁶ See Economic Watch (2002), Ministry of Finance and Economic Affairs, Vol. 1 Issue 2 of The Gambia

In spite of the above difficulties, progress has been made in some areas, such as the adoption of a strategy for accelerating the integration to a single regional market, the harmonization of ECOWAS and Union Economique et Monetaire du Afrique de l'Ouest (UEMOA) programmes to accelerate the integration process; and the liberalization of national markets and external trade that resulted from adjustment and reform programs which led to some degree of convergence in macroeconomic policies. For almost half a century since the introduction of convergence hypothesis in the classic works of Solow and Swan in the mid 1950s, convergence theory has continued to feature prominently in economics. According to the Solow-Swan Growth Theory, there are two versions of convergence: absolute convergence and conditional convergence. The former states that if a group of countries have access to the same technology, the same population growth rate and same saving propensity, and only differ in terms of their initial capital-labour ratio, then it can be expected that all countries will converge to the same steady-state capital-labor ration, output per capita, consumption per capita, and the same growth rate. This means that both rich and poor countries will approach the same capital-labor ratio because poor countries will grow relatively faster and rich nations will grow relatively slower. Poor countries will accumulate more capital and grow at a faster rate than rich countries, because the marginal product of capital relative to labor is higher in the poor country. On the other hand, conditional convergence states that if countries possess the same technological possibilities and population growth rates, but differ in savings propensities and initial capital-labour ratio, then there should still be convergence to the same growth rate, but not necessarily at the same capital-labor ratio. This means that countries can differ in their steady states and thus differ in consumption per capita. As long as they have the same population growth rate, then all their variables (capital, output, consumption, etc.) will eventually grow at the same rate.

1.3.2 Overview of the Gambian economy

As a result of macroeconomic imbalances in the mid-1980s, The Gambia embarked on a Structural Adjustment Program (SAP) called Economic Recovery Program (ERP) with the International Monetary Fund (IMF) to correct the imbalance and set the economy on the path for growth. The imbalance was corrected and by 1992, a Programme for Sustained Development (PSD) has replaced the ERP. As Table 1.1 shows, GDP (at factor prices) has been increasing in nominal terms from D1977.4 million in 1990 to D9, 086.3 million in 2003. On the other hand the Gambia Dalasi has been depreciating over the period from D7.50/US\$ in 1990 to D30.96/US\$ in 2003. Inflation has been fairly stable and in single digits except in 2003 when it rose to 17%.

••••••••••••••••••••••••••••••••••••••		1990	1995	2000	2001	2002	2003
GDP	Dalasi	1,977.40	2,969.50	4736.10	5953.10	6642.10	9086.30
Inflation Rate	% per annum	8.00	6.50	0.20	8.10	13.00	17.60
Exports (fob)	Dalasi (M)	42.70	82.30	126.60	102.10	109.30	101.00
Imports (cif) ^{1a}	Dalasi (M)	122.80	108.50	189.90	152.11	171.60	161.00
Exchange Rate (Market Rate)	Dalasi/US\$	7.50	9.64	14.89	16.93	23.39	30.96
Total Reserves ²	US\$ M	55.30	106.15	109.43	106.01	106.88	59.31
Private sector credit	Dalasi (M)	289.80	453.30	687.00	775.00	1,335.00	1,977.00
Interest Rate -Discount Rate ² (End of Period)	% per annum	16.50	14.00	10.00	13.00	18.00	29.00
Population	Millions	0.92	1.11	1.32	1.36	1.40	1.44

Table 1.1: Selected macroeconomic indicators for The Gambia

Source: International Financial Statistics, IMF, and national sources Notes

¹ Imports and Exports figures are from International Transactions accounts which are more complete than from BOP accounts

² Total Reserves less Gold includes monetary authorities' holdings of SDRs, reserve position in the Fund, and foreign exchange.

Imports for 1990 and 1995 are fob, rest are cif

Private sector credit increased from D 290 million to D 1335 million in the same period. However, it is argued that in Africa, public investments are, in most cases, necessary to attract private investment. The Gambia invested heavily in schools, hospitals, health centers and roads since 1995 and this is what is reflected from this scenario. The extent that these public investments would have on the attainment of the MDGs in The Gambia is yet to be seen, but they have no doubt created the environment for the private sector to exploit resources in the rural areas that was difficult to do before these investments. Accumulating international reserves has been one priority of monetary policy since The Gambia embarked on its structural adjustment program in 1984. The reserves have increased steadily from US\$ 55 million in 1990 to US\$ 109 million in 2000 before falling off to US\$ 59 million.

The end-period discounted interest rate increased despite efforts to reduce it. In 1990 it was 16.5% which then grew steadily to 18% in 2002 and jumped to 29% in 2003. Comparing this with inflation, the real rate has also increased from about 8% in 1990 to approximately 17.6% in 2003. This is different to what happened before the SAP period when inflation increased faster than the nominal interest rates, resulting in negative real interest rates. Hence, during the SAP-days, one priority was to make real interest rates positive to attract both domestic and international savings. Tight monetary policy embarked upon since then has resulted in these positive but high levels. These high lending rates discouraged investment in productive sectors where the average internal rate of return for most projects much lower, coupled with a relatively long gestation period. Thus, it is not surprising that the import-distribution sector of the economy thrived and continues to do so at the expense of the productive sector.

The population of The Gambia has also been increasing at close to 3% per annum for over a decade. In 1990 it was under a million (920,000), but by 2004, it has grown to 1.48 million mainly as a result of the influx of refugees from the neighboring countries of Liberia, Sierra Leone, and now Cote D'Ivoire.

1.3.3 Overview of the Senegalese economy

GDP at factor cost for Senegal has been increasing in nominal terms for the past 14 years, from CFA 1595 billion in 1992 to CFA 3725 billion in 2003 as shown in Table 1.2. Inflation for the period has always been in the single digits. At 1990 prices, inflation has been around 5% from 2002 to 2004 after rising marginally from 3% in 2001. In 1995 the rate was about 39%, which could be explained by the lagged effects of the devaluation of the CFA in 1994.

		1991	1995	2000	2001	2002	2003
GDP	CFA (B)	1,595.400	2,242.900	3,192.000	3,342.700	3,472.700	3,725.400
Consumer Price Index	1990=100	100.000	139.200	100.000	103.100	105.400	105.300
Exports (fob) ²	CFA (B)	226.500	483.400	648.000	735.200	743.000	731.000
Imports $(fob)^2$	CFA (B)	314.300	607.200	951.500	1,047.100	1,117.900	1,201.000
Exchange Rate (Market Rate)	Dalasi/US\$	256.450	490.000	704.950	744.310	625.500	519.360
Private sector credit ³	CFA (B)	252.100	283.800	622.200	651.800	682.000	782.100
Interest Rate -Discount Rate ¹ (End of Period)	% per annum	11.000	7.500	6.000	6.000	6.000	4.500
Population	Millions	7.300	8.570	10.340	10.600	10.860	11.120

Table 1.2: Selected Macroeconomic Indicators	tor	Senegal	
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Source: International Financial Statistics, IMF

Notes

Discount Rate is the rate at which the Central Banks lend or discount eligible paper for Commercial Banks.

² Imports and Exports figures are from International Transactions accounts which are more complete than from BOP accounts

³ 1991 value is for 1993

Since 1940, Senegal has been a member of a Monetary Union of former French colonies – *Union Economique et Monetaire du Afrique de l'Ouest (UEMOA)*⁷ - with the CFA franc as their common currency and a common central bank, *Banque Centrale d'Afrique l'Ouest*. Until 1994, these countries maintained a fixed exchange rate of 1 French franc (FF) to 50 CFA francs (CFAF) with the full backing of the French Treasury. However the CFA suffered 100% devaluation in 1994 and it is now 100 CFA to 1 French franc. Unlike The Gambia, Senegalese monetary policy is designed and implemented by *Banque Centrale d'Afrique l'Ouest (BCEAO)*.

Private sector credit has been increasing in the 1990s until 2000 when the reverse occurred and most of the credit went to the public sector. In 1993 claims on the private sector was CFA 252 billion which increased to CFA 782 billion in 2003. The population has increased from 7.3 million in 1990 to 11.4 million in 2004, an increase

⁷ The Union comprises seven former French colonies, Benin, Burkina Faso, Cote D'Ivoire, Mali, Niger, Senegal, and Togo and recently Guinea-Bissau (former Portuguese Colony)

CHAPTER 2

Assessment of the optimality of Sene-Gambia as a currency area

2.0 Introduction

The literature on optimal currency areas (OCA) has continued to grow since the pioneering works of Mundell (1961), McKinnon (1963) and Kenen (1969). Many currency areas have been formed, some unsuccessfully (the East African Currency Union), and some successfully, like the European Union. These successes have reawakened interest in them and as these interests in currency areas grew, attempts were made to explain the criteria that make them optimal. These criteria range from economic factors to political and social considerations. Economic factors include the degree of openness of the candidate countries, the cyclical co-variance of their macroeconomic fundamentals, the degree of factor mobility, the level of financial integration and product diversification between them, the similarities of their industrial structures, and inflation rates. Some socio-political considerations include ethnic composition of the region, and the political will and commitment of the leaders driving the process. Forming a currency area requires the convergence of economics towards stable states for key variables.

2.1 Literature review on optimal currency area

The formation of a currency area normally requires the adoption of a single currency and eventually abolishing others, as is the case for the Euro, or disposing of one's national currency for the union currency, as was the case with Guinea Bissau joining the CFA zone. Since joining a currency area entails losing one's national currency, the decision to join would have to be made after an assessment of the uses and effectiveness of the national currency. Among the many uses of a national currency is its ability to serve as an adjustment tool from disequilibrium. Therefore the decision to join a currency union would, to a great extent, be influenced by the answer to the question: *how effective is the national currency as an adjustment tool for both internal and external shocks*? If it has never been effective as an adjustment tool, then letting it go is relatively easier for a country. On the other hand, if it has

been effective, then letting it go becomes more difficult. In effect, the decision to join a currency area requires an empirical exercise evaluating the positives against negatives. In most cases, some of these are non-quantifiable, which makes the assessment exercise rather difficult. The decision is also not only an economic one but a socio-political one as well.

Hence in determining the optimality of a currency area, both quantitative and qualitative assessments need to be undertaken to identify the similarities and differences between the candidate countries and their implications for the future stability of the resulting union. Furthermore, the costs and benefits to each country in joining the union must be ascertained. The comprehensive results could then be used to decide whether or not to join. This implies that there is no single rule of thumb to determine the optimality of a currency area; all criteria have to be assessed and weighed.

In this regard, methodologies abound in the literature to assess the criteria for OCA. Fielding and Shields (1999) uses a reduced form vector autoregression (VAR) model to assess the similarity of the response of the CFA franc zone countries⁸ to external shocks. Mkenda (2001) uses co-integration analysis to find a long-run stable relationship between the exchange rates of the three countries of the East Africa Community within the framework of generalized purchasing power parity. Jonung and Sjöholm (1998) use indices as criteria to determine if Finland and Sweden should form a monetary union. De Grauwe (1997) uses short-run Philips curves for Germany (which gives high priority to reducing inflation) and Italy (which gives it low priority) to provide the intellectual underpinning of the Maastrich decision to institute a European Central Bank that is a close copy of the Bundesbank, one with political independence and price stability as the sole objectives of monetary policy. Anthony and Hallett (2000) use cost benefit analysis to argue that the establishment of a Caribbean Monetary Union would result in insignificant gains.

⁸ These are Benin, Burkina Faso, Cote D'Ivoire, Mali, Niger, Senegal, and Togo that share the CFA franc as their currency supported by the French Treasury. Now Guinea Bissau has joined them.

This chapter combines the first three methodologies to determine the optimality of the Sene-Gambia sub-region as a currency area. The reasons why three methods are used in this study are firstly, their varying degrees of sophistication (the first being relatively more sophisticated) and comprehensiveness (the third method being relatively more comprehensive as it covers more variables). The first uses a reduced form VAR to determine the output growth and price change responses by The Gambia and Senegal to price shocks from the US, UK and France; the second method tests the theory of generalized purchasing power parity in The Gambia and Senegal, using co-integration analysis. The third method uses five indices to assess the similarities between the two economies within the context of an optimal currency union. Secondly, using more than one method would lead to amore robust conclusion and that there is no rush to conclusion on the optimality of the currency area.

A successful currency area must be characterized by the convergence of macroeconomic variables to ensure the stability of the resulting union. Convergence is attained when the difference between two or more time series is reduced over time, or more formally, becomes arbitrarily small as time elapses. In terms of the regional integration of countries, this would imply that critical macroeconomic variables of candidate countries should be converging.

In the last two decades, empirical studies in other fields of economics have also dealt with the issue of convergence testing and measurement. In international trade theory, the empirical validation of the "factor price equalization (FPE) theorem" has led some researchers to test for the convergence of the time series of the prices of factors. Regional integration treaties such as the Maastrich Treaty of the European Economic and Monetary Union and the West African Monetary Union (WAMU) of ECOWAS stipulate convergence criteria for countries wishing to join. The ECOWAS convergence criteria are conditional but as St. Aubyn (1995) argue, the Maastrich treaty convergence criteria were non-conditional to avoid major tensions in the exchange rate mechanism. This meant that absolute convergence was not sought and small variance was accepted as compliance.

As indicated above, the literature on optimum currency areas has seen tremendous growth over the past four decades since the pioneering works of Mundell (1961), McKinnon (1963), Scitovsky (1967) and Kenen (1969). Mundell (1961), who can be credited with its birth, identified it using factor mobility, arguing that factors are mobile within an optimum currency area, but immobile between areas. He defined currency areas as "areas within each of which there is factor mobility, but between which there is factor immobility". Using a variant of Mundell's original argument, Scitovsky (1967) and Ingram (1973) looked at optimum currency areas in terms of financial integration, and argue that a high degree of financial integration should be a key characteristic of an optimum currency area.

For Harberler (1970) and Fleming (1971), a similar rate of inflation is among the qualifying conditions for an optimum currency area, because differences in the rate of inflation and productivity growth are primary sources of external payments disturbances. Kindelberler (1973) believes the nation state is an optimum currency area, since, in his opinion, conflicting sovereignty problems are bound to occur in a union of countries, thus deterring its progress. From a more practical perspective, Ishiyama (1975) argues in favour of the cost-benefit analysis (CBA) approach to OCA, with the net effect determining which way to go. He sees many benefits of a currency union, such as reduction of currency conversion costs; elimination of speculative capital flows; saving on exchange margins; and the potential to accelerate fiscal integration. On the other hand, he sees the costs as loss of autonomy in national monetary policy, possible loss of autonomy in national fiscal policy, possible worsening of inflation – unemployment trade off and an increase in regional disparities.

Fiscal integration is another criterion identified in the literature of an optimal currency area. Arguing in favour of limited fiscal integration, Corden (1972) contends that monetary integration does not require parallel fiscal integration. This view has been supported by the West African Monetary Union so far, mainly because governments have financed budget deficits through borrowing in the community or international capital markets. Other authors, on the other hand, have given stronger reasons for fiscal integration. Bhatia (1985) argues that a case exists for enforced fiscal integration in a union (such as WAMU), maintaining that there is need for a coordinated strategy to diversity and to develop the economy. A centralized strategy would be more manageable and efficient than a national one. Arguing in the same line, Allen (1976) recommends centralized fiscal policy for five reasons:

- 1. Given economics of scale in collecting and processing information, a centralized government would operate with more complete information than individual national governments.
- 2. National governments always formulate policy with concern for spill-over effects from other member governments' policies, and a centralized government would be free from this problem.
- 3. Centralized government would enjoy more confidence and higher credit rating in capital markets implying greater borrowing capability.
- 4. It would make redistribution policies more effective because they would be more comprehensive.
- 5. In investment policy, national government may provide "beggar-thy-neighbor" incentives to industry or foreign interest, while a uniform common policy would not, in theory, lead to competitions among areas to attract investment.

Ricci (1997) develops a two-country model to investigate the circumstances under which it is beneficial to participate in a currency area. It captures both the real and monetary arguments suggested by the optimum currency area literature in a monetary model of trade with nominal rigidities. He argues that the net benefits that a country expects from participation in a currency area increase with the correlation of real shocks between countries; the degree of international labor mobility; the degree of adjustment provided by a fiscal tool; the difference between inflationary bias of the domestic authority and the inflationary bias of the authority of the currency union; the variability of domestic monetary shocks; and the extent of the deadweight and efficiency gains deriving from the adoption of a single currency. The same benefits, he argues, decrease with the variability of real shocks; that of foreign monetary shocks; and correlation of monetary shocks between countries. The main result is that the effect of the degree of openness on the net benefits is ambiguous, in contrast with the usual argument that the more open economies are, the better candidates they make for a currency area.

Investigating if the CFA franc zone of West Africa is an optimal currency area, Fielding and Shields (1999) use a modified method of Blanchard and Quah (1989) to estimate a VAR appropriate for a small open economy. They focused on the identification of shocks to inflation and output growth, conditioning on common foreign price shocks and on money supply growth, the evolution of which is not independent of union membership. They find that there is a high degree of correlation between inflation shocks to the CFA and those to a representative Anglophone country, Kenya. So if the policy response to inflation shocks is immediate, and inflation is all that matters, the cost of CFA membership to current members is unlikely to be large. Moreover, the correlation of inflation shocks across the two monetary unions in the CFA is as high as the correlation within them, so there is no particular advantage to having two currencies rather than one. They argue that this conclusion is not necessarily applicable to potential future members of enlarged monetary union, including Anglophone African states and underwritten by the European Central Bank instead of the French Treasury. They also find that the picture with regard to shocks to output growth is rather different. There are within the CFA region two groups of countries within which output growth shocks are highly positively correlated, but between which output growth shocks are negatively correlated.

Anthony and Hallett (2000) investigated whether the case for economic and monetary union in the Caribbean is realistic. They first provide evidence to demonstrate that the adoption of a regional currency would not provide any significant gains in the elimination of transaction costs because of the relatively small amount of intra-regional trade. Some countries will benefit more than others, but overall the gains will be insignificant. Then they look at how the convergence criteria would assist potential members in pursuing appropriate and credible monetary and fiscal policies. Although the general focus of the convergence criteria is correct, they point out that it is unlikely it would bring about the necessary convergence in the fiscal positions of the potential members. Thus countries qualifying for the Caribbean Monetary Union may still be faced with unacceptable levels of fiscal deficits and debt-levels that could jeopardize the sustainability of the currency union.

Ishiyama (1975), a proponent of the cost-benefit analysis approach, argues that the theory of optimum currency areas provides important academic insights into the conditions under which adjustment through flexible exchange rates do not work well. It has also led to the recognition of more precisely defined benefits and drawbacks of a common currency, and new aspects of policy coordination among countries on pegged exchange rates. The rapid development of joint floating of some European currencies and the euro-dollar market - and, more recently, managed floating of major currencies – have been the principal grounds for the revived and continued interest in the creation of an optimum currency area. Arguing that several theories contained in what he identified as the traditional approach are useful but do not cover the many facets of the problem comprehensively enough, Ishiyama (1975) suggests as an alternative the cost-benefit approach, which takes the benefits and costs of a common currency explicitly into account.

Also more recently, Alesina, Barro and Tenreyro (2002) stipulate that as the number of independent countries increases and their economies become integrated, more multi-country currency unions will be observed. They explore the pros and cons of different countries to adopt as an anchor, the US dollar, the euro, or the yen, although there is no yen area as opposed to the dollar and euro. They argue that countries that trade with each other stand to gain more from adopting the same currency. Also smaller countries should, all things being equal, be more inclined to give up their currencies. Hence, as the number of countries

increases, the number of currencies in the world should increase less than proportionately. They also argue that countries that stand to gain the most from giving up their currency are those that have a history of high and volatile inflation; countries that have the largest comovements of outputs and prices with potential anchors are those with the lowest costs of abandoning monetary independence.

Tjirongo (1995) used the theory of optimal currency area to evaluate Namibia's suitability for becoming a member of the Common Monetary Union (CMU) of South Africa, Lesotho, Namibia and Swaziland. It also assessed the costs and benefits from Namibia's membership of the union and the instruments that could be used to address asymmetric shocks. Using factor mobility, openness of the economy and degree of diversification, he concluded that it is because of the relative size of Namibia to South Africa, the degree of openness of the Namibian economy to foreign trade, and high degree of capital mobility between the two countries that Namibia's nominal exchange rate is not effective as a policy instrument against external shocks from South Africa. As for the benefits and costs of membership, he concluded that Namibia could gain positive net benefits by joining due to the long-term benefits from price stability.

Another empirical study of currency areas is Bergman (1999) which examines the optimality of the Scandinavian Currency Union (SCU) of Denmark, Norway and Sweden. He investigated the macroeconomic series of the three countries during the time of the union, and also estimated a structural VAR model to examine the symmetry of country-specific structural shocks in each of the three countries. The external shocks were assumed to emanate from Belgium. He found that country-specific structural shocks in the SCU members were not very symmetric during the union period. He further found that the differences between the pattern of structural shocks in Belgium and those of the SCU member countries were not clear and therefore concluded that the three Scandinavian countries did not form an optimal currency union.

2.2 Data sources, data problems and methodology

Data used in this analysis is primarily from the *International Financial Statistics* (IFS), compiled by the International Monetary Fund (IMF), supplemented by data from the *World Development Indicators* database of the World Bank, and data from National Statistics Offices in Banjul and Dakar. The latter include publications of the Central Statistics Office, Ministry of Finance and Economic Affairs, and the Central Bank in The Gambia and Bureau Statistique Nationale, Banque Centrale d'Afrique Occidental and other sources in Senegal. All the series used in this study are derived either directly from these databases or from some computations using these data sets. For example, the consumer price index (CPI) used in the co-integration analysis is the ratio of The Gambia's CPI to Senegal's CPI, both derived from the databases mentioned above as in Ramirez and Khan (1999) who find co-integrating equations between the exchange rates and consumer price indices for Canada, France, Germany, Japan, and UK, with respect to the USA.

This study determines the optimality of Sene-Gambia as a currency area in three steps based on three methodologies outlined below. The theoretical underpinnings of these methodologies are presented in section 2.3.

The first step uses the method used by Fielding and Shield (1999) to estimate reduced form vector autoregression (VAR) models for The Gambia and Senegal. These are used to determine how the output growth and prices of these countries would respond to external price shocks from UK, USA and France. These countries are chosen because of the significance of the first two for the economies of The Gambia and Senegal, respectively, whilst none of the latter is immune from shocks emanating from the US. If, on average, they respond to each shock in a similar manner, then it can be inferred that the Sene-Gambia region is a candidate for an optimal currency area. On the other hand, if their response, on average, is not similar, then the optimality of the sub-region as a currency area cannot be inferred.

The second step uses co-integration analysis on the theory of Generalized Purchasing Power Parity⁹ (GPPP) to determine whether a long-run stable relationship exists between the exchange rates of the currencies of the two countries and their consumer price indices. It derives from Enders' (1995) argument that the real exchange rates between two countries comprising the domain of an optimal currency area should be co-integrated. Generalized purchasing power parity contends that if two countries qualify for the creation of a currency union, then they must experience symmetrical shocks to their macroeconomic variables, i.e., their fundamental variables must on average move together. This rationale is behind both Mkenda (2001) and Ramirez and Khan (1999) both of which inspire this step. Fielding and Shields (1999) also argue that the cost of monetary union membership will depend on the extent to which price and output shocks are correlated across countries, and the degree of similarity in the long-run effects of the shocks to the macro-economy.

The third step employs five criteria, also used by Jonung and Sjoholm (1998), to determine the similarities and differences between the two economies. These are the openness of each economy to external trade; the cyclical co-variance of their key macroeconomic variables (GDP, money supply, real and nominal interest rates); the similarity of their inflation rates; the similarity of their economic structure; and political motivations. This step also investigates the convergence of the key variables of The Gambia and Senegal by testing for pair-wise convergence in inflation using unit root tests. In determining this, time series variation is used as in Bernard and Durlauf (1995), Bernard and Jones (1996) and Estrin *et al* (1999). Using unit roots test, the stationarity of the difference between two respective variables is investigated because the difference between converging series should be stationary and should not possess a unit root.

⁹ GPPP theory contends that in the absence of government interventions, the price of a basket of goods would cost the same in The Gambia as in Senegal. See Section 2 for a detailed explanation.

The optimality of the Sene-Gambia region as a currency area is assessed using all these results. This is in recognition of the earlier argument that there is no single rule of thumb to determine the optimality of a currency area, in the end, it is the net of the benefits over the cost of joining an OCA that will finally determine whether a country joins a currency area or not.

In summary the assessment of the optimality of the Sene-Gambia as a currency is undertaken in the three steps as summarized below.

- Step 1: Determine the similarities or otherwise of the responses of the two countries to external shocks from the UK, France, and USA by using the methodology of Fielding and Shields (1999), which involves estimating a reduced form VAR for inflation and output growth for each country, and identifying structural shocks to each variable.
- **Step 2**: Use the theory of generalized purchasing power parity (law of one price) to find if the exchange rates of Senegal and The Gambia are co-integrated.
- Step 3: Use other OCA eligibility criteria, as in Jonung and Sojholm (1998) to assess the similarities of the economic structures of the two countries.

The results of all these three steps are then used to determine the optimality of the Sene-Gambia sub-region as a currency area.

2.3 Theoretical framework

This section presents the theoretical underpinning of the empirical work undertaken in this chapter, by examining the theory behind the three methodologies used. It starts with the theoretical framework of the first method – a reduced form VAR to test the response of output growth and prices in The Gambia and Senegal to external shocks from the three foreign countries mentioned above. The next section looks at the theory behind the second method testing for generalized purchasing power parity between Senegal and The Gambia using co-integration analysis, whilst the following section looks at the indices used in the third method.

This section ends with a review of the theory behind convergence, looking at the various forms with practical implications for forming a currency area.

2.3.1 Theoretical and econometric framework of the VAR model

As in Fielding and Shields (1999), the dependent variables of the VAR model are the real interest rate growth (Δr); nominal money stock growth (Δm); and income growth (Δy); whilst the independent variable (Δp^*) in this study is the consumer price index (of France, UK, and US) multiplied by the rate of nominal exchange rate depreciation. In particular, this study assesses the effects of shocks from three foreign countries (Fielding and Shields (1999) used only one). The model is specified by the following system of equations.

$$\Delta(m-p) = \alpha_0 + \alpha_1 \Delta y + \alpha_2 \Delta r \qquad \alpha_1 \ge 0 \ge \alpha_2$$
(2.1)

$$\Delta p = \beta_0 + \beta_1 \Delta p^* \qquad \beta_1 \ge 0 \qquad (2.2)$$

$$\Delta y = \delta_0 + \delta_1 \Delta p + \delta_2 \Delta r \qquad \qquad \delta_1 \le 0, \delta_2 \le 0 \tag{2.3}$$

$$\Delta r = \theta_0 + \theta_1 \Delta y + \theta_2 \Delta p^* \qquad \qquad \theta_1 \le 0 \le \theta_2 \tag{2.4}$$

Equation 2.1 states that long-run real money demand growth is a function of real income growth and real interest rate changes. Equation 2.2 embodies a weak version of the assumption of relative PPP, and equation 2.3 allows the growth of aggregate supply to depend on the growth of aggregate domestic prices. The introduction of $\delta_1 \Delta p$ allows for the possibility that high inflation can have deleterious consequences for long-run growth. The coefficient δ_2 allows interest rate increases to depress capital stock growth and hence income growth in the long run. Equation 2.4 is an inverted aggregate demand curve, in which the growth of aggregate demand depends on the rate of change of the interest rate (which affects the domestic demand for consumption and investment goods) and real exchange rate appreciation (which affects net export growth).

 Δy is defined as the annual change in the logarithm of GDP at current prices. All The Gambian data for this series is taken from the *International Financial Statistics*, while for Senegal, data from the World Development Indicators is used to supplement the IFS data for the period 1998 to 2003. Δm is computed as the change in the logarithm of broad money that is reported in line 351 in the IFS. Δp is defined as the annual change in the logarithm of the consumer price index, also derived from IFS. To facilitate the assessment of the impact of price shocks, the consumer price indices for UK, France and USA are used. The foreign prices are computed as the consumer price index of the foreign country multiplied by the exchange rate of the foreign currency against The Gambian dalasi or Senegalese CFA franc. Exchange rates with respect to US dollar are readily available, but the rates to convert \pounds sterling to dalasi or CFA franc are not as readily available. These rates are derived through their respective rates to the Special Drawing Rights (SDR) of the IMF. For example, the rate of CFA per \pounds Sterling is derived from converting the \pounds Sterling to SDR and the CFA to SDR and then dividing them. Δp^* is defined as the change in the logarithm of this measure. The full dataset is available in the annex.

For the interest rate, the only rate reported consistently for Senegal is the official Central Bank discount rate, which is unlikely to equal the marginal cost of loanable funds.

Output is derived in its reduced form by substituting aggregate demand (2.4) into aggregate supply (2.3). This yields,

$$\Delta y = \delta_0 + \delta_1 \Delta p + \delta_2 (\theta_0 + \theta_1 \Delta y + \theta_2 \Delta (p^* - p))$$

$$=\frac{\delta_0+\delta_2\theta_0}{1-\delta_2\theta_1}+\frac{\delta_1-\delta_2\theta_0}{1-\delta_2\theta_1}\Delta p+\frac{\delta_2\theta_0}{1-\delta_2\theta_1}\Delta p^*$$
(2.5)
Since $\delta_2 \theta_1 \ge 0$, the signs of $\frac{\Delta y}{\Delta p}$ and $\frac{\Delta y}{\Delta p^*}$ are ambiguous. For the same reason, the term $(\delta_1 - \delta_2)$

 $\delta_2 \theta_1$ is ambiguously signed, but $\delta_2 \theta_2 \leq 0$, so that the effects of Δp and Δp^* on Δy could work in the same or opposite directions. Since equation (2.5) is obtained by substituting the aggregate demand equation into the aggregate supply equation, the shocks to output are not to be interpreted as 'aggregate demand' or 'aggregate supply' shocks but rather as 'aggregate real' (as opposed to price or nominal money) shocks.

Money demand growth is also expressed in reduced form as

$$\Delta(m-p) = \alpha_0 + \alpha_1 \Delta y + \alpha_2 (\theta_0 + \theta_1 \Delta y + \theta_2 (\Delta p * -\Delta p))$$

$$= \alpha_0 + \alpha_1 \theta_2 + [\alpha_1 + \alpha_2 \theta_1] \Delta y + \alpha_2 \theta_2 \Delta p^* + [1 - \alpha_2 \theta_2] \Delta p \qquad (2.6)$$

The equilibrium adjustment of the real marginal cost of loanable funds is implicit in both of the above equations.

The steady-state of each economy is described by the values of the parameters in equations (2.2), (2.5) and (2.6) plus a statement of the long-run level of foreign prices as

$$\Delta P^* = \Delta P_0^* \tag{2.7}$$

The estimation of the four variables (Δp^* , Δp , Δy , and Δm) within a VAR framework for which equations (2.2), (2.5), (2.6) and (2.7) describe the steady-state, means that six long-run restrictions have to be imposed. These are the absence of Δm in (2.5); the absence of Δy and Δm in equation (2.2); and the absence of Δp , Δy , and Δm in (2.7). These six restrictions are used to identify the system. Corresponding short-run restrictions are not imposed on (2.2) and (2.5). This allows changes in Δm to influence Δy in the short-run, because disequilibrium in the money market might affect aggregate demand, as consumers respond to excess supply (or demand) for money by increasing (or reducing) their spending. Changes in Δm and Δy are also allowed to affect Δp in the short-run because short-run deviations from PPP are possible, and in the short-run, prices rather than nominal money may adjust to clear the money market in response to changes in Δy and Δm .

In the absence of any short-run restrictions on the model (except for the strict exogeneity of Δp^*), the dynamics of inflation, output growth and money growth can be described by a system of the form

$$B_{11}(L)\Delta p^* = \varepsilon_{1t} \tag{2.7a}$$

$$B_{21}(L)\Delta p_{t}^{*} + B_{22}(L)\Delta p_{t} + B_{23}\Delta y_{t} + B_{24}(L)\Delta m_{t} = \varepsilon_{2t}$$
(2.7b)

$$B_{31}(L)\Delta p_{t}^{*} + B_{32}(L)\Delta p_{t} + B_{33}\Delta y_{t} + B_{34}(L)\Delta m_{t} = \varepsilon_{3t}$$
(2.7c)

$$B_{41}(L)\Delta p_{t}^{*} + B_{42}(L)\Delta p_{t} + B_{43}\Delta y_{t} + B_{44}(L)\Delta m_{t} = \varepsilon_{4t}$$
(2.7d)

Where $B_{ij}(L) = lag$ polynomials embodying restrictions to ensure that equations (2.2) and (2.5)

-(2.7) hold in the long-run

 ε_{ii} = orthogonal shocks to foreign inflation, domestic inflation, output growth, and money growth, respectively.

It is worth noting that, given the assumptions made above, the output growth shocks, ε_{3t} , combine shocks to aggregate demand as well as shocks to aggregate supply, so that separate identification of the two components is necessary given the data available on the interest rate for Senegal. Fielding and Shields (1999) argue that to the extent that ε_{3t} is dominated by productivity shocks, it can be expected that economies with similar production structures will have a relatively high correlation in ε_{3t} .

The econometric framework for this model also borrows from Fielding and Shields (1999). The identification of the model is based on the methodological framework initially introduced by Blanchard and Quah (1989) and modified by Fielding and Shield (1999). For each country, a reduced form VAR is estimated. It is of the form,

$$X_t = A(L)X_{t-1} + e_t$$

$$= (I - A(L))^{-1} e_{t}$$
 (2.8)

Where $A(L) = 4 \times 4$ matrix of lag polynomials

$$X_t = 4 \times 1 \text{ vector of stationary variables} = (\Delta p^*, \Delta p, \Delta y, \Delta m)$$
(2.9)

 e_t = Vector of reduced form residuals

The restrictions $A_{12} = A_{13} = A_{14} = 0$, i.e., Δp^* is strictly exogenous, hold. No restrictions are imposed on the reduced form residual co-variance matrix, so that the reduced form innovations e_t have no obvious economic interpretation. Such an interpretation will depend on the derivation of an alternative moving average representation to (2.8), which formulates variable movements as a function of past structural shocks. That is,

$$X_t = C(L) \varepsilon_{it} \tag{2.10}$$

Where in terms of theoretical model (2.2a), (2.5a), (2.7a), $C = B_{-1}$ and the matrix ε_{it} contains the structural shocks to each equation in the system. The elements of ε_{it} are uncorrelated, which allows the estimation of the cross-country correlation coefficients for each element of ε_{it} . Moving from equation (2.8) to (2.10) requires the identification of a non-singular matrix S that links the reduced form and structural innovations, i.e.

$$e_i = S\varepsilon_{ii} \tag{2.11}$$

where in terms of equation (2.10), S = C(0). The identification of the four-variables model requires 4X4 restrictions. Following Blanchard and Quah (1989), it is assumed that the structural shocks are orthogonal and have unit variance, i.e., $Var(\varepsilon_{it}) = I$, giving 10 restrictions [((n+1)n)/2]. The other six restrictions come from the assumption in moving average process described in equation 10, which can be written in full as:

$$X_{t} = \begin{bmatrix} \Delta p^{*} \\ \Delta p \\ \Delta y \\ \Delta m \end{bmatrix} = \begin{bmatrix} C_{11}(L) & C_{12}(L) & C_{13}(L) & C_{14}(L) \\ C_{21}(L) & C_{22}(L) & C_{23}(L) & C_{24}(L) \\ C_{31}(L) & C_{32}(L) & C_{33}(L) & C_{34}(L) \\ C_{41}(L) & C_{42}(L) & C_{43}(L) & C_{44}(L) \end{bmatrix} = \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \end{bmatrix}$$
(2.12)

The C(L) matrix is lower-triangle i.e., C_{12} , C_{13} , C_{14} , C_{23} , C_{24} , $C_{34} = 0$. These are the six restrictions embodied in the long-run macroeconomic models described above. The imposition of these restrictions enables the recovery of structural shocks ε_{it} from the reduced form of shocks e_i in the original VAR.

The equations of the VAR model are estimated one at a time using OLS estimation that, according to Verbeeck (2000), is consistent because the white noise terms are assumed to be independent of the history of the dependent terms. Greene (1993) also contends that because the explanatory variables are the same in each equation, a system estimator, like seemingly unrelated regressions (SUR), provides the same estimates as OLS applied to each equation separately. If different restrictions are imposed upon the equations, the SUR estimations will be more efficient than OLS, though OLS remains consistent.

2.3.2 Theoretical framework of the generalized purchasing power parity

In its simplest form, the theory of purchasing power parity simply amounts to applying the law of one price. It states that in the absence of government intervention and significant freight charges and tariff, an internationally traded basket of similar goods should sell for the same effective price in every country, when converted into the same currency. This means that the cost of a basket of goods in The Gambia should be similar to the cost of the same basket of goods in Senegal in the absence of government interventions. As Ramirez and Khan (1999) argue, this is not the case in reality since a number of complications such as differentiated products, tastes and costly information deter this law of one price. An example is the lucrative re-export trade to Senegal that The Gambia had enjoyed for a long time because relatively higher tariff rates in the Dakar port (government intervention) created incentives for businesses to import goods through the Banjul port for re-export to Senegal.

The results from several empirical studies on the validity of the purchasing power parity have been mixed. Few studies have found evidence for the theory in the short-run while the results on the long term have been varied. Hakkio (1984), Dockery and Georgellis (1994) have found evidence of generalized parity in the short-run. However, Krugman (1978), Dornbush (1980) and Frankel (1981) have found evidence against long-run purchasing power parity.

The GPPP approach for determining the optimality of a currency union was developed by Enders and Hurn (1994). Empirical studies including Ramirez and Khan (1999) have shown that the exchange rates are non-stationary, as they tend to be influenced by some fundamental macroeconomic variables, including terms of trade and government borrowing. It has also been found that most macroeconomic variables are non-stationary. Hence, PPP-defined real exchange rates tend to exhibit non-stationarity. The explanation behind the PPP theory is that if two countries qualify for the creation of a currency area, they must experience symmetrical shocks to their macroeconomic variables. The fundamentals in the two countries must thus, on average, move together. Therefore GPPP postulates that the real exchange rates between the two countries comprising the domain of a currency area should be co-integrated (Enders (1995), Mkenda (2001)).

As explained above, Mkenda (2001) argues that GPPP is also relevant in a country setting. In such a setting, a currency area is such that the fundamentals that drive the real exchange rates will exhibit common stochastic trends. Therefore, the real exchange rates in the currency area will share common trends, so that, within the currency area there should be at least one linear combination of the various bilateral exchange rates that is stationary, which means that the real exchange rates are co-integrated. Using Ramirez and Khan (1999), long-run relations are sought between the exchange rate between The Gambian dalasi and the Senegalese CFA, and the consumer prices of both countries. This is explained by

$$DalCFA_{t} = \alpha_{0} + \alpha_{1} \left[\frac{CPI_{t}^{*}}{CPI_{t}} \right] + \varepsilon_{t}$$
(2.13)

Obviously, ignoring either the short- or long-run properties of a model results in a misspecified relationship. Including the lagged co-integrating vector into the model incorporates the long-run relationship, and including the variables in their differenced form incorporates the short-run dynamics.

With respect to currency areas, GPPP theory contends that two countries can qualify as members of an optimal currency area if they experience similar external shocks, i.e. their macroeconomic variables must respond symmetrically to shocks. This implies that their fundamental variables (income, terms of trade and government consumption) should be affected by changes in the real exchange rate and they must move together.

Mundell (1961) explained the significance of the exchange rate on an optimal currency area, arguing that where wages are sticky and labor immobile, real shocks to the economy need an adjustment tool, such as the exchange rate, to restore internal and external equilibrium. In a world with two countries and no capital mobility, homogenous goods, etc., an expenditure-switching shock (demand shifts away from domestic products to foreign ones) requires real wages to fall or workers to move to the favored country in order to restore the equilibrium in the goods and labor markets, consequently restoring external equilibrium. Real wages would start to rise in that country, attenuating the positive competitiveness effect. If migration occurs, the migrants' additional consumption of goods imported from their country of origin will increase their relative prices. This ultimate effect will be a reversal in trade balances. Hence if the real wages are sticky or labor is immobile (thus hampering market-clearing conditions), other transfer mechanisms are needed to smooth out fluctuations and restore external equilibrium. This is what the real exchange rate can do.

GPPP theory postulates that, though bilateral real exchange rates are generally non-stationary, they will exhibit common stochastic trends if the fundamental variables (i.e. the forcing variables) are sufficiently interrelated (Grandes (2003)). In the two-country case such as Senegal and The Gambia, this means that the real exchange rate between the two countries comprising the domain of a currency area should be stationary. As explained above, Enders

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(1995) argues that PPP posits that the real exchange rate between two countries comprising the domain of a currency area should be co-integrated. Before identifying the co-integrating equations, it is essential to initially identify the stationarity of the variables. For this, unit root tests, such as the Augmented Dickey-Fuller tests, are conducted. These test the hypothesis that a series has unit roots and is therefore non-stationary, against the alternative hypothesis that the series does not have a unit root and is, therefore, stationary.

2.3.3 The theoretical frameworks of "other" criteria

In addition to using VAR and PPP as qualification criteria for forming an optimal currency area, other determinants also exists in the literature and are examined in this section. These include: factor mobility, openness, degree of product diversification, flexibility of prices and wages, industrial structures, high cyclical co-variation in economic activities, similar economic policy preferences, and political factors. The methodology basically looks at variables that can act as adjustment instruments in lieu of the exchange rate mechanism. These are examined below.

2.3.3.1 Factor mobility

It is argued that the higher the degree of mobility between countries, the better their chances of forming a successful currency union. In this case, factor mobility supplements the exchange rate as an adjustment tool to respond to factor mobility shocks.

2.3.3.2 Degree of openness

McKinnon (1963) maintained that the more open an economy is the better candidate it is for a currency union. This is because the nominal exchange rate becomes less effective as a policy instrument for adjustment in a more open economy. Hence, an open economy finds it easier to enter a currency union because the nominal exchange rate is no longer significant as a monetary policy instrument. In support of this, Frankel and Rose (1998) argue that a small open economy is better off forming a currency union with its trading partners that are

characterized by open economies, since exchange rate disparities no longer exist to create a hindrance to trade between them. In addition, the single currency would provide a credible nominal anchor for monetary policy in the individual countries. They further argue that the more integrated the open economies are in terms of capital flows, labor mobility, or similar economic behavior, the less important the exchange rate is a policy instrument in individual countries.

The openness of The Gambia and Senegal to each other, and to the rest of the world is determined using Jonung and Sjoholm (1998) and Mkenda (2001) where the share of each country's trade with the other as a ratio of its GDP, and the ratio of the total trade of each country with the rest of the world as a ratio of its GDP are used. These are represented as:

$$O_{ijt} = \frac{X_{ijt}}{GDP_{it}}$$
(2.14)

where

 O_{ijt} = openness of country *i* to country *j* at time *t* X_{ijt} = export to/import of country *i* to country *j* at time *t* GDP_{it} = GDP of country *i* at time *t*.

$$M_{it} = \frac{X_{iwt}}{GDP_{it}}$$

where

 M_{it} = openness of country *i* to country *j* at time *t*

 $X_{iwt} = \text{export to/import of country } i \text{ to world at time } t$ $GDP_{it} = GDP \text{ of country } i \text{ at time } t.$

(2.15)

2.3.3.3 Degree of product diversification

The more diversified the products that an open economy produces, the less reliant it has to be on its nominal exchange rate as a policy instrument to adjust for shocks. This is even more so if the country exports a wide variety of its products, because it can then expect various sectors to act to absorb external shocks. For instance, a fall in the demand for one product that result in increased unemployment would be met with labor moving to other sectors that can absorb them. In this case, the nominal exchange rate is not needed to adjust for the increased unemployment because the economy reallocates the excess labor to other sectors that can use it, thereby buffering it from external shocks. On the other hand, if an economy is less diversified, a shock that affects the main sector could have a bigger effect on the economy. In this regard, Kenen (1969) argues that a more diversified economy is more stable for a currency union than a less diversified one.

Empirically, the Herfindhal index is used to determine the degree of product diversification in each country. This index is determined as

$$H = 100 * \sum_{j=1}^{n} (s_j)^2$$
(2.16)

where H = Herfindhal index

 $s_i =$ fraction of sector *j* in value added to GDP in country *j*

The index ranges from 0 to 100. The higher its value, the smaller the degree of product diversification and the less ready the countries are to forming a successful currency union.

2.3.3.4 Flexibility of prices and wages

In regimes where prices and wages are flexible, and adjust immediately to restore equilibrium, the exchange rate becomes redundant as an adjustment instrument. This is because prices and wages respond immediately to shocks, thereby equilibrating the sectors that are in disequilibrium.

2.3.3.5 Similarity in industrial structures

Just as in the case for product diversification, countries with similar industrial structures do not need the nominal exchange rate as an adjustment instrument, since they respond in a similar manner to external shocks and are therefore good candidates for a currency union. (See Mkenda (2001), Bayoumi and Ostry (1995), Jonung and Sjoholm (1998)). Empirically this is determined using the contribution of industry to value added to production. Given that agriculture is significant to both economies, the contribution of this sector to GDP is also examined.

2.3.3.6 Similarity in inflation rates

When countries have similar inflation rates, economic policies and macroeconomic frameworks, the nominal exchange rate also becomes redundant, so that the economies are good candidates for a currency union. (Jonung and Sjoholm (1998)). In fact the convergence criteria for many monetary and currency unions include convergence in a number of variables, including inflation. This is to ensure that one member that is embarked upon prudent fiscal discipline through the implementation of tight monetary policies is not financing the expansionary policies of the other member or members.

2.3.3.7 Cyclical co-variation in economic activity

This criterion assesses if the countries' economic activities moves together, since candidates to an OCA must have fundamentals moving together. To do this, the correlation coefficients of their GDP, money, nominal and real interest rates growths for the two countries are compared.

2.3.3.8 Political factors

As with many unions, such as the Sene-Gambia Confederation, the role of political factors in their formation is paramount in a currency union. This is because strong political will of the leaders in government is needed in most cases to galvanize public support for the policy (Jonung and Sjoholm (1998)). Without political will and public support, the commitment to

the currency union would be lacking, which can lead to the demise of the union. Political will among leaders is important because, as mentioned above, belonging to a currency union requires the eventual replacement of national currencies for another, which is a national sovereignty issue. Losing a currency to join or form a union can tantamount to losing one's sovereignty in the eyes of many. Hence a strong political will, coupled with the readiness to explain all the benefits and costs of joining the currency union, is needed.

Cohen (1993) offers empirical support for the importance of political factors in forming a currency union. In his study of six currency unions, Cohen found that political factors dominated economic factors in successful OCAs. Mkenda (2001) argues that the dissolution of the East African Currency Board in 1966 is an example of the absence of political will to sacrifice policy needs for the sake of the currency union. She also catalogues a number of empirical studies of the economic optimality of the currency area. These include that of Jonung and Sjoholm (1998). For their evaluation, they compared the indices of a number of parameters including political ones. They concluded that Finland and Sweden could constitute an OCA, while they were not obvious candidates for membership in the European Monetary Union.

2.4 Empirical analysis

This section empirically determines the optimality of the Sene-Gambia sub-region as a currency area using the three methods mentioned above. As explained above countries wishing to form an optimal currency area should not be diametrically different in their economic structure or else the relationship would not be mutually beneficial and the resulting union may not be stable. Potential candidates to an optimal currency area respond to external shocks in a similar manner.

The reduced form VAR that we estimated to measure response to price shocks from the three foreign countries mentioned above is specified as

 $X_t = A(L)X_{t-1} + e_t$

$$= (I - A(L))^{-1} e_t$$

where

 $A(L) = 4 \times 4$ matrix of lag polynomials

 $X_t = 4 \ge 1$ vector of stationary variables

=
$$[\Delta p^*, \Delta p, \Delta m, \Delta y]$$

As explained in section 2, the following restrictions are imposed:

$$\{A_{12}, A_{13}, A_{14}\} = 0$$
 (2.23)
==> $\Delta p^* = \text{strictly exogenous}$

Fielding and Shields (1999) argue that using OLS to estimate the VAR for a single country would be efficient, since the lags of all the endogenous variables appear in all of the equations. In this case there is no need to estimate a residual co-variance matrix, and, if the e_i are not correlated there is no need to estimate the model simultaneously. Having found that the e_i are not correlated, we chose to estimate each equation separately using OLS. Besides, residual co-variance between The Gambia and Senegal is not a significant determinant of whether The Gambia or Senegal chooses to form an optimal currency area. There are more important factors that influence The Gambia or Senegal's participation in an optimal currency area, such as political and strategic issues. Although using Seemingly Unrelated Regression (SUR) estimation would have produced more efficient estimators than OLS, Fielding and Shields (1999) argue that this does not allow for correlation between say Δp in one country and Δy in another. Moreover, our study is more interested in the direction of the impact of these external shocks on the domestic economies – whether the impact has negative or positive

(2.8')

effects - than the magnitude of the impact. That is we are more interested in getting an unbiased estimate, which can be equally produced by OLS, than one with lower variance.

2.4.1.1 Estimating the Gambian VAR model

The Gambian VAR model is estimated for the period 1969 to 2003. Table 2.1 below shows the impact of price shocks from the three foreign countries mentioned above on The Gambian output growth and price changes. It can be seen that shocks from all these three countries have an inverse effect on output growth, meaning that price increases in these countries decreases output growth in The Gambia. For a unit increases in prices in US, UK and France, growth in The Gambia decreases by 0.000155, 0.0000075 and 0.00023 respectively. The explanation of this to some extent is that The Gambia imports goods and services from these countries, and inflation in these countries would increase the price of imports to The Gambia, thereby increasing the cost of the production processes in The Gambia and, thereby, decreasing output. This result is strengthened by the statistical significance of the estimates for US and UK, which can be ascertained with 95% confidence although that of France cannot be so ascertained.

	Effects of price shocks from				
	US	UK	France		
On Gambian Output					
Coefficient	-0.000155	-0.000075	-0.00023		
t-statistic	-3.07	-2.53	-0.874		
Adj. R^2	0.414	0.357	0.24		
p-value	0.0045	0.017	0.39		
On Gambian Prices					
Coefficient	-0.0000016	-0.0000017	0.000354		
t-statistic	-0.034	-0.065	1.876		
Adj. R ²	-0.032	-0.032	0.07		
p-value	0.97	0.95	0.07		

 Table 2.1 Impact of shocks on Gambian output and prices

Source: Author's computations

With regards to price changes, a unit increases in prices in the US and UK decreases prices in The Gambia, whereas a unit increase in prices in France increases prices in The Gambia although the results are not statistically significant. *A priori* reasoning would argue that increases in prices in the US and UK would also increase prices in The Gambia because of the close trade ties between them. This however is not the case. An explanation for this may be that there exist other more important determinants of price movements in The Gambia than price movements in US and UK. With regards response to French price shocks, the Senegal-factor may explain this.

2.4.1.2 Estimating the Senegalese VAR model

With regard to the Senegalese economy, external price shocks from the US and the UK also adversely affect the growth of the Senegalese economy, as shown in Table 2.2. However, price increases in France also increase Senegalese output growth, although none of these are statistically significant.

· ·	Effects of price shocks from				
	US	UK	France		
On Senegal Output					
Coefficient t-statistic	-2.2216E-06 -1.4462	-4.9165E-07 -0.3954	3.3191E-06 0.6511		
Adj. R^2	0.0860	0.0292	0.0375		
p-value	0.1582	0.6953	0.5198		
On Senegal Prices					
Coefficient	1.95664E-06	1.62915E-06	6.6156E-06		
t-statistic	2.0291	2.1918	2.1514		
Adj. R ²	0.0863	0.1034	0.0991		
p-value	0.0508	0.0358	0.0391		

 Table 2.2 Impacts of shocks on Senegalese output and prices

Source: Author's computation

As for their impact on Senegalese prices, external price shocks from the three foreign countries have a direct effect. A unit increase in prices in these countries increases prices in Senegal. These results are statistically significant.

2.4.1.3 Overall impact

	Output	Prices		
	Gambia Senegal	Gambia Senegal		
US Shocks	Negative Negative	Negative Positive		
UK Shocks	Negative Negative	Negative Positive		
French Shocks	Negative Positive	Positive Positive		
	······			

Table 2.3	Summary	of	shock	effects
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Source: Author's computation

The overall impact of external price shocks to The Gambia and Senegal is summarized in Table 2.3. Output growth in both The Gambia and Senegal responds to price shocks from the US and UK in a similar manner. Price increases in these countries result in a decrease in output growth. However, price increases in France have different effects. They increase output growth in Senegal but decrease output growth in The Gambia. In summary external shocks from these countries affect both economies in the same way.

Price shocks from the US and UK affect the two economies differently. Price increases in the US and UK decrease prices in The Gambia but increase prices in Senegal. However, price increases in France directly affect the two economies by increasing prices in both The Gambia and Senegal. In summary, external price shocks from these three countries cannot be said to affect both economies in the same way.

2.4.2 Method 2 – Testing with GPPP and co-integration analysis

As explained in section 1, the second methodology adopted in this study for testing if Sene-Gambia could form an optimal currency area is based on the theory of generalized purchasing power parity (GPPP). As explained above, this theory implies that a basket of goods should cost the same in The Gambia and Senegal, in the absence of transport costs, tariffs and other government interventions. Countries forming an optimal currency area should exhibit a stable long-run relationship among their exchange rates. This section empirically estimates (2.3). However, before doing this, the stationarity of the variables is first determined to check if they possess unit roots. The results of these tests are shown on Table 2.4.

Variable	Trend	Intercept	Lags	ADF	5% CV	Adjusted R2	Durbin Watson	Akaike Criterion	Order of Integration
CPIG	No	Yes	1	0.730	-2.9527	0.280	2.169	2.119	I(2)
ΔCPIG	No	Yes	1	-2.129	-2.9558	0.213	2.040	2.120	I(1)
ΔCPIG	Yes	Yes	1	-2.382	-3.5505	0.216	2.010	2.143	I(1)
ΔCPIG	No	Yes	2	-0.990	-1.9517	0.141	2.070	2.180	I(1)
ΔΔCPIG	No	Yes	1	-5.165	-2.9591	0.678	2.050	2.266	I (0)
CPIS	No	Yes	1	0.519	-2.9499	0.003	1.980	2.920	I(1)
ΔCPIS	No	Yes	1	-3.628	-2.9527	0.346	2.010	2.961	I(0)
DalCFA	No	Yes	1	-0.780	-2.9499	-0.037	1.980	5.690	I(1)
ΔDalCFA	No	Yes	1	-3.093	-2.9527	0.544	1.998	5.675	I (0)

Table 2.4 Unit Roots Test Results

They show that the consumer price index for The Gambia (CPIG) is integrated of the second order (I(2)), as it has to be differenced twice for it to be stable. For this time series, the trend does not matter, as tests indicating the presence or absence of trends still results in a non-stationary variable. The Durbin-Watson (DW) statistics indicate the absence of autocorrelation. With respect to the consumer price index for Senegal, the results show the series to be integrated of order one (I(1)). It becomes stable when differenced once and is therefore non-stationary in its values. The DW statistics also indicate the absence of autocorrelation in this series. Similarly, the exchange rate between The Gambian dalasi and Senegalese CFA is also integrated of order one (I(1)) and is, therefore, non-stationary. The

series also does not exhibit any autocorrelation. Detailed results are shown in Annex Table

D5.

Given that all the variables are non-stationary, the Johannsen co-integration technique is used to determine if there exists a stable long-run relationship between the consumer price indices of the two countries and their exchange rates. This is to see if their exchange rates are cointegrated, a condition for forming an optimal currency area. The results of this test are shown in Tables 2.5

Trend	Eigen Value	LR	5% CV	Hypothesised CE	СРІ	С	Log LR	No. of CE
Linear and Deterministi	0.280 0.022	11.590 0.733	15.410 3.760	None At Most One	-41.136	-2.690	-110.317	One
No Deterministic Trend	0.268 0.060	12.300 2.032	12.530 3.840	None At most One	-43.210		-111.306	One

 Table 2.5 Co-integration Results

Source: Author's computations

CE = Co-integrating equation

CPI = Ratio of CPIG to CPIS

LR = Likelihood ratio

The results show that there is one co-integrating equation between the exchange rate and the consumer price indices of the two countries with either a deterministic trend or no trend. This is one of the results that support the optimality of the Sene-Gambia region as a currency area.

2.4.3 Method 3 - Testing with "other" OCA criteria

The third methodology is based on Jonung and Sjoholm (1998) and assesses the similarities or differences between the two economies. They include the degree of openness of both exports to trade; the cyclical co-variance of the economies with respect to the growth of GDP, money, nominal and real interest rates; the economic structure of the economies within the context of the contribution of industry to value added; the similarity of their inflation rates; and political considerations.

2.4.3.1 Degree of openness of both economies

As explained above, two measures that are normally used to determine the degree of openness are the share of intra-regional trade in each country's GDP, and the share of total trade in each country's GDP (Mkenda (2001)). This study only uses the latter because total intra-Sene-Gambian trade tends to be underreported, as a great part of this occurs across borders points where there are no custom posts. The artificiality of the borders is such that in some areas the border goes through villages such that family members live on either side of the border. In this thesis, the degree of openness is determined by exports and imports as percentages of GDP.

	Gambia 1970-79 1980-89 1990-99 2000-02			Senegal 1970-79 1980-89 1990-99			2000-02	
Imports/GDP	26.66	16.15	6.84	3.41	132.63	102.22	57.72	32.29
Exports/GDP	17.18	5.00	1.06	0.14	92.52	57.28	38.55	22.09

Table 2.6 Trade as a share of GDP (%) (average for the period)

Source: Author's computation

The trade share of GDP for the average ten-year period from 1970 to 2002 is given in Table 2.6 which show that Senegal is relatively more open than The Gambia in terms of both exports from and imports into the sub-region. In the 1970s, imports amounted for about 27% of GDP in The Gambia whilst it was over 130% in Senegal. These declined over the decade such that by the 1980s it was just over 16% for The Gambia and just over 100% in Senegal. This decline continued such that by the 1990s the openness of The Gambian economy was just over 6% whilst that of Senegal was 57%.

What is interesting is that for both countries the openness of both the economies seems to decrease over the period. However, given the extensive liberalization that both economies had

undergone while they were implementing structural adjustment programmes, (by lowering tariff rates, removing import quotas and opening up to the economy to free movements of imports), this is far from the truth. For The Gambia, imports became more expensive mainly due to a decline in the growth rates of GDP relative to that of imports, further accentuated by the devaluation of the dalasi and the adoption of a floating exchange rate. But what is more critical for The Gambia in the 1990s was the clamp down on re-exports by Senegal after the devaluation of the CFA franc in January 1994. Fig. 2.1 illustrates the openness in both countries showing clearly the declining trends for the countries, with heightened openness during the mid-1970s.



With regard to openness measured as the share of exports to GDP, a similar situation also exists. The Senegalese economy is more open than The Gambian one, and the decline of openness is more dramatic in The Gambia than in Senegal. Where exports were about 92% of GDP in the 1970s, this declined relatively smoothly and by the period 2000-2002 exports were only 22% of GDP.

However, in the case of The Gambia, the share was about 17% in the 1970s; by the period 2000-2002 it was only 0.14% of GDP. Part of this can be explained by the privatization exercise embarked upon as part of the structural adjustment program in the mid-1980s,

especially the privatization of The Gambia Produce and Marketing Board (GPMB). The Gambian economy has always been a groundnut-producing agrarian one but some industrial production especially the processing of groundnuts has always been an integral part of it. The GPMB was not only exporting groundnuts but also producing decorticated nuts and some amounts of cooking oil, for domestic consumption. The industry employed the largest proportion of the population working in the industrial sector. As part of the government's privatization exercise, GPMB was privatized in 1992. Unfortunately, the new company found it more profitable to export unshelled nuts than process them. They, therefore, made redundant most of the staff that had not been laid off before the sale. This not only increased unemployment but also virtually killed the plant and with it the industry. Now The Gambia only exports very small amounts of processed oil from a relatively smaller plant that is now in an export zone within the city limits of Banjul. This is just a shadow of what it was in the 1970s and 1980s. The degree of openness of the two countries, with respect to exports, is illustrated graphically in Figure 2.2.



By both measures of the degree of openness (with respect to exports and imports), the Senegalese economy is more open than The Gambia's. The period between 1973 and 1982

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for Senegal was the period that the share of exports to GDP increased dramatically, after which a steady decline started. For The Gambia this is more for the period between 1977 and 1981, after which it declined steadily.

2.4.3.2 Cyclical co-variance between the economies

			Mean		
	Co-variance	Correlation	Senegal	Gambia	
GDP	32.48	0.17	10.95	14.57	
Money Supply	-0.42	0.23	13.36	17.64	
Real Interest Rate	230.69	-0.12	-3.7	2.51	
Nominal Interest Rate	-24.44	-0.15	0.55	3.85	

Table 2.7 - Cyclical Co-variance of growth rates

Source: Author's computation

To measure the cyclical co-variation between the two economies, the co-variance and correlation between four macroeconomic variables are examined. Mkenda (2001) used the correlation relationships. The macroeconomic variables are the growth of output, money, and nominal and real interest rates. Table 2.7 shows these statistics along with the country means. The table shows that the growth of the money supply and the nominal interest rate do not move together, but are inversely related for the two countries: high values for The Gambia tend to move with low values for Senegal. However, the growth rate of GDP and real interest rates (both real and nominal) and money growth. The correlation coefficients of the interest rates is negative, implying an inverse relationship, whereas the correlations of the two countries' GDP and money growth are positive, implying a direct relationship. For both countries these are positive and very low. In general, the two sets of statistics indicate that besides the growth of GDP, the macroeconomic fundamentals for the two countries do not move in the same direction and even where they move together, as in GDP growth, the correlation is rather low.

Going by these, the formation of a currency union between the two countries will prove to be very difficult.

2.4.3.3 Similarity in inflation rates

	1970-80	1980-90	1990-00	2000-04
Gambia	0.83	5.52	3.5	9.38
Senegal	2.33	3.13	4.14	
Correlation Coefficient	0.6	0.1	0.3	

Table 2.8 Average inflation rates and respective correlation coefficients

Source: Author's computation

The inflation rates for The Gambia have been relatively lower than Senegal's during the 30year period. In the first decade the average inflation rate for The Gambia was less than 1% but this increased drastically to over 5% by the 1980s before declining to an average of 3.5% in the 1990s. It should be noted that The Gambian dalasi was devalued in August 1985 causing the inflation rate to increase to 15.6% by the end of the year, from 4.3% in 1984. On the other hand, Senegal's inflation rate has been relatively more stable, averaging 2.33% in the 1970s, then rising to 3.13% in the next decade and continuing to rise by 4.14% in the 1990s. The devaluation of the West African CFA took place in 1994, causing the inflation rate to increase to 32% from - 0.7% in 1993. However, by the end of 1995 it had come down to 8%.

With respect to the behaviour of the inflation rates for the two countries, they cannot be said to be moving in the same direction. The two series were moving closer together in the 1970s, but by the 1980s they were in opposite directions. Fig.2.3 illustrates this.



The wide divergence between the trends throughout the 1980s and a greater part of the 1990s also indicates that forming a currency union would be a challenge. This is so despite the fact that both Senegal and The Gambia have programmes with IMF and the World Bank. As explained above, the CFA monetary union that Senegal already belongs to determines monetary policy in the union, so that Senegal has little control in this area. What this means is that the extent to which the IMF and the World Bank can influence policies in The Gambia is different from that in Senegal, hence the different inflation trends.

The unit root tests of the differences between the inflation rates of The Gambia and Senegal in Table 2.9 (for the period 1970 to 2003) show it to be non-stationary at both the 1% and 5% critical values.

ADF Test Statistic	-2.691856	1% Crit 5% Crit 10% Crit	ical Value* ical Value ical Value	-3.6752 -2.9665 -2.622
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DIFF(-1)	-0.574235	0.213323	-2.691856	0.0123
D(DIFF(-1))	-0.029444	0.196228	-0.150051	0.8819
C	0.029431	1.167988	0.025198	0.9801
R-squared	0.296156			
Adjusted R-squared	0.242014			
Durbin-Watson stat	1.984579		· · ·	
F-statistic	5.470004			
Prob(F-statistic)	0.010404			

 Table 2.9 - Unit root test results for Difference in Inflation rates

Source: Author's computation

2.4.3.4 The structure of the two economies compared

Socially, The Gambia and Senegal share many characteristics such as ethnicity and climate, however GDP per capita for Senegal is almost three times bigger as shown on Tables 1.1 and 1.2.

With respect to final consumption, The Gambia government spends, in nominal terms, about 12% of that of the Senegalese government, whilst The Gambian households consume about 18% of that of Senegalese households. As a share of total final consumption within each country, the Senegalese government's final consumption is about 15% whilst The Gambia's is about eleven percent.

In terms of the main economic activities, agriculture dominates both economies, contributing just over 20% of total GDP for both countries. In The Gambia this is followed by commerce and hospitality services that contribute about 17% of GDP compared to 22% of GDP for

Senegal. Similarly manufacturing contributes about 19% to GDP in Senegal compared to 5% for The Gambia.

As indicated above, agriculture is the main activity for both countries and the main products are groundnuts and cotton. Over the period 1996 to 2000, The Gambia harvested an area of over 120,000 hectares of producing just under 90,000 metric tonnes of groundnuts, whilst Senegal harvested under 800,000 hectares and producing just over 600,000 metric tonnes. Rice is the staple food for both The Gambia and Senegal; unfortunately, its production does not match its consumption. In the recent past The Gambia cultivated on average 16,000 hectares producing about 26,000 metric tonnes of rice whilst Senegal cultivated on average 72,000 hectares and produced about 168,000 metric tonnes. Rice yields are, therefore, higher in Senegal (2,379kg/ha) than The Gambia (1,601kg/ha).

2.4.3.5 Political factors

The political factors in each country that determine the optimality of Sene-Gambia as a currency area are different. Whereas The Gambian authorities are eager and willing to enter into a single currency, it is not the case for Senegal. Repercussions of re-exporting to Senegal and eventual clamping down on the border have left a bad taste of both authorities. Where The Gambia saw the trade as the by-product of appropriate domestic policies on its part (lower tariff rates in The Gambian ports), Senegal saw these as policies that undermine their fledging manufacturing industry that was struggling to blossom. The clamp down following the devaluation of the CFA in 1994 only added to the smuggling of products across the border.

However, of more fundamental significance, is the monetary union that Senegal already belongs to that has substantial backing from France – the CFA franc zone. Short of The Gambia leaving its currency and joining the CFA, it would be impossible to see the reverse. After all, the guarantee that France offers the CFA franc cannot be matched by anything The Gambia or the ECOWAS could offer at present. As explained below, The Gambia is joining

other ECOWAS members – Ghana, Nigeria, Sierra Leone, and Liberia - to form a currency union by 2011. This is a manifestation on the part of The Gambia of a desire to be part of an optimal currency area. Senegal is already in a currency area. The challenge is for Senegal and other members of the CFA franc zone to agree at some point in the future to let go of the CFA for an ECOWAS currency. The concurrence of France would be key in arriving at the decision. As Europe expands, the influence of France in Europe would be expected to eventually diminish to the level that maintaining the same level of support to the CFA zone would remain a challenge, let alone another currency including all 15 members of ECOWAS. So it could be expected that at some point in the future, the CFA zone may find it reasonable to join other ECOWAS countries and have a single currency rather than exist on their own without French support.

2.5 Interpretation of results

In this section we interpret the results of the estimation exercise in section 2.4. The study uses three different methods and so that the interpretation of the results becomes more complex. The general results of all three methods combined support the optimality of the Sene-Gambia region as a currency area. Whereas the pronouncement from method 1 is mixed, that of method 2 gives a categorical yes, whilst that of method 3 leans more towards optimality than otherwise. These are explained in detail below.

2.5.1 The structural VAR model

The first method uses the structural VAR to determine the response of the Senegalese and The Gambian economies to external output and inflation shocks from the US, UK and France. The theory contends that countries forming an optimal currency area should respond to external shocks in a similar manner.

	Gambia	Senegal
VAR Model		
Changes in United States Prices on Outputs in	Negative	Negative
Changes in United States Prices on Prices in	Negative	Positive
Changes in United Kingdom Prices on Outputs in	Negative	Negative
Changes in United Kingdom Prices on Prices in	Negative	Positive
Changes in French Prices on Outputs in	Negative	Positive
Changes in French Prices on Prices in	Positive	Positive

Table 2.10 Summary of Response to External Shocks (VAR Model)

The results above show that for 50% of the cases, both The Gambian and Senegalese economies respond in a similar manner. These are responses to output shocks from US and UK and inflation shocks from France. For the remaining 50% of the cases, they respond differently. These are with regards to inflation shocks from US and UK and output shocks from France. It is worth noting also that it is only in one of the six cases that both economies respond positively (to French inflation shocks), whereas for two of these, both countries respond negatively (output shocks from US and UK). For the remaining three cases, Senegal's response to the shocks is positive whilst that of The Gambia is negative. It can therefore be concluded from this methodology that the evidence is mixed in support of the optimality of the Sene-Gambia region as a currency area.

2.5.2 The generalized purchasing power parity (GPPP) model

From the second methodology used by this study, that of GPPP, the conclusion is definite. Deriving from Ender's (1995) argument that the real exchange rates between two countries comprising the domain of an optimal currency area should be co-integrated, the results of the study affirm this argument for Senegal and The Gambia by identifying the existence of one co-integrating equation between them. This means that there exists one long-run stable relationship between the CFA of Senegal and dalais of The Gambia and their consumer price indices. Similar results are found by Mkenda (2001) for the Scandinavian countries and Ramirez and Khan (1999) for OECD countries. The result is summarized on Table 2.11. Unit root tests indicate that all the series are non-stationary with orders of integrations of at least one as explained in page 63.

	Gambia	Senegal
Generalized Purchasing Power Parity		· · · · ·
Presence of co-integrating equation(s)	One Co-integ	grating Equation exists

Table 2.11 Summary of Response to External Shocks - GPPP Method

2.5.3 "Other" criteria

The third methodology derives from the argument that countries that form the domain of an optimal currency area must have economies that are structurally similar. Their inflation policies must, as a matter of concern be similar. This would ensure that a low-inflation country does not finance the fiscal deficit of a high-inflation partner. Similarly, there should not be significant disparities in the degree of openness of the economies and the cyclical co-variance of their key fundamental variables must be similar. As indicated in Table 2.12 below, five such criteria were examined, three of which were a resounding yes and two mixed. As for the degree of openness, both in terms of imports as well as exports, Senegal is shown to be relatively more open than The Gambia. With regard to the cyclical co-variance, both the output and nominal interest rates of the two countries exhibit positive co-variance, whereas for money supply and real interest rates, the co-variance is negative. The results for this criterion are mixed. For 50% of the cases, the cyclical co-variance is similar whilst for the remaining 50% the co-variance is dissimilar. So going by this criterion, it could be said that the results are mixed.

	Support optimality		
Other Criteria			
Degree of Openess	Yes		
Imports			
Exports			
Cyclical Covariance	Mixed		
GDP	Positive		
Money	Negative		
Nominal Interest Rtaes	Positive		
Real Interest Rates	Negative		
Inflation	Yes		
Structure of Economies	Mixed (Qualified Yes)		
Political Considerations	Yes		

Table 2.12 Summary of response to external shocks - Other Criteria Method

Source: Author's compilations

With respect to inflation, as Harbeler (1970) and Fleming (1971) argue, a similar rate of inflation is among the qualifying conditions of an optimum currency area, because differences in the rates of inflation and productivity growth are primary sources of external payments disturbances. As shown in Table 2.8, the inflation rates for Senegal and The Gambia are very similar, with the average for both countries falling below 5% for the three decades under study. By this criterion, the results indicate that Senegal and The Gambia could form an optimal currency area.

Regarding the structures of the economies, the Senegalese economy is many times bigger than that of The Gambia and has a larger industrial base. Although the size of the economy matters, what matters most is the efficiency of the economies. The Gambian soap manufacture has withstood the competition from Senegal and abroad, which indicates that it is one of the industries that could survive competition that would result from the optimal currency area. The final criterion used in this study is based on political considerations. In the recent past, political antagonism has plagued the Sene-Gambian relationship to the extent that, for three months in 2005, Senegal imposed a border blockade in response to the unilateral increase in tariff rates of ferry crossings in The Gambia that are frequently used by Senegalese trucks traveling across to the southern part of Senegal. This blockade hurt The Gambian economy, as many imports from Senegal such as LPG and basalt rocks for road construction were among the goods that could not enter The Gambia from Senegal. Consequently, road construction projects in The Gambia were delayed. In the end, a meeting between the heads of states resolved the issues; the tariffs were revised downwards and the blockade lifted. This phenomenon, though uncommon, seems to periodically characterize the Sene-Gambia relations; however the ethnic composition and mutual feeling of kinship between their populations ensures that dialogue is embarked upon and tensions released within a short period of time.

CHAPTER 3

Assessment of trade facilitation effects of the Sene-Gambia Confederation on The

Gambian economy

3.0 Introduction

Now that most of the results of chapter two affirms the optimality of the Sene-Gambia region as a currency area, it now needs to be determined if Gambia could benefit from the proposed economic integration of ECOWAS by examining if she benefited from the Sene-Gambia confederation that was formed in 1982 but dissolved in 1989. This is done using cointegration analysis by estimating a trade model for The Gambia that is specified as an errorcorrected gravity model in which the Confederation is modeled in the deterrence function as a dummy variable. Additionally, the model also examines the significance of supply-side constraints to production in The Gambia relating to exports and also modeled in the deterrence function. The results of this chapter are of significant policy relevance to The Gambia as she prepares for regional integration. This has received an even greater impetus from the failure of the DOHA talks in Geneva in July 2006, at a time when the 7th Annual Session of African Union Heads of States meeting in Banjul called for the rationalization and integration of the Regional Economic Groups into an integrated African market. Hence the results of this chapter could help inform policy in the Gambia on preparing for this eventuality.

As small African states like The Gambia realize that their small sizes inhibits their aspirations to make trade work for them, they are increasingly finding that regional integration offers them markets that they would otherwise not have. Furthermore, as ODA¹⁰ is becoming increasingly tied to veiled conditionalities, countries like The Gambia are increasingly arriving at the conclusions that trade and not aid will see them out of the development challenges they are facing. This is despite the flare that surrounded the Multilateral Debt Relief Initiative

¹⁰ It is common to find Country Assistance Programmes set out in three scenarios: scenario 1(best case) with more resources if certain conditions prevail in the economy, scenario 2 (normal case) relatively less resources, if other conditions prevail, and scenario 3 (worst case) for even lesser resources if certain conditions prevail. In effect these turn out to be conditionalities. This is the format of the DFID Zambia Assistance Strategy for 2005-7 and closely resembles that of the World Bank.

(MDRI)¹¹ extended to 18 poor countries including Senegal, although Gambia and other deserving poor countries were not included. Furthermore, Gambia is not close to benefiting from the Heavily Indebted Poor Countries Initiative (HIPC) debt relief soon because it just graduated from a Staff Monitored Programme (SMP) and a Poverty Reduction Growth Facility (PRGF) loan has just been approved in February 2007. The Gambia was suspended from the PRGF track in 2005 for wavering implementation of agreed triggers of the Poverty Reduction Growth Facility (PRGF) with the International Monetary Fund (IMF). This directly affected bilateral debt relief from other cooperating partners who take their cue from the IMF. Therefore, prospects for increased fiscal space for The Gambia to address its development challenges are slim, at least in the short to medium term.

As argued by the UN Millennium Project, for countries like The Gambia to be catapulted out of the poverty trap they are caught in, three elements are critical: increased ODA, debt relief, and market access. The prospects of these are rather slim for The Gambia which is left with only one option: trade itself out of poverty. However, this may not be easy as The Gambian economy is characterized by supply-side constraints (structural) to production that militate against its smooth transition from a low-exporting country to a high-exporting country. The opportunities offered by the American Growth and Opportunities Act (AGOA) of the United States and the Economic Partnership Agreements (EPA) of the European Union have not been fully exploited by many African countries because of these constraints. As a result, critics are now questioning whether African countries can even benefit if accorded unlimited market access to developed markets. Unless these supply-sided constraints are addressed in the African countries themselves, the lifting of farm subsidies in US and Europe and unlimited market access would marginally benefit the African countries.

¹¹ The Multilateral Debt Relief Initiative (MDRI), announced at the G8 Summit at Gleneagles in July 2005 is the initiative through which debt owed to the World Bank, IMF and African Development Bank are fully forgiven. Together with relief from HIPC, the debt stocks of benefiting African countries have been reduced significantly. For example at the beginning of 2004 Zambia's debt stock stood at about US\$ 7.2 billion, in April Zambia acceded to HIPC completion point with its accompanying debt relief and in July, she also benefited form the MDRI. Between these two relieves, the debt stock for Zambia declined to US\$ 506 million in July 2006, creating a fiscal space of about US\$ 6.5 billion.

Although these constraints tend to be country-specific, certain constraints are common to all. They include the lack of financial deepening and underdeveloped infrastructure that result in high energy and communications costs within the continent. These result in high transactions costs for doing business in these countries. The lack of financial deepening means that bank loans are mainly extended to short-term loan ventures such as imports and exports rather than on production/manufacture for exports that normally has a longer gestation and has the potential to create more rewarding jobs. Of the identified constraints, financial deepening is one of the main areas of focus of this chapter. It is modeled into the error-corrected gravity model to assess its significance on trade in The Gambia. Financial deepening is measured by the claims that the banking sector has on the private sector, i.e., the amount of credit extended to the private sector. This is usually a reliable proxy of how well the private sector can do. In African countries such as Gambia, government borrowing usually tends to crowd out the private sector, especially if the high public borrowing is used to finance recurrent expenditures rather than capital investments. A private sector, which has reasonable access to credit, can exploit the opportunities available for increased production. This could translate to higher exports. If the financial sector is not deep enough, then there is a tendency for the private sector not to receive the optimal levels of credit. Financial deepening is modeled in the errorcorrected gravity model in the deterrence function as one of the attributes that offer resistance to exports from Gambia. The specification of the gravity model and its theoretical background are presented in section 3.4.

In the last 12 years The Gambia has developed a significant part of its road infrastructure but the same cannot be said of other neighboring countries, so that the smooth transport of goods (exports) in the region remains a challenge. Furthermore, West Africa is still not serviced by a critical mass of airlines or shipping lines to lower transportation costs within the region. Although the telecommunications networks are relatively more developed with the proliferation of mobile phone networks in the continent, the cost of intra-African communications is still high. It is cheaper in many African countries to make calls to US or Europe than it is to call another African country. Finally, the over-reliance on oil-powered generators and the recent price escalation of crude oil means that the cost of energy is relatively high, thereby eroding any potential that domestic firms may have for static competitiveness in manufacturing. All these constraints inhibit growth of private sector, and with it, its potential to produce and export more.

Internationally, there is now a growing concern about the limiting effects of these supply-side constraints to African integration in world trade such that cooperating partners are now focusing their attention on the policy dialogue to address them. In this regard, a group of six multilateral agencies¹² inaugurated the Integrated Framework (IF) in October 1997 at the WTO High Level Meeting on Integrated Initiatives for Least-Developed Countries' (LDC) Trade Development. By 2005, and pursuant to a greatly increased interest from LDCs to join the IF, and repeated calls to enhance the IF by both beneficiaries and donors in different fora, Ministers of Finance and Development in the Development Committee meeting of the World Bank and the IMF in September, 2005 endorsed a proposal to enhance the IF. The meeting endorsed the proposal for an enhanced Integrated Framework, including expanding its resources and scope and making it more effective. These resources are intended to address the supply side constraints faced by LDCs. The Gambia is a beneficiary of this enhanced IF trust fund and can use the resources to identify and catalogue the specific supply-sided constraints that need to be addressed.

This chapter is divided into eight sections, including this introduction. The next section looks at trade in Africa highlighting its declining share in world trade in the last fifteen years. In the following section, an analysis of export intensities in Gambian trade with respect to key trading partners in West Africa and the rest of the world and trade facilitation by the Confederation and its capture in the error-corrected gravity model is done. The following section is a review of the literature on economic integration in general, and in Africa in particular, followed by a review of the literature on gravity models illustrating their use in African trade modeling. The next section looks at the theory of gravity models, data and the problems associated with its collection and the methodology of the study which describes the three steps leading to the estimation of the error-corrected gravity model. The following section tests the stationarity of each time series. Some were found to be non-stationary; as a result, long-run stable relationship between the series was identified using co-integration analysis. To our own knowledge, this is the first time that an error-corrected gravity model has been used to estimate a trade model for The Gambia. The final section of this chapter interprets the results of the estimation.

3.1 Trade in Africa

Africa's share of world exports has declined from 3.1% in 1990 to 2.6% in 2004 just as its share of World imports declined form 2.8% to 2.3% in the same period.

	1990 %	1995 %	2000 %	2004 %
Share of World Exports				
Africa	3.1	2.2	2.3	2.6
o/w South Africa	0.7	0.6	0.5	0.5
Share of World Imports				
Africa	2.8	2.5	2	2.3
o/w South Africa	0.5	0.6	0.5	0.6

Table 3.1 - African merchandize trade statistcs(1990 to 2004)

Source: International Trade Statistics, 2004, WTO

It can be seen that Africa, for now, cannot be said to have benefited significantly from globalization. This however, does not have to continue, because African countries have to adapt to these changing conditions so that they make globalization work for them. This means addressing all the constraints to production that entangle their economies, including supply-

¹² These are UNDP, ITC, UNCTAD, UNDP, World Bank and the WTO.

side constraints. Notwithstanding the opportunities offered by AGOA and EPA, the temporary nature of the former and tendency of the EPAs to be loped-sided in favour of the EU^{13} , require African countries to re-strategize and start acknowledging the opportunities offered by regional markets to which they belong, as current intra-Africa trade leaves considerable room for growth. In 2004, as shown on Table 3.2, intra-African trade accounts for only 9.9% of African exports which is valued at US\$ 23 billion, compared to 42.7% with the European Union (valued at US\$ 99 billion), 18.5% with North America (valued at US\$ 43 billion) and 16.8% with Asia (valued at US\$ 39 billion). As a share of world trade, intra-African trade is only 0.3%, whereas African trade to Europe, North America and Asia are 1.1%, 0.5 and 0.4% respectively.

Table 3.2 African exports by selected destination in 2004 and annual percentage changes

	World	A frica	Europe	North America	Asia
Sh	ares of A frid	can trade	e by desti	nation (20	004)
Of A frican exports (%)		9.9	42.7	18.5	16.8
Of World exports (%)		0.3	1.1	0.5	0.4
А	nnual percer	ntage cha	ange (20	00 to 200)4)
2000-2004	12	14	7	13	13
2002	2	24	- 3	-10	. 8
2003	25	22	20	48	23
2004	32	22	· 17	39	49

Source: International Trade Statistics, 2004, WTO

In terms of annual change between 2000 and 2004, intra-African trade grew more (14%) than with other partners although it declined from 24% in 2002 to 22% in 2004. In both 2003 and 2004, African countries traded more with North America (48% and 39% respectively) and Asia (23% and 49%) than with other African countries.

¹³ In 2005 Zambia refused to sign its bilateral EPA with EU after analysis show that the agreement would result in net loss for Zambia and net gain for the EU. They are working on a revised agreement.
	2000-04 %	2002 %	2003 %	2004 %
Fuel and mining Products			·	
World	12	-3	28	44
Africa	8	25	30	39
Europe	5	-7	17	19
North America	14	-14	57	45
Asia	14	5	27	69
Manufactures				
World	12	5	24	20
Africa	12	2	19	17
Europe	11	-5	28	19
North America	12	38 .	17	16
Asia	15	21	31	23,
Agriculture products				
World	. 10	3	19	19
Africa	10	12	13	10
Europe	10	6	17	14
North America	11	1	25	13
Asia	10	-9	21	33

Table 3.3 African exports by major products and main destinations

Source: International Trade Statistics, 2004, WTO

With regards the composition of African exports, African countries exported more manufactured goods (12%) than agricultural products (10%) over the same four-year period as shown in Table 3.3. In 2002, African countries exported more manufactured products (38%) to North America than any other product followed by fuel and mining products to Asian countries (25%).

3.2 Trade facilitation and diversion in Gambia

The formation of the Sene-Gambia Confederation was finally made possible by political reasons, the restoration of The Gambian government by Senegalese troops after a failed coup d'etat in 1981; however, its potential in facilitating trade effects especially for Senegal to capture the market potential, has always been the reason behind the enthusiasm of late President Sedat Senghore of Senegal to see the Sene-Gambia Confederation formed. He stepped down in 1980 without achieving this. When the Confederation was finally formed,

expectations that Senegalese industry could thrive motivated by the diversion of The Gambian demand to Senegalese exports were high. To the extent that the Confederation facilitated trade between the two countries, resistance to this flow also existed as trade with other West African countries, especially Guinea Bissau, continued. The trade facilitation by the Confederation is captured in two ways in this chapter. The first is through the conventional export intensities index and the second through the deterrence function of the error corrected gravity model.

The export intensity index is a measure of the degree of representation of a country's exports in another country's imports. The index is specified as

$$Ex_{ij} = \frac{\left[X_{ij} / X_i\right]}{\left[\frac{\left(X_{ivj} - X_{ij}\right)}{\left(X_w - X_i\right)}\right]}$$
(3.1)

where $Ex_{ij} = Export$ intensity index of country *i* with trading partner *j*

 X_{ij} = Exports of country i to trading partner j

 X_i = Total exports of country *i*,

 X_{w_i} = Exports from World to country *j* (imports of country *j* from world),

 $X_w =$ Total world exports.

The higher the index, the more important country *i* exports are to country *j*. Table 3.4a gives the export intensity indices for The Gambia and its key trading partners for whom data is readily available. Unfortunately, data on Direction of Trade Statistics of Gambia is only available with Guinea and Ghana, from 1992 for US, and 1998 for Guinea Bissau, Japan and China.

	Senegal	Ghana	Guinea	G/Bissau	US	Japan	China
1970- 1979	12.4					· · · · ·	
1980-1989	151.6						
1980- 1984	40.9				·		
1985- 1989	110.7						
1990	101.5	7.9	259.1		'	·	
1991	78.6	17.9	579.0				
1992	63.7	12.9	336.9		0.1		·
1993	51.7	14.6	508.9		0.2	·	·
1994	21.6	26.1	80.9		0.4		
1995	37.6	27.9	41.0		0.9		
1996	28.8	29.4	33.3		0.6		
1997	273.7	na	na		1.2		
1998	540.9	133.3	1,544.6	1,362.0	0.6	2.1	0.1
1999	210.1	296.2	3,959.9	3,162.6	1.3	4.1	0.2
2000	107.6	73.3	181.3	5,609.1	0.1	11.5	0.0
2001	164.3	140.2	94.7	11,408.7	0.3	3.8	na
2002	174.5	152.0	92.3	12,501.7	0.1	0.9	na
2003	40.0	417.1	277.2	33,500.9	0.1	4.0	1.0
2004	41.0	257.9	na	17,343.7	0.3	5.6	0.1

Table 3.4a Export Intensities

Source: Author's computation

The results show that The Gambian exports were just marginally significant in Senegal in the early 1970s but grew gradually through the 1980s, only to decline again through the mid-1990s. It jumped markedly from 1997 for the following five years with indices greater than 100; however, by 2003 and 2004 the index dropped to its early 1980 levels. It is interesting to note that the trade pattern between The Gambia and Senegal is correlated with some key political developments that happened in the sub-region as shown on Table 3.4b.

Table 3.4b: Ralating export intensity with some political developments

Years	Export Intensitiy	Increase (fold)	Senegalese President	Gambian President	Remarks
1970-1980	12.30	_	Leopold Senghore	Dawda Jawara	Pre-Confederation days
1981-1989	79.97	6.50	Abdou Diouf	Dawda Jawara	Intervention and Confederation
1990-1993	73.86	0.92	Abdou Diouf	Dawda Jawara	Immidiately after Confederation
1994-1999	185.45	2.51	Abdou Diouf	Yahya Jammeh	President Jammeh's first four years
2000-2004	105.46	0.57	Abdoulaye Wade	Yahya Jammeh	President Wade's first four years

Source: Author's computation

For instance, the export intensity index average 12.3 in the 1970s but jumped more than six fold to 79.97 during the 1980s, the period following the reinstatement of President Jawara by Senegalese troops and the confederation years. However the index dropped to 73.86 following the break-up of the confederation but before President Yahya Jammeh came to power. During the first four years of President Jammeh and last four of President Diouf, the index increased almost three fold to 185.45 on average. However the first four years of President Wade saw the index drop again to 105.46. The biggest jump of the index occurred during the Confederation years.

The results also show that when the Confederation ended, trade between Gambia and Senegal started declining and during this time, trade diversion towards Guinea Bissau and Guinea Conakry to some extent, was experienced. These trends were maintained over the 1990s until recently in 2004. Guinea Bissau exhibits extremely high indices that indicate its heavy reliance on re-exports from Gambia during this period. This is the period of political instability within Guinea Bissau and tense relations with Senegal; therefore there was heavy dependence on re-exports from Gambia. The indices for US, Japan and China, for the period they are available, are relatively small and indicate that Gambian exports to these countries are relatively insignificant in these economies.

3.3 Literature review of economic integration in Africa and gravity models

3.3.1 Economic integration in Africa

A review of the literature on economic integration in Africa, and then in West Africa, follows in this section. As indicated above, with the smallness of the African economies, especially within the context of the global village that the world has become, regional integration is one of the few options left to gain from globalization and compete effectively as blocks. It is within this context that many African countries have made forays into regional integration, some with limited success and some none at all. ECOWAS was formed in 1975 and it has more successes in the political front than forging economic integration. It has successfully intervened in Sierra Leone and Liberia to maintain peace. The Community of Eastern and Southern Africa (COMESA) and Southern African Development Community (SADC) have also had their limited successes. On the other hand, other integration efforts such as the Guinea-Ghana-Mali Confederation and the East African Community were not successful and eventually broke up. However the recent successes of the European Union and the North Atlantic Free Trade Area have fuelled a re-emergence of this trend. This notwithstanding, both supporters and critics of regionalism abound in the literature. Lawrence (1996) argues that neither past experience nor traditional trade theory provides an adequate guide to answering the questions as to whether regional agreements undercut or contribute to a more successful international economy. However, he acknowledges that regionalism is here to stay and keeping regionalism open must be a primary objective.

In supporting regionalism, Fernandez (1997) argues that trade agreements can serve a useful economic purpose beyond direct gains from trade liberalization by reducing uncertainties and improving credibility, making it easier for the private sector to plan and invest. They have the potential to confer on their members, several possible benefits including credibility, bargaining power, insurance, and a co-ordination mechanism. These incentives, Baldwin (1993) argues creates a "domino" effect, with outsiders wanting to be insiders and expanding the Preferential Trading Area (PTA). Baldwin (1994) further states that international trade arrangements have the potential to influence economic growth by encouraging the accumulation of factors. Trade, he says, affects growth mainly via its effects on investment in human, physical and knowledge capital, and closer economic co-operation improves the efficiency with which these productive factors are combined to produce output. Despite his pessimism of the benefits of African integration, Oyejide (1998) suggests that trade is important in widening markets, enhancing the division of labor, improving resource allocation and encouraging competition and product specialization. Larger markets, through integration, enable the exploitation of scale economies and increase access to technology. Together, these effects result in raising the level of factor productivity which, in turn, enhances overall economic growth. Oyejide (1998) acknowledged that this happens under effective trade liberalization. He further argued that "...a small population combined with low per capita income would place sharp limitations on the development and growth prospects within the limited market of each country, by restricting the ability to benefit from lower unit cost arising from the exploitation of the economies of scale and curtailing allocative efficiency gains that could have been generated by increased competition....". Arguing in favor of regional integration over global liberalization, he stated, "...Regional integration could be regarded as a more viable source than the (even larger) world market because of the anticipated problems of market access and the presumed higher transaction costs of producing for the world market...."

On the other hand, Bhagwati (1997), in criticizing regionalism, argued that the PTA policy is inferior to multi-lateralism, not only because it denies trading opportunities to outsiders, but because it may also be worse for members. Trade diversions may redirect trade from efficient to inefficient sources. He asserts that the proliferation of free trade areas has become a pox in the world trading system which he describe as a "...sphagetti-bowl of ever more complicated trade barriers, each depending on the supposed nationality of products...". Other researchers have shown that protection in PTAs reduces incentives for members to liberalize tariffs reciprocally for non-members. Levy (1995) finds that bilateral Free Trade Areas can undermine political support for a multilateral free trade area.

A great deal of empirical work has been done to analyse African integration efforts. Using OLS on the Almost Ideal System (AIDS) model devised by Deaton and Muellbauer (1980), Testas (1998) evaluated Algeria's integration into the North African Arab Maghreb Union (AMU) and found six out of the eight estimated coefficients statistically significant at 5% or better, an R^2 of 0.6, and no serial correlation. He also found that intra-regional (Algeria-AMU) trade price coefficients are smaller in absolute values than extra-regional (AMU-ROW) ones, where ROW is 'Rest of the World'. In principle, the smaller estimate of the price

coefficients for intra-regional imports means that larger changes in relative prices would be required to generate significant changes in trade shares. He also found the coefficient of income to be negative and one explanation he put forward is that Algerian imports from the AMU are necessities so that, as income grows, spending on intra-regional imports declines. He acknowledges that more research is needed in this area to determine whether the same conclusions can be reached on a more disaggregated level.

Economic integration is usually premised on the belief that member states can immediately respond to important demands from other members. In this regard, Omarah and Abou Lehaf (1997) argue that is therefore necessary to examine the extent to which the commodity composition of key items of the exports from African countries corresponds with the commodity composition of the imports of African countries that is important in eliciting short-run trade potential. The main objective of this study is to determine the relative intra-African potential, by country, relying on measures of export-import similarity by computing a trade potential index (TPI) (which measures the relative strength of the individual economies as suppliers to other African countries). They show that the potential for improving intra-African trade is rather modest, with only a few countries having export structures strongly matching the import demands of other African economies.

Other studies such as Wang and Winters (1998), and Testas (1998) agree with this assertion that the potential for intra-African trade is very small and suggest that Africa should open up to other regions if it is to benefit fully from international trade. Many trade models have been put forth to test the hypothesis that in Africa the export patterns of countries are so similar that the potential for intra-trade is small. These include (i) Production and Export Similarity Indices (PESI) (Koester 1986), (2) Relative Comparative Advantage (RCA) (Donges et al, 1982), (2i) Comparative Export Performance Measures (CEP) (Koester, 1986), and (iv) Trade Overlap Indicators (TOI) (Koester, 1986). Omarah and Abou-Lehaf (1997) highlighted the shortcomings of the above-mentioned trade models. They argued that although the PESI can show the extent to which the production (exports) of a pair of countries differ, it may not be totally right to conclude that such a dissimilarity is a sufficient condition for trade potential to exist. Differences in production structures may, in fact, reflect differences in consumer preferences, in which case production similarities, not dissimilarities, would be a valid measure of trade potential. This means that a better measure of trade potential is one that looks at the export structure of one country and the import structure of another one. As for the Relative Comparative Index, they argued that it is an insufficient indicator of specialization because of its high reliance on country-specific information. Government policies in exporting countries themselves can have a major influence on this index. Such a case would arise if specific exports were subsidized, if trade barriers produced major distortions in production incentives, or other government policies had a substantial export bias. As for the Comparative Export Performance (CEP) index, they argue that it might also not be a proper measure of trade potential, because higher values may suggest better comparative advantage but those greater than one already indicated that such an advantage exists. Moreover, the products to which the measure was applied (agriculture) are those that face the most protection and subsidization, limiting the effectiveness of the measure.

Rodrik (1998) explained the reasons why trade reform in Africa is so difficult. He argue that it entails a large magnitude of income redistribution in comparison with the efficiency gains of reform. He found that lowering tariffs from 40% to 10% would result in about 30 to 35% loss of real income to urban employers, a 41% loss in income for recipients of quota rents, but only a gain of 20% for farmers. Hence the net effect is a loss of social welfare. He also attributed the difficulty of trade reform to time inconsistency of government policies and incomplete information. On the other hand, Fouroutan (1998) blamed extreme ethnic diversity for the difficulty of trade reform in Africa.

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Winters and Zhen (1998) argued that African economies are closed to international trade. However, this is as much due to budgetary reasons as it is to the protection of domestic industries. Oyejide (1998) recognized that one of the key problems to trade is the reliance of many national budgets on tariff revenue. To overcome this dependency, incomes in these countries have to increase so that taxation would shift from trade to income. This would be possible if exports increased significantly. Many studies have advocated this view of outward export orientation for African economies, as was done in South East Asia.

On the West African front, Oguledo (1996) estimates the trade flow effects of ECOWAS by specifically investigating whether it can exert any influence on trade flows within the Economic Community using a gravity model. The results show that the ECOWAS-effect, proxied by the membership dummy and tariff variables, is significant in influencing trade flows within the community. The results also find conventional gravity model variables such as population size, income, and distance, as well as non-conventional variables such as prices (and tariffs) to be statistically significant in influencing trade flows within the community. To tackle the problem of data availability, Oguledo (1996) used cross-sectional data for 1979, and recognizing the limitations this puts on the results, he suggested that they be taken only as tentative and suggested further research as ECOWAS data collection techniques improve and more recent data become available. Also finding in favour of ECOWAS, Deme (1995) estimated the parameters of a multivariate trade flows model using panel data from 1975 to 1991. His result suggested that the regional integration scheme succeeded in increasing the trade flows between member countries.

However many other authors have questioned the effectiveness of ECOWAS to facilitate trade in the region. Hannik and Owusu (1998) used a trade intensity index and observed that trade flows within the region are strong only when considered in relative terms. A comparison of trade flows before and after ECOWAS, made them conclude that ECOWAS has not been effective in promoting trade.

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Despite his belief in regional integration, Oyijide (1998) went even further to question the potential benefits of African integration, arguing that the effects of African integration, at the regional level, would be very small for the following reasons. First, at the empirical level, gravity model simulations of trade flows between African countries, in the absence of trade restrictions, show them to be intrinsically modest. Second, results from gravity models suggest that intra-African trade is not low because of trade restrictions but rather because they are *naturally* low. Third, comparisons of trade ratios show worse results in situations where integration schemes have been established. However, it should be pointed out that many studies, such as Oguledo (1996), and Omarah and Abou-Lehaf (1997) produced static results because of data limitations.

The issue of integration continued to be the subject of many studies over the years. Earlier ones such as Okigbo (1967), Diejomaoh and Iyoha (1980), Enzewe (1983), Rimmer (1984), Asante (1986) and Lukacs (1987) were characterized by limited empirical depth. However, more recent studies such as Deme (1995), Oguledo (1996), Omarah and Abou-Lehaf (1998), and Testas (1998) used various models for in-depth empirical analysis of the impact of integration.

Despite this growing body of literature on economic integration in Africa and ECOWAS (West Africa) little has been written on economic integration between The Gambia and Senegal. This essay adds to this slim body by filling the information gap that exists on the Sene-Gambia Confederation.

3.3.2 Gravity models

Many trade models have been formulated to explain trade flows including the gravity model. Testas (1998) has shown that the impact of economic integration can be estimated through four methods - the residual imputation method, price wedge model, the gravity model and the Almost Ideal System of Demand (AISD) model. The residual imputation method involves the construction of a hypothetical anti-mode to represent trade in the absence of integration. The difference between this and actual trade is attributed to the effects of integration. The price wedge model uses an import demand function relating imports to income and the ratio of commodity import prices to prices of domestic supplies. The impact of economic integration then depends on the price elasticity of import demand over sources of supply and is governed by two main factors: (i) total expenditures on imports, and (2) an index of the prices of imports from different sources of supply. Deaton and Muellbauer (1980) show that when the conditions of adding-up, homogeneity and symmetry are met, the model can be handled by ordinary least squares (OLS) techniques and can be estimated separately for each supplier. However, Winters (1984, 1985, 1987) and Brenton and Winters (1992) have shown that this model is not necessarily superior as it often leads to convergence difficulties and other related problems.

In spite of all these trade models, the gravity model has been the workhorse of trade economists in explaining the behaviour of trade flows; however, this too has not been without its criticisms. Porojan (2000) catalogues the criticisms of the gravity model in the literature. The initial criticism levied against the gravity model was related to the lack of theoretical foundations (Lerner 1994), but this was later dispelled by the work of Baldwin (1994). Notwithstanding, Evenett and Keller (1998) show that much of the success of the gravity equation relies on increasing-returns-to-scale-based theories of trade. Their analysis is, however, focused on the proportionality of the volume of trade to the trading countries' incomes and not on its relationship to trade resistance or on the role of the demand side. Concentrating more on the role of distance, Asilis and Rivera-Batiz (1994) developed a geographical theory of interregional trade in which space plays a central role. This paper extends and formalizes the basic elements of the gravity model, making location endogenous, and examining how trade is brought about by the interaction between size, distance and

divergent regional productive sectors. Essentially, in this model trade occurs as a result of the endogenous geographical dispersion of factors of production and population. Similarly, Bougheas, Demetriades and Morgenroth (1999) introduce infrastructure in the bilateral trade model and show that location and endowment (income) play a decisive role in determining whether two partner countries will decide to enhance their trading opportunities by developing (transport-cost-reducing) infrastructure. On the empirical side, Polak (1996) is concerned with the misspecification and inbuilt bias (downwards for 'far-away' countries and upwards for 'close-countries). He is joined by Hamilton and Winters (1992) in calling for a more differentiated measure of distance, a point taken on by Brulhart and Kelly (1999) who included a remoteness indicator in their OLS estimation.

Questioning the appropriateness of the widely used 'highly restrictive log-linear specifications' of gravity models, Fik and Mulligan (1998) suggest the use of the Box-Cox transformations. They show that parameter estimation bias comes from both inappropriate choice of explanatory variables and functional misspecification. Nevertheless most authors continue to estimate and report OLS estimates for the standard model, ignoring the misspecification caused by the nature of the measurement problems associated with data collected for aggregate spatial units and by the implications of violated standard assumptions that underlie regression analysis.

Porojan (2000) revisits the gravity model in the light of increasingly acknowledged findings of spatial econometrics and interprets the results in view of some recent theoretical developments from the economic literature that contribute to its foundation. The author argues that when the inherent spatial effects are explicitly taken into account, the magnitude of the estimated parameters changes considerably and, with it, the measures of the predicted trade flows. He explores the empirical performance of the gravity model when the inherent spatial effects are explicitly accounted for within the framework of spatial econometrics. The emphasis is on the size and significance of the estimated parameters, given the practical relevance of the

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calculated potential trade flows they generate. Using predicted trade flows for the EU and for some of its potential members, he finds that the traditional formulation seriously overestimates the size of the trade flows to and from 'island' countries, while underestimating it for countries that have trading neighbours. Moreover, the large explanatory power of regional trading bloc membership dummy variables vanishes when spatial effects are included in the model specification. The overall performance of the alternative specification proposed is superior to the currently prevailing one. He concludes that the spatial econometrics approach to estimating the gravity model of trade changes the perspective on the results traditionally reported in the literature. He further argues that when the spatial effects inherent in nature of the data used for estimation are incorporated in the analysis, substantial changes occur in both the magnitude and statistical significance of the estimated parameters. This amounts to a change in the empirical foundations of the policy decisions based on such modeling of trade.

Using a modified gravity model to identify separate effects of PTAs on intra-bloc trade, members' total imports and their total exports, and to test for significant changes in trade patterns following the creation of the trade blocs, Soloaga and Winters (2000) finds no indication that new regionalism boosted intra-bloc significantly and found trade diversion only for EU and EFTA.

Working on the deterrence attributes of a panel gravity model, distance which is allowed to change over time for 130 countries over the period 1962-96, in a standard specification, in which transportation costs are proxied only, Soloaga and Winters (2000) paradoxically find that the absolute value of the elasticity of bilateral trade to distance has been significantly increasing. They attribute the result to a relatively larger decline in costs independent of distance than in distance-related costs (e.g. oil price). They also find that an extended version of the model that controls for these two factors eliminates this positive trend without reversing it. However, when they split the sample into two groups (rich-rich and poor-poor), the paradox is maintained for the poor-poor group. While not conclusive, these results are

consistent with the view that poor countries may have been marginalized by the current wave of globalization.

Analyzing the impact of various regional economic agreements in Europe on the intensity of trade between European countries, Alho (2004) uses the classical gravity model to reach a more systematic view on the impact of regionalism on the intensity of mutual integration through trade in Europe. He finds that European trade is significantly influenced by various regional agreements, and that intensities of trade are strongly asymmetric between the regions. The European Monetary Union (EMU) has a positive impact on bilateral trade intensity and its effect on total European trade of its member countries is also significantly positive. Both between the EU and CEE countries there are, respectively, significant differences with respect to the intensity in this trade. Alho (2004)'s results are similar to Rose and van Wincoop (2001): the trade intensity prevailing within the Euro area is some 50% higher than that prevailing within the EU single market, and this difference is statistically significant.

Modeling the effects of increased patent protection and property rights on bilateral trade flows, Fink and Braga (2004) used a conventional gravity model to capture the effects of preferential trading agreements and also included separate dummy variables for the European Community (EC), the European Free Trade Agreement (EFTA), the Latin American Integration Association/Latin American Free Trade Association (LAIA/LAFTA), the Association of South East Asian Nations (ASEAN), and the Central American Common Market (CACM). They find that the Intellectual Property Rights (IPRs) have a significantly positive impact on bilateral trade flows for both total non-fuel imports and exports because their inclusion leads to relatively small changes in the coefficients of most of their gravity variables. The biggest changes occur in the coefficients on GDP and populations of the destination country of the trade flow. These changes can be explained by the strong correlation between the strength of IPRs protection and the level of economic development as measured by per capita GDP. Economic integration for small states like the Gambia and Senegal is not always easy because of the tendency of the bigger partner(s) with already established industries to flourish at the expense of the smaller partner, but the potential for economies of scale and other benefits that the smaller partner may enjoy makes integration a necessary condition for survival in the competitive markets. The gravity model is used in this study because economic literature has very few models and it has therefore been the workshop of trade analysis. The gravity models is versatile and can be specified in many forms (for example using dummy variables) which makes it a strong a candidate to analyze trade facilitation effects of the Sene-Gambia Confederation on The Gambian economy and the effects of supply-side constraints to production.

3.4 Theory of gravity model, data and research methodology

3.4.1 Theoretical background of the error-corrected gravity model

Theoretically, gravity models are specifications of spatial interaction processes between populations of two centers, communities or regions – an origin and a destination. A gravity model specifies the functional relationship between the attributes of both points and those that will deter movement between the two points. The basic gravity hypothesis asserts a multiplicative relationship between interaction frequencies and the effects of origin, destination, and separation attributes. The interaction processes specified by the gravity model is modeled by many authors, including Sen and Soot (1981), Porell (1980) and Deme (1995), as

$$T_{iij} = A(i)_{t} B(j)_{t} F(d_{ij})_{t}$$
(3.2)

where T_{ijt} = movement of goods from region *i* to region *j* at time t

 $A(i)_t$ = origin weight functions (which may involve locational attributes other than population size, and which may contain any relevant dimensional constants of the origin country) at time t

- $B(j)_t$ = destination weight functions (which may also involve locational attributes other than population size, and which may contain any relevant dimensional constants of the destination country) at time t
- $F(d_{ij})_t$ = determence function at time t.

Each of the three components of the gravity model, $A(i)_t$, $B(j)_t$ and $F(d_{ij})_t$, can have its own functional specification. There are three theoretical approaches of gravity models; deterministic, probabilistic and minimal. The deterministic approach is utility-based and was first proposed by Niedercorn and Bechdolt (1969), in which spatial interaction behaviour is modeled within the classical utility-maximizing behavior of actors subject to the usual budget constraints. The probabilistic approach uses the assumption that if probabilistic variations in micro-interactions are assumed to depend only on average interaction costs and activity levels, then gravity models of the exponential type asymptotically approximate the most probable patterns of macro-interaction frequencies. The minimal theories approach stipulates sets of necessary and sufficient conditions for the existence of the gravity model representation.

If all actor attributes of each origin (X_{ii}) , and all relevant opportunity attributes of each destination (Z_{jin}) are represented by positive measures, then the respective origin and destination functions are represented as

$$A(i)_{t} = \prod_{t \neq T} (x_{it})^{r_{t}}$$
(3.3)

$$B(j)_{t} = \prod_{w \not \perp \Omega} (z_{jw})^{s_{w}}$$
(3.4)

Where r_t and s_w are parameters to be estimated.

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In a similar vein, the deterrence functions can be specified to reflect the attitudes towards spatial separation. They can be either ordinal, as in the case of "cultural separation" or measurable, as in the case of the expenditures on time and money. It can have a power, exponential or multivariate specification. The power specification is inappropriate for modeling interactions involving small cost values (see Fotheringham and O'Kelly(1989)).

This means that the mean interaction activity between origins and destinations with very small values of interaction costs must be overwhelmingly larger than all other mean interaction levels. But this type of behavior is not generally observed. The exponential specification resolves the 'small distance problem' without requiring additional parameters, whilst the multivariate specification can be extended to involve multidimensional profiles of interaction costs. The exponential specification is used in our error corrected gravity model.

3.4.2 Data, availability and problems

The variables used in this study are exports from Gambia to Senegal, the average labor productivity in The Gambia, domestic absorption in Senegal, private sector credit in The Gambia, a trade diversion index, and a dummy variable. This is a time series analysis and the coverage is from 1970 to 2004. As explained above the main element for this chapter is the estimation of an error-corrected gravity model using co-integration analysis to establish a stable long-run relationship between exports from The Gambia to Senegal and the other independent variables mentioned above. This will then inform the significance of the confederation to the Gambian economy. Data are sourced from various sources, the main ones being from the Central Statistics Department of the Ministry of Finance and Economic Affairs in The Gambia, *International Financial Statistics* and *Direction of Trade Statistics* of the International Monetary Fund (IMF), *Statistics Database* from World Trade Organisation, *Penn World Tables, and US Bureau of Statistics Trade database*.

Exports from The Gambia to Senegal are the dependent variable of this model. This comes from the Trade data of the *Central Statistics Department* in The Gambia and had missing data points for 1970, 1971 which are replaced by the 1972 figure The Gambian exports to other countries are derived from the Direction of Trade Statistics (DOTS) of IMF.

The ratio of Gross Domestic Product (GDP) at factor cost to employable labor force is the proxy for average labor productivity in The Gambia, the attribute of the origin function. A

more popular measure is the ratio of GDP to the actively employed population, but the lack of complete data on the latter series prevented the use of the variable. Average labor productivity is not a common attribute in most gravity models in the literature, as many studies such as Oguledo (1996), Deme (1995) and Baldwin (1994) use population instead. One problem with using population is its implied assumption that the productivity of the population is exogenous and that a positive correlation exists between population size and exports. This implies that all those in the origin country are assumed to be equally productive, and the larger the population, the more responsive its exports can be to increased demand. This does not always hold, as two regions with the same population size but different productivity levels, can respond differently to the same opportunities. Coupled with income levels, the latter determines to what extent a society can respond to an increased demand for exports. The "quality" of the population, as manifested by the productivity of the population, is more important to a country than its size.

GDP at factor cost is collected from national sources and complemented by *International Financial Statistics* of the International Monetary Fund. Data on annual population, its growth rates, and labor force are also derived from national sources and complemented by *Penn World Table* data and FAO data. Whereas the first two series are reported annually, labor force data is reported at five-year intervals. As a result, population data for in-between periods are intra-polated as the product of current population and the ratio of last year's labor force to last year's population, i.e.,

$$LF_{t} = popn_{t} * \frac{LF_{t-1}}{Popn_{t-1}}$$

Where

LF_t = Labour force at time t Popn_t = Population at time t LF_{t-1} = labour force at time t-1 Popn_{t-1} = Population at time t-1 (3.5)

Domestic absorption in Senegal, the attribute of the destination function, is the difference between the output and net exports. [See Abel, Bernanke and Smith 1995, p.157-8]

$$Y = C^{d} + I^{d} + G + NX$$
(3.6a)

$$NX = Y - IC^{d} + I^{d} + GI$$
(3.6b)

$$= Y - Domestic Absorption$$
(3.6c)

 $\therefore Domestic Absorption = Y - NX$ (3.6d)

This series is extracted from IMF's Appendix Statistics of Senegal Country Reports.

Private sector credit is one of three attributes of the deterrence function, and helps to proxy the extent of financial deepening in The Gambia. It is one of the supply-sided constraints that The Gambia and other African countries are currently facing. Oyejide (1998) acknowledged that the 'hub-and-spoke' trade pattern that exists between Africa and Europe is caused, in part, by high trade costs between African countries. Only the drastic reduction of these trade costs can enable African markets to be large enough to become 'hubs' in their own right. Economic integration should thus lower these trade costs within Africa. A proxy for these constraints is the 'claims on the private sector' in the monetary survey of the *International Financial Statistics*.

The second attribute of the deterrence function is the trade diversion index, for which the ratio of Guinea Bissau imports to world imports is a proxy. This is because the trade intensity analysis shows that most of the trade that is being diverted from Senegal, as the latter clamped down on imports from the Gambia was going to Guinea Bissau showing incredibly high export intensity indices.

The dummy variable is the third attribute of the deterrence function and is specified as unity for the years when the Sene-Gambia Confederation was in existence (1982 to 1989) and zero otherwise (from 1970 to 1981 and from 1990 to 2001). The Confederation dummy is used in the deterrence function to assess the facilitation effects of the Confederation (see Deme (1995)). As mentioned above, one of the objectives of the Sene-Gambia Confederation was to eventually integrate both economies so as to enhance their growth and development.

Data availability has been one of the main challenges of this study. Missing data arising from infrequent surveys was a problem and has resulted in some more desirable series not used in the study. For instance, the proportion of the population with secondary education was considered as another attribute of the origin function because it enhances the "quality" of the population. This derives from the assumption that when two countries have the same population size, the one with the more educated labor force is more likely to respond more effectively to increases in export demand. However, missing secondary education data for a significant part of the period under review led to its exclusion from the study. Underreporting, especially of exports, is also a common challenge for data accuracy. This is because the porous nature of the Senegal-Gambia border allows unrecorded trade to flourish. To the extent possible, deliberate efforts have been made to collect data from international sources such as IMF and WTO. Although data reliability in African countries is always a concern, policy formulation is still being conducted in these countries and therefore there exists the information space for the results of this study. In response to this paucity of data the support being given by cooperating partners in these countries are increasingly being directed at capacity development in statistical analysis.

3.4.3 Methodology

The methodology adopted in this chapter is in three steps.

Step I – Testing for stationarity

Being a time series study, the problem of spurious regressions is avoided by testing each series for stationarity using the *Augmented Dickey-Fuller* (ADF) unit root test and doing the appropriate corrections. Unit roots were found in each of the series.

Step 2 - Testing for co-integration

After testing for stationarity and the series reduced, co-integration analysis is undertaken in which the number of co-integrating equations, i.e. the number of stable long-run relationships that exist for the variables, are determined. This is done using the *Johansen Co-integration test*.

Step 3 - Estimating the error-corrected gravity model

The resulting normalized coefficients are used to derive the error correction terms of the errorcorrected gravity model. The number of co-integrating equations identified by the likelihood ratio test is used to ascertain the number of error correction terms that are incorporated into the model. Using error correction terms, a model is estimated for the The Gambia. The coefficients and signs of the supply-side constraint, the trade facilitation index and the Confederation dummy variable then becomes the focus of the interpretation of the results.

3.5 Specification of the error-corrected gravity model

As explained above, the raison d'etre of this chapter is to model policy variables into a trade model for The Gambia to test the significance of supply-side constraints, trade facilitation, and the Confederation on The Gambian economy. The key focus of the study is therefore on the three policy variables of the deterrence function. As for the attributes of the destination country (Senegal), the model uses the attribute of domestic absorption of Senegal. For Gambia, instead of population, the average labour productivity is used. The origin function is thus specified as

$$A(i)_{t} = e^{\alpha_{0}} X_{1t}^{\alpha_{1}}$$
(3.7)
Where

 $A(i)_{t}$ = origin function origin function at time t

 X_{1t} = average labor productivity at time t

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$$B(j)_{t} = X_{2t}^{\alpha 2}$$
(3.8)

Where $B(j)_t$ = destination function at time t

 X_{2t} = domestic absorption at time t

A potential attribute that has been used extensively in the literature is per capita GDP, however its closeness to domestic absorption, through GDP, may have created problems of multicollinearity and is therefore not used in his study.

The deterrence function is specified in exponential form of the three attributes as:

$$F(c_{ij})_t = \exp[Cr_t] \exp[DV_t] \exp[-DM_t]$$
(3.9)

where $F(c_{ij})_t$ = determined function at time t

 $Cr_t = private sector credit at time t$ (supply-side constraints: extent of financial deepening)

 DV_t = trade diversion index at time t

 DM_t = dummy variable for confederation

= 1 if Confederation was in existence in that year

= 0 otherwise

Therefore the consolidated gravity model is:

$$E_{iit} = \prod_{i} e^{\alpha_0} X_{1t}^{\alpha_1} X_{2t}^{\alpha_2} exp[Cr_i]_t exp[DV_i]_t exp[-DM_i]_t$$
(3.10)

Where E_{ijt} = exports from country *i* (The Gambia) to country *j* (Senegal)

 X_{it} = as specified in the above functions

exp(...t = as specified above

Unit root tests indicated that trade diversion index is stationary, exports, domestic absorption and credit to the private sector are non-stationary and integrated to order one, which average labour productivity is non-stationary and integrated to order three. Therefore the model specified as in (3.11) is estimated.

$$\Delta \ln E_t = \alpha_0 + \theta_1 \Delta \ln E_{t-1} + \alpha_1 \Delta \Delta \Delta \ln ALP + \alpha_2 \Delta \ln AB + \beta_1 \Delta Cr + \beta_2 DM + \beta_3 DV$$
(3.11)

The co-integration tests revealed two co-integrating equations for the model. The number of co-integrating equations and the corresponding error-correction terms are then used to make (3.11) a more efficient model by re-specifying and loading it with the required error-corrected terms as in (3.11°) .

$$\Delta \ln E_{t} = \alpha_{0} + \theta_{1} \Delta \ln E_{t-1} + \lambda_{1} ECTG_{1} + \lambda_{2} ECTG_{2} + \alpha_{1} \Delta \Delta \Delta \ln AL + \alpha_{2} \Delta \ln AB$$
$$+ \beta_{1} \Delta cr + \beta_{2} DV + \beta_{3} DM \qquad (3.11)'$$

Where $E_t = nominal value of The Gambian exports to Senegal$

 ECT_i = respective error-correction term

LG = average labor productivity of The Gambia

AB = domestic absorption for Senegal

Cr = credit to GDP ratio for The Gambia

DV = Trade diversion index

DM = dummy variable for confederation

3.6 Empirical analysis – unit root tests and co-integration analysis

In this section we undertake the empirical analysis. First the unit root tests are done on each series using the ADF, which is followed by a co-integration analysis to determine the number of co-integrating equations and therefore the number of error correction terms needed to stabilize the model. Finally the error-corrected gravity model is estimated.

3.6.1 Unit roots tests – testing for non-stationvarity

As explained above, the stationarity of each series is tested by examining the presence of unit roots in any of them using the Augmented Dickey-Fuller tests. This is done for each series until the order of integration of the variable is determined. The first of these tests is the nominal values of the series. When this test reveals that the series is stationary, i.e. the ADF test statistic is equal to or more than the MacKinnon critical values (MCV) for the rejection of hypothesis of a unit root, then that series is integrated to the order zero, I(0). On the other hand if it is non-stationary, i.e., ADF > MCV, then a second test on its first difference is done. If the series becomes stationary at this stage then it is integrated of order one, I(1). Similarly, when the series is still non-stationary, its second difference is then tested and if it becomes stationary at this stage then it is integrated of order two, I(2). If not, then its third difference is tested and this continues until he series becomes stationary. Detailed results of this are presented on table 3.5. Table 3.5: Detailed results of Augmented Dickey-Fuller unit root tests

	ADF	1% Adj		DW	Integration
	Statistics	CV	R ²	Statistic	Order
Exports					
Test I	-3.607	3.640	0.323	1.997	I(1)
Test II	-6.020	3.650	0.664	2.072	
Average Labour Productivity					
Test I	3.419	3.650	0.308	1.385	I(3)
Test II	2.026	-3.658	0.551	1.924	
Test III	-3.240	-3.666	0.795	1.844	
Test IV	-9.712	3.675	0.936	1.630	
Credit					
Test I	0.518	-3.642	-0.028	1.734	I(1)
Test II	-6.960	-3.658	0.610	2.447	
Domestic Absorption					
Test I	-1.219	-3.642			
Test II	-4.316	-3.658	0.533	2.037	I(1)
Trade Diverson Index					
Test I	-3.708	-3.642	0.297	2.077	I(0)

Source: Author's Computations

Notes

Test I - levels, Test II - first difference, Test III - second difference, Test IV - third difference

The results show that exports are marginally stationary at 5% but not at 1%, with an Augmented Dickey-Fuller (ADF) test statistic of -3.607 compared to the MacKinnon critical values (MCV) of -3.640. However its first difference is stationary with ADF of -6.02 compared to MCV of -3.65 which indicates that it is I(1).

For average labor productivity, the ADF test statistics are less than the MacKinnon critical values for tests I, II and III, but is stationary after the third difference with a ADF statistic of - 9.71 compared to a MCV statistic of -3.65 indicating that average labour productivity is I(3). Domestic absorption is only stationary in its first difference form with an ADF test statistic of -6.96 compared to the MCV of -3.658. Hence, this series is I(1). Credit is also found to be stationary at its first difference with a ADF statistic of -4.316 compared with a MCV statistic

of -3.658. Therefore credit is I(1). The trade diversion index is found to be stationary at its nominal levels with a CV of -3.7 compared to a MCV statistic of -3.6, and so this is I(0).

3.6.2 Co-integration analysis – testing for long-run equilibrium

As indicated above, all series except trade diversion index exhibit non-stationarity and are integrated on a higher order. To help determine the number of co-integrating equations, the option chosen is to examine all possible combinations of rank and intercepts trends. Testing under the assumption of the presence of a linear data trend, coupled with an intercept, identifies two co-integrating equations at the 5% significant level. Detailed results are presented on the annex tables.

3.6.3 Estimation of error-corrected gravity model

The error-corrected gravity model (3.11') is estimated and the results presented in Table 3.6.

The results show that domestic absorption, the Sene-Gambia Confederation, and supply-side

Variable		Coefficient	Std. Error
	C	1.175376	0.423764
	DLNE(-1)	-0.058018	0.149572
Average labour productivity (The Gambia)	DDDLNLP	0.213565	0.65449
Domestic absorption (Senegal)	DLNAB	4.018081	1.974666
Confederation dummy	DM	15408.84	3019.539
Trade diversion index (Guinea-Bissau)	DV	5141.936	11588.34
Private Sector Credit (SS-side Constraint)	DCR	0.038136	0.007575
Error correction term 1	ECT1	-0.002949	0.029854
Error correction term 2	ECT2	0.73207	0.140316
R-squared	0.613499		
Adjusted R-squared	0.472954		
F-statistic	4.365122		
Prob(F-statistic)	0.002836		
Durbin-Watson stat	2.37179		

Table 3.6 - Estimation Results

constraints are statistically significant in The Gambian trade model. On the other hand, trade diversion and average labour productivity in The Gambia are found to be statistically insignificant. The adjusted R^2 is 0.47 and the DW statistic is 2.371. The results are interpreted in section 3.7. The results can be summarized into equation (3.12) as

$$\Delta \ln E_{t} = \frac{1.17 - 0.06}{(2.77)} \Delta \ln E_{t-1} + \frac{0.21}{(0.32)} \Delta \Delta \Delta \ln LP_{t} + \frac{4.02}{(2.03)} \Delta \ln AB_{t} - \frac{0.003}{(0.09)} ECT_{1} + \frac{0.73}{(5.21)} ECT_{2} + \frac{15408DM_{t}}{(5.10)} + \frac{5141.94}{(0.44)} DV_{t} + \frac{0.04}{(5.03)} \Delta DCR_{t}$$
(3.12)

Adjusted $R^2 = 0.473$.

3.7 Interpretation of results

The results of the estimation show the key policy variables to be very significant in the trade model for The Gambia that can help in the integration dialogue.

Average labour productivity in The Gambia is one of the variables that have been found to be statistically insignificant with a t-ratio of 0.32 but a positive coefficient of 0.21. What this result means is that the productivity of Gambians did not come into play in the trade that was going on between The Gambia and Senegal. This can be understood from the point that most of this trade is on re-exports which are not produced in The Gambia. The re-exports are the difference between total imports and that consumed in The Gambia. These exports are produced elsewhere, mainly from Asia, and are received and re-shipped from Banjul. There is, therefore, no value added to the production of these exports in The Gambia which would have required labour productivity. Therefore the productivity of The Gambians is statistically insignificant in The Gambian trade model with exports as a dependent variable, a significant proportion of which are for re-exports. One might have been tempted to drop the productivity variable and re-estimate the model with another attribute of The Gambia. However, the result in itself is of policy relevance for The Gambia, which has for a long time depended on reexports, which in some cases has caused friction with Senegal. The results are confirming apriori thoughts that the re-export trade, besides creating fiscal space for The Gambia, is of little strategic importance to productivity in the economy. This policy relevance is why the model is left intact with findings on labour productivity.

On the other hand, domestic absorption in Senegal has been found to be positive with a coefficient of 4.01 and statistically significant with a t-ratio of 2.03. It means that an increase in domestic absorption in Senegal will result in a corresponding increase in demand for Gambian exports. To be specific, for every unit increase in domestic absorption in Senegal, there will be four units increase in Gambian exports to Senegal. The coefficient of the Confederation dummy is also positive at 15408.8 and statistically significant with a t-statistic of 5.103. The results therefore show that The Gambia benefited from the Sene-Gambia confederation and it was therefore positive for the Gambia. It could therefore be interpreted with a strong level of confidence that the Sene-Gambia Confederation had strong trade facilitation effects for The Gambia. The results show that trade diversion, as proxied by

increasing Gambian exports to Guinea Bissau is statistically insignificant in explaining The Gambian trade model, although it has a positive coefficient t-ratio of 0.44.

Financial deepening has been strongly identified as a significant variable in The Gambian trade model. With a positive coefficient of 0.04 and t-statistic of 5.03, the results show that for every unit increase in private sector credit in The Gambia, re-exports to Senegal will increase by 400 units. The model has captured the fact that most of the trade is financed by commercial banks. The more credit available the more is imported into The Gambia to be re-exported. The more holistic interpretation of this result is that for trade in the Gambia to flourish, there needs to be a more deepened financial sector in the Gambia. This means that supply-sided constraints to trade are statistically significant to trade in The Gambia and thus needs to be adequately addressed to facilitate trade sector.

CHAPTER 4

Summary, conclusions and policy recommendations

4.0 Introduction

This chapter presents a summary of the two studies with their conclusions as well as the corresponding relevant policy recommendations. As stated above the aim of this thesis is to empirically assess the readiness of The Gambia for regional integration as the proposed ECOWAS monetary union for 2011 draws near. This is accomplished through two studies. The first is an assessment of the optimality of the Sene-Gambia as a currency area using three methodologies – a reduced form structural vector autoregression model (VAR), the theory of generalized purchasing power parity (GPPP), and a number of other criteria used in the literature on other countries (chapter 2), whilst the second study draws from Gambia's experience during the Sene-Gambia Confederation by assessing the effects of the Confederation on its economy (chapter 3).

4.1 Summary of essay on optimality of Sene-Gambia as a currency area

In summary, output growth in both The Gambia and Senegal responds to price shocks from the US and UK in a similar manner. Price increases in these countries result in a decrease in output growth. However, price increases in France have different effects. They increase output growth in Senegal but decrease output growth in The Gambia. With regards to price shocks from the US and UK, the two economies respond differently. Price increases in the US and UK decrease prices in The Gambia but increase prices in Senegal. However, price increases in France directly affect the two economies by increasing prices in both The Gambia and Senegal.

With respect to the GPPP model, the results show that there is one co-integrating equation between the exchange rate and the consumer price indices of the two countries with either a deterministic trend or no trend. This being a condition for forming an OCA, the results support the optimality of the Sene-Gambia region as a currency area. With regards the five criteria of the third method, three of them support the optimality of subregion as a currency area whilst the other two are mixed. Although Senegal is relatively more open than The Gambia, they are bone open to international trade which supports optimality. However, with regard to the cyclical co-variance, both the output and nominal interest rates of the two countries exhibit positive co-variance but money supply and real interest rates exhibit negative co-variance. This result is mixed.

The inflation rates for Senegal and The Gambia are very similar, with the average for both countries falling below 5% for the three decades under study which also supports optimality. Regarding the structures of the economies, the Senegalese economy is many times bigger than that of The Gambia and has a larger industrial base. As argued above, although the size of the economy matters, efficiency of the economies is more important as explained about the soap industry in Gambia. This result is interpreted as mixed although it could be said to lean more towards optimality.

The final criterion used in this study is based on political considerations. The experience between the countries explained above shows that political considerations can positively influence any outcome in the sub-region. This could be a qualified support for optimality.

4.2 Summary of essay on the trade facilitation effects of the Sene-Gambia Confederation on The Gambian economy

The third chapter specifies an error-corrected gravity model to assess the trade facilitation effects of the Sene-Gambia Confederation on The Gambian economy. Additionally it also examines the significance of financial deepening (proxy for supply-side constraints) to the economy. The study is undertaken in three steps: testing for stationarity using the Augmented Dickey-Fuller (ADF) unit root test; testing for co-integration using the Johansen Co-integration test to find the existence of stable long-run relationships; and estimating an error-

corrected gravity model in which with average labour productivity is the attribute of the origin function, domestic absorption in Senegal is that for the destination function with supply-side constraint, the trade facilitation index and the Confederation dummy modeled in the deterrence function.

The results of the estimation show the key policy variables to be very significant in the trade model for The Gambia. These can help in the integration dialogue. Average labour productivity in The Gambia is one of the variables that have been found to be statistically insignificant because it does not play any role in the production of these re-exports which are produced mainly in Europe or Asia. On the other hand, domestic absorption in Senegal has been found to be positive and statistically significant which means that an increase in domestic absorption in Senegal will result in a corresponding increase in demand for Gambian exports. To be specific, for every unit increase in domestic absorption in Senegal, there will be four units increase in Gambian exports to Senegal.

The coefficient of the Confederation dummy is also positive and statistically significant which show that The Gambia benefited from the Sene-Gambia confederation. This si accentuated by the statistical insignificance of the trade diversion index, proxied by increasing Gambian exports to Guinea Bissau. It could therefore be interpreted with a strong level of confidence that the Sene-Gambia Confederation had strong trade facilitation effects for The Gambia.

Financial deepening has been strongly identified as a significant variable in The Gambian trade model which means that for trade in the Gambia to flourish, there needs to be a more deepened financial sector. This means that supply-sided constraints to trade are statistically significant to trade in The Gambia and thus needs to be adequately addressed to facilitate trade sector.

4.3 Conclusions

With regard to the optimality of a currency area, the conclusion is that one method or criterion should not be the only basis for determining the optimality of a currency area. Even within one method such as the "Other criteria" method, which used a number of criteria, the results were not the same. In general, the sum effects of the results of all three methods combined support the optimality of the Sene-Gambia region as a currency area. Where the pronouncement from method 1 is mixed, that of method 2 gives a categorical yes, while that of method 3 leans more towards optimality than not. The preponderance of the results supports the optimality of the Sene-Gambia region as a currency area.

With regard to the Sene-Gambia Confederation, the conclusions of the study are that it was positive for The Gambia to join, despite previous perceptions to the contrary, especially in The Gambia. Furthermore economic integration can work for The Gambia. Therefore the aim of the 7th Annual Summit of the African Union Heads of States for an integrated African continent should also be an objective that The Gambia should effectively pursue. What is interesting is that the political reasons for the formation of the Confederation were more prominent and, therefore, clouded the economic benefits. The fact that the constitution only allowed the President of Senegal to assume the Presidency of the Confederation and did not allow for a rotation of the Presidency was always troubling for Gambians. Therefore, it was not surprising that this clause finally sealed the fate of the Confederation as Senegal refused to renegotiate the constitution. Because the results of such studies were unavailable at the time, the Gambia was not in a position to know the full benefit it was getting from the Confederation. Another conclusion of this study is that financial decenning of The Gambian economy is very critical for its effective participation in trade. This is one of the supply side constraints that the economy has to relax in its poverty reduction efforts.

4.4 Policy recommendations

The limitations of this study are similar to those of previous empirical studies on the issue of economic integration in West Africa: data problems. Although more data is available nowadays, the comprehensiveness of the data needed for more meaningful cross-country analysis is lacking. Different countries have different priorities and, unfortunately, data collection and compilation do not feature prominently in these countries. As a result, missing data characterize these studies. However, studies on an issue as important as economic integration in Africa cannot wait for the day that near-perfect data are available. While waiting for such a day, studies such as this one are still useful but have to be interpreted with the caution. The policy recommendations that can be put forth based on the results of the study are:

- 1. The Gambia can join the ECOWAS single currency, and work for further integration of its economy with others to enable her benefit from globalisation. It should also work towards a single currency in Africa and the integration of these economies, as this will enable the Gambia make use of the economies of scale, that the 600 million African population can offer as a market as opposed to its 1.5 million.
- 2. The Gambia should mainstream trade into its MDG-based national development plan. The country's exports in the recent past have been declining and therefore there should be deliberate policy interventions to enhancing the competitiveness of its exports.
- 3. The Gambia should deepen the financial sector with the explicit purpose of providing credit for long-term private sector investments in the productive and manufacturing sectors. This should be consciously linked to the amount of employment created. This should also include the cataloguing all such supply-side constraints confronting exports in The Gambia, and deliberate policy interventions put in place to address them.

The study show that the average labour productivity of Gambians is not significant in this trade model as no value is added to re-exports. This tends to confirm apriori reasoning that very little value is added to re-exports before being re-exported to other countries. It is therefore recommended that The Gambia enter into a strategic partnership with Senegal and other countries in the sub-region to their mutual benefit. Industries in one country should be supported by policies in the other. The trade policy should aim at promoting exports from the sub-region to the rest of the region as well as Africa.

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Appendix A – Millennium Development Goals, Targets and Indicators

Goal 1. Eradicate extreme poverty and hunger

Target 1: Reduce by half the proportion of people living on less than a dollar a day Indicators

1. Proportion of Population below \$1 (PPP) per Day (World Bank)

2. Poverty Gap Ratio, \$1 per day (World Bank)

3. Share of Poorest Quintile in National Income or Consumption (World Bank)

Target 2: Reduce by half the proportion of people who suffer from hunger Indicators

4. Prevalence of Underweight Children Under Five Years of Age (UNICEF)

5. Proportion of the Population below Minimum Level of Dietary Energy Consumption (FAO)

Goal 2. Achieve universal primary education

Target 3: Ensure that all boys and girls complete a full course of primary schooling

Indicators

6. Net Enrolment Ratio in Primary Education (UNESCO)

7. Proportion of Pupils Starting Grade 1 who Reach Grade 5 (UNESCO)

8. Literacy Rate of 15-24 year-olds (UNESCO)

Goal 3. Promote gender equality and empower women

Target 4: Eliminate gender disparity in primary and secondary education preferably by 2005, and at all levels by 2015

Indicators

9. Ratio of Girls to Boys in Primary, Secondary, and Tertiary Education (UNESCO)

10. Ratio of Literate Women to Men 15-24 years old (UNESCO)

11. Share of Women in Wage Employment in the Non-Agricultural Sector (ILO)

12. Proportion of Seats Held by Women in National Parliaments (IPU)

Goal 4. Reduce child mortality

Target 5: Reduce by two thirds the mortality rate among children under five Indicators

13. Under-Five Mortality Rate (UNICEF)

14. Infant Mortality Rate (UNICEF)

15. Proportion of 1 year-old Children Immunised Against Measles (UNICEF)

Goal 5. Improve maternal health

Target 6: Reduce by three quarters the maternal mortality ratio

Indicators

16. Maternal Mortality Ratio (WHO)

17. Proportion of Births Attended by Skilled Health Personnel (UNICEF)

Goal 6 Combat HIV/AIDS, malaria and other diseases

Target 7: Halt and begin to reverse the spread of HIV/AIDS

Indicators

18. HIV Prevalence Among 15-24 year-old Pregnant Women (UNAIDS)

- Condom use rate of the contraceptive prevalence rate and population aged 15-24 years with comprehensive correct knowledge of HIV/AIDS (UNAIDS, UNICEF, UN Population Division, WHO)
- 20. Ratio of school attendance of orphans to school attendance of non-orphans aged 10-14 years

Target 8: Halt and begin to reverse the incidence of malaria and other major diseases Indicators

- 21. Prevalence and Death Rates Associated with Malaria (WHO)
- 22. Proportion of Population in Malaria Risk Areas Using Effective Malaria Prevention and Treatment Measures (UNICEF)
- 23. Prevalence and Death Rates Associated with Tuberculosis (WHO)
- 24. Proportion of Tuberculosis Cases Detected and Cured Under Directly-Observed Treatment Short Courses (WHO)

Goal 7. Ensure environmental sustainability

Target 9: Integrate the principles of sustainable development into country policies and programmes; reverse loss of environmental resources

Indicators

25. Forested land as percentage of land area (FAO)

- 26. Ratio of Area Protected to Maintain Biological Diversity to Surface Area (UNEP)
- 27. Energy supply (apparent consumption; Kg oil equivalent) per \$1,000 (PPP) GDP (World Bank)
- 28. Carbon Dioxide Emissions (per capita) and Consumption of Ozone-Depleting CFCs (ODP tons)

Target 10: Reduce by half the proportion of people without sustainable access to safe drinking water

Indicators

30. Proportion of the Population with Sustainable Access to and Improved Water Source

(WHO/UNICEF)

31. Proportion of the Population with Access to Improved Sanitation (WHO/UNICEF)

Target 11: Achieve significant improvement in lives of at least 100 million slum dwellers, by 2020

Indicators

32. Slum population as percentage of urban population (secure tenure index) (UN-Habitat)

Goal 8. Develop a global partnership for development

Target 12: Develop further an open, rule-based, predictable, non-discriminatory trading and financial system includes a commitment to good governance, development, and poverty reduction — both nationally and internationally

Target 13: Address the special needs of the least developed countries Includes: tariff and quota free access for least developed countries' exports; enhanced programme of debt relief for HIPCs and cancellation of official bilateral debt; and more generous ODA for countries committed to poverty reduction

Target 14: Address the special needs of landlocked countries and small island developing States

Target 15: Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term.

Target 16: In cooperation with developing countries, develop and implement strategies for decent and productive work for youth.

Target 17: In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries

Target 18: In cooperation with the private sector, make available the benefits of new technologies, especially information and communications

Indicators

Official development assistance

- 32. Net ODA as percentage of OECD/DAC donors' gross national product (targets of 0.7% in total and 0.15% for LDCs)
- Proportion of ODA to basic social services (basic education, primary health care, nutrition, safe water and sanitation)

34. Proportion of ODA that is untied

35. Proportion of ODA for environment in small-island developing states

36. Proportion of ODA for transport sector in landlocked countries

Market access

37. Proportion of exports (by value and excluding arms) admitted free of duties and quotas

38. Average tariffs and quotas on agricultural products and textiles and clothing

39. Domestic and export agricultural subsidies in OECD countries

40. Proportion of ODA provided to help build trade capacity

Debt sustainability

- 41. Proportion of Official Bilateral HIPC Debt cancelled
- 42. Total Number of Countries that Have Reached their HIPC Decision Points and Number that Have Reached their Completion Points (Cumulative) (HIPC) (World Bank-IMF)

43. Debt Service as a Percentage of Exports of Goods and Services (World Bank)

44. Debt Relief Committed Under HIPC Initiative (HIPC) (World Bank-IMF)

45. Unemployment of 15-24 year-olds, Each Sex and Total (ILO)

46. Proportion of Population with Access to Affordable, Essential Drugs on a Sustainable Basis (WHO)

47. Telephone Lines and Cellular Subscribers per 100 Population (ITU)

48. Personal Computers in Use and Internet Users per 100 Population (ITU)

Appendix B - Technical notes

Technical Note 1 - Convergence and Chebyshev's inequality

Using Chebyshev's inequality one can show that convergence in mean square implies convergence in probability. The inequality states that for any random variable:

$$\Pr{ob}(|X_n - \mu_n|) \le \frac{\sigma_n^2}{c^2}$$

Taking the limits of n as it to infinity, it can be seen that if

$$\lim_{n\to\infty} E(X_n) = c \text{ and } \lim_{n\to\infty} Var(X_n) = 0$$

then

$$P \lim X_n = c$$

(TN12)

(TN11)

Technical Note 2 - Distribution functions

Limiting distributions, like probability limits, can greatly simplify the analysis of a problem as in the convergence exercise embarked upon in this study. Greene (1993) illustrates this by showing results that combine the two concepts as:

1. If
$$x_n \xrightarrow{a} x$$
 and $p \lim y_n = c$ then

$$x_n y_n \xrightarrow{d} cx$$
 (TN21)

which means that the limiting distributions of $x_n y_n$ are the distribution of cx.

$$x_n + y_n \xrightarrow{d} c + x$$
 (TN22)

$$\frac{x_n}{v} \xrightarrow{d} \rightarrow \frac{x}{c} \text{ if } c \neq 0$$
 (TN23)

2. If $x_n \xrightarrow{d} x$ and $g(x_n)$ is a continuous function then

$$g(x_n) \xrightarrow{d} gx$$
 (TN24)

The second of these results is analogous to the Slutsky Theorem for probability limits. It can be shown that the limiting distribution of t_2n will be that of the square of a standard normal, which is chi-squared with one degree of freedom. We conclude, therefore that

$$F[1, n] \longrightarrow chi - squared$$
 (1) (TN25)

3. As a result that combines convergence in distribution and probability is

If y_n has a limiting distribution and $p \lim(x_n - y_n) = 0$,

then x_n has the same limiting distribution as y_n .

Definition: An estimator $\hat{\theta}$ of a parameter θ is a consistent estimator of θ if and only if

$$p \lim \hat{\theta} = 0 \tag{TN26}$$

Theorem: The mean of random from any population with finite mean μ and finite variance σ^2 is a consistent estimator of μ . A corollary to this theorem is that in random sampling for any function g(x), if E[g(x)] and Var[g(x)] are finite constants,

$$p \lim_{i \to \infty} \frac{1}{n} \sum_{i} g(x) =$$
(TN27)

A particularly convenient result is the Slutsky Theorem which, states that

For a continuous function $g(x_n)$ that is not a function of n,

 $Plim g(x_n) = g(plim x_n)$

If $plim x_n = c$ and $plim y_n = d$, a few implications of the theorem are as follows:

a.	$plim(x_n+y_n)=c+d$	(TN28)
b.	$plimx_ny_n = cd$	(TN29)
c .	$plim(x_n/y_n) = c/d$	(TN210)

The Slutsky Theorem also applies to functions of random variables and matrices as well. One is ultimately interested in finding a way of describing the statistical properties of estimators when their exact distributions are unknown. The concepts of consistency and convergence in probability are obviously important. But the theory of limiting distributions given above is not yet adequate. As such, if

$$p \lim \hat{\theta}_n = \theta$$
, then $\hat{\theta}_n \xrightarrow{d} \theta$ (TN211)

That is, the limiting distribution of $\hat{\theta}$ is a spike. This is not very informative, nor is it at all what we have in mind when we speak of the statistical properties of an estimator.

As an intermediate step, to more reasonable description of the statistical properties of an estimator, Greene (93) suggests use of a stabilizing transformation of the random variable to one that does have a well-denied limited distribution. To jump to the most common application whereas

$$p \lim \hat{\theta}_n = \theta$$

We often find that

$$Z = \sqrt{n(\hat{\theta} - \theta)} \xrightarrow{d} f(z)$$
(TN213)

Where f(Z) is a well-defined distribution with a mean and a positive variance.

The single most important theorem in econometrics provides an application of this theorem – the Central Limit Theorem (CLT)

CLT: if X_i , ..., X_n are a random sample from any probability distribution with finite mean μ and finite variance σ^2 and $\overline{X} = \frac{1}{n} \sum_i X_i$, then

$$\sqrt{n}(\overline{X}-\mu) \xrightarrow{d} N[0,\sigma^2]$$

(TN214)

(TN212)

Note that the central limit theorem holds regardless of the form of the parent distribution. In practical terms, the theorem states that sums of random variables, regardless of their form, will tend to be normally distributed. Since nearly all the estimators we construct in econometrics fall under purview of the CLT, it is obviously an important result.

Various modified forms of the central limit theorem also exist in the literature such as the Lindberg-Levy and Lindberg-Feller Central Limit Theorems.

Technical Note 3 - Methods of measuring convergence

The literature has various methods for measuring convergence, including dispersion, initial value, Markov chain, co-integration, random fields, Kalman filter, and VAR methods. St. Aubyn (1995) catalogues them as presented below.

a. Dispersion Methods

These methods rely on the three attributes: location, variation or distribution. The first important property of numerical data is its central tendency or location. This shows a distinct tendency for data to group or cluster about a certain central point, such that for any particular batch of data, it is possible to select some typical value of average to describe the entire batch. Five types of averages are often used as measures of central tendency. They are the arithmetic mean, the median, the mode, the midrange, and the mid-hinge. A second important property that describes a batch of numerical data is variation, the amount of dispersion or 'spread' in the data.

Two batches of data may differ in both central tendency and variation, or they may have the same measure of central tendency but differ greatly in terms of variation. Dispersion measures are based on the simple idea that if n time series are converging, their dispersion should be declining over time. The five measures of variation are the range - the difference between the largest and smallest observations in the set of data; the inter-quartile range - a measure of the middle spread; the variance – measures evaluating how the values fluctuate about the mean; the standard deviation – the square-root of the variance; and the coefficient of variation that measures the scatter in the relative data.

b. Initial value method

Under this method, if a cross-section of non-stationary economic series is converging, then the series that started further from the steady-state should be growing faster. Initial value methods emphasize the point at which data analysis starts, hence the name.

c. Markov chains

This method starts with the assumption that the initial cross-section distribution of a series is unequal. Then if there were any convergence among the series it would be expected that this distribution would become more equal. Moreover the initial position of a series should not matter in the long-run, with lowest series in the first period and the highest one having the same probability of being at the top in the distant future.

d. Co-integration methods

These have been used extensively in the first essay and will also be used in this essay. Cointegration methods are based on the weakness of ordinary least squares regression methodology when the dependent and independent variables contain unit roots. If both dependent and independent variables have unit roots, then the classical regressions will give spurious results. (See section 2).

e. Random field methods

A random field is a data set where the time series and cross section dimensions have comparable magnitudes. Quah (1993) extends the unit root regression to a random field framework.

f. Kalman filter method

This is a recursive algorithm that can estimate state models - general form representations of dynamic systems. There are two main benefits to representing a dynamic system in state space form. First, the state space allows unobserved variables (known as the state variables) to be incorporated into and estimated along with the observable model. Second, state space models can be estimated. The Kalman filter is used both to evaluate the likelihood function and to forecast and smooth the unobserved state variables.

Appendix C and D – Data and statistical tables

Appendix C – Data tables

Annex Table C1 – Detailed data tables for optimal currency area Annex Table C2 – Detailed data tables for trade facilitation study

Appendix D - Statistical tables

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Annex Table D4 – Export intensities

Annex Table D5 – Detailed results of ADF Unit root tests

Annex Table D6 - Detailed results of Johansen Co-integration test

Appendix Table C1 - Data and working tables for Chapter 2 Method 1

	∆pfrsfr	44.19580	75.19269	38.89067	74.18828	149.42000	145.38500	133.75000	144.62208	154.28792	194.00119	272.96983	305.21897	310.76108	274.80664	244.02364	199.65428	91.98466	122.20971	103.65000	137.88500	137.88000	135.65913	102.98587	93.84000	4700.80815	164.50185	189.06725	115.29275	65.36764	3888.54264	22.30300	16.90400	-85.01900	-78 61300
	Sq∆	0.01204	0.01652	0.02594	0.04644	0.06670	0.11943	0.00468	0.04665	0.01460	0.04002	0.03634	0.02495	0.06958	0.04773	0.04838	0.05308	0.02606	-0.01837	-0.00801	0.00194	0.00141	-0.00768	-0.00048	-0.00255	0.12154	0.03288	0.01180	0.00679	0.00499	0.00358 -{	0.00317	0.01315	0.00958	-0.00013
	∆pfrsuk	364.32225	749.42089	-273.33808	-50.03749	807.90174	677.14753	785.69040	2259.08259	318.77020	2405.61767	5267.04433	2943.74138	1807.85374	4315.39949	1163.31450	1286.19241	2993.54063	2558.39954	4511.94480	2970.99210	5187.31359	1365.97597	4131.09030	2209.36243	4648.54245	4225.82595	3266.02811	1848.09242	2137.62363	3069.76910	2650.44371	4727.78437	5589.21041	5615.58141
	Sq∆	0.01204	0.01652	0.02594	0.04644	0.06670	0.11943	0.00468	0.04665	0.01460	0.04002	0.03634	0.02495	0.06958	0.04773	0.04838 -	0.05308	0.02606	-0.01837	-0.00801	0.00194	0.00141	-0.00768	-0.00048	-0.00255	0.12154 3	0.03288 -	0.01180 1	0.00679 1	0.00499	0.00358 1	0.00317	0.01315	0.00958	-0.00013
·	∆pfrsus	306.27650	-83.05665	77.34402	-145.26575	292.09279	645.35488	1202.45465	66.83918	-361.35585	554.86610	2331.40724	4366.30396	3672.15438	5297.56291	4796.68449	-5314,88601	-3080.60630	-2912.58768	3175.64195	28.78581	-1375,50251	1025.72825	1950.67223	2293.87025	21288.22585	-2655.74212	4340.55683	8116.56796	-2598.21833	9942.32827	7332.73627	6038.90876	11196.67754	-9854.71382
	Sq∆	0.01204	0.01652	0.02594	0.04644	0.06670	0.11943	0.00468	0.04665	0.01460	0.04002	0.03634	0.02495	0.06958	0.04773	0.04838	0.05308	0.02606	-0.01837	-0.00801	0.00194	0.00141	-0.00768	-0.00048	-0.00255	0.12154	0.03288	0.01180	0.00679	0.00499	0.00358	0.00317	0.01315	0.00958 -	-0.00013
Senegal	∆ys	0.04473	0.01266	0.04407	0.00740	0.08543	0.07901	0.05314	0.02588	0.00584	0.07044	0.03343	0.02826	0.10891	0.06148	0.00379	0.05160	0.03789	0.05098	0.03063	-0.00217	0.02195	-0.00070	0.01722	-0.00651	0.10114	0.04320	0.04544	0.03262	0.24591	0.00747	-0.03601	0.02292	0.03838	0.11056
	∆pfrgfr	0.39772	0.50156	1.12588	-0.48084	1.52939	2.71177	2.15626	0 47549	2.26240	0.89949	-1.03804	1.92175	2.48094	-0.39658	9.85658	2.31211	52.31384	7.05747	-5.91237	30.57503	6.03311	27.29703	-1.38084	-1.99768	18.57981	19.49106	-3.82187	-10.50432	20.38813	175.44712	3.54840	1.88170	10.52270	14.20370
	Qpg	-0.00871	0.01307	0.03622	0.02905	0.03837	0.10011	0.06829	0.05073	0.03685	0.02583	0.02867	0.02508	0.04476	0.04390	0.08671	0.07306	0.19468	0.09177	0.04802	0.03453	0.04987	0.03600	0.03936	0.02720	0.00736	0.02931	0.00475	0.01191	0.01491	0.00928	0.00083	0.03376	0.02094	na
	∆pfrguk	3.25849	5.12506	4.22427	-8.06247	8.86789	15.66319	13.27444	14.86074	8.90879	15.79991	23.92587	18.65871	15.09590	8.79049	62.26181	15.88338	351.36122	91.94357	35.36208	146.99312	167.03868	243.58221	-180.43442	33.21336	100.32073	41.12890	198.36700	104.26442	138.33171	64.20527	408.09111	279.01707	401.15773	982.82657
	∆pg	-0.00871	0.01307	0.03622	0.02905	0.03837	0.10011	0.06829	0.05073	0.03685	0.02583	0.02867	0.02508	0.04476	0.04390	0.08671	0.07306	0.19468	0.09177	0.04802	0.03453	0.04987	0.03600	0.03936	0.02720	0.00736	0.02931	0.00475	0.01191	0.01491	0.00928	0.00083	0.03376	0.02094 1	na 1
	∆pfrgus	2.75198	-1.05077	5.66367	-7.29857	4.37000	13.00630	15.86849	-3.79619	0.62667	1.32981	4.43317	30.41202	28.17484	20.65115	101.36770	-44.57158	256.36095	-47.51240	32.17859	141.30399	-29.96181	139.77319	42.58063	48.85480	24.62803	28.60622	47.93799	80.48170	58.95028	76.53948	371.75041	252.27955	702.39770	863.93626
	Qpg	-0.00871	0.01307	0.03622	0.02905	0.03837	0.10011	0.06829	0.05073	0.03685	0.02583	0.02867	0.02508	0.04476	0.04390	0.08671	0.07306	0.19468	0.09177	0.04802	0.03453	0.04987	0.03600	0.03936	0.02720	0.00736	0.02931	0.00475	0.01191	0.01491	0.00928	0.00083	0.03376	0.02094	na
ambia	۵yg	0.02454	-0.00266	0.12600	0.00397	0.15915	0.14503	0.09973	0.10584	0.00680	0.07124	-0.01391	0.04009	0.06319	0.05996	0.09648	0.06513	0.09619	0.13651	0.04163	0.07467	0.08577	0.04580	0.04958	-0.06833	0.05920	0.03998	0.03661	0.00920	0.02956	0.05973	-0.01125	-0.00308	-0.05321	0.02893
. O		1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004

Method 3

Difference Gambia Real Senegal 0.07 0.07 0.08 0.09 Gambia Interest Growth Gambia Interest 4.17 4.17 4.17 4.17 4.17 4.1287 Senegal Interest Growth $\begin{array}{c} 12.00\\ 2.00$ Senegal Interest Difference а 15,58 15,58 39,247 39,247 39,247 39,247 39,257 39,257 36,72 20,939 26,72 26 Money Growth Senegal Gambia Gambia M2 Growth Gambia M2 senegal M2 Srowth 29.73 37.27 37.27 52.37 77.26 52.37 77.26 52.37 77.26 113.65 113.55 113. senegal M2 Difference Senegal Growth Arte na 10.85 10.85 10.85 10.85 10.85 10.85 11.65 11.74 11.74 11.74 11.75 1 Sambia Growth Growth atte 5.81 5.81 5.81 5.81 5.82 5.83 33.65 0.92 5.83 15.66 1.58 25.81 17.83 33.65 0.92 25.81 17.83 35.93 36.93 36.93 36.93 36.93 36.93 36.93 36.93 36.93 36.93 36.93 36.93 36.93 36.93 36.93 36.93 36.93 36.93 36.93 37.60 17.83 36.93 36.93 36.93 37.50 17.12 36.93 36.53 37.50 17.12 36.53 36.53 37.50 17.12 37.50 17.12 36.53 36.53 37.50 17.12 37.50 17.12 37.50 36.53 37.50 17.12 37.50 36.53 36.53 37.50 37.50 37.50 37.50 37.50 37.50 36.53 37.50 37 77, 40 81, 90 81, 90 109, 80 158, 40 158, 40 158, 40 221, 20 356, 70 425, 00 425, 00 74, 85 74, 85 599, 40 748, 50 748
 Cyclical Co-Variance

 Senegal
 Senegal

 GDP
 Growth

 GDP
 Growth

 GDP
 Growth

 Rate
 Crowth

 216.60
 na

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 273.60
 10.68

 271.14
 1.72

 286.070
 28.50

 860.70
 28.50

 82.40
 5.18

 73.91
 16.3

 75.90
 0.50

 73.91
 16.3

 75.91
 17.46

 73.91
 16.3

 7.30
 16.4

 82.26
 GDP

Part 1

123

Part 2

	Gambia	0.00	-0.10	0.20	0.50	0.40	0.60	1.90	1.50	1.30	1.10	0.80	0.90	0.90	1.70	1.80	4.30	4.30	15.60	10.20	6.30	4.90	8.00	6.10	7.50	5.60	1.60	6.50	2.30	0.30	4.80	1.70	0.20	8.10	13.00
	Senegal	0.00	0.50	0.60	1.00	1.90	3.20	7.00	0.30	3.40	1.10	3.30	3.30	2.40	7.50	5.90	6.60	8.20	4.40	-3.10	-1.30	0.30	0.20	-1.20	-0.10	-0.40	22.60	7.30	2.80	1.80	1.10	0.80	0.70		
	ExportS	53.01	63.65	53.75	77.67	66.00	124.82	108.73	101.58	133.34	98.19	97.48	71.11	70.59	62.21	56.90	57.74	59.29	54.59	49.38	39.18	51.76	52.09	49.25	40.11	42.75	40.96	45.68	39.24	33.26	21.74	20.39	21.24	21.43	23.60
Ratios	ExportG	21.31	20.53	17.37	16.13	21.15	26.77	17 61	11.42	14.79	11.69	14.37	7.86	5.44	7.62	7.68	5.02	5.74	2.93	2.94	3.57	1.23	1.38	1.42	1.88	2.52	1.22	0.51	0.61	0.40	0.54	0.10	0.31	0.07	0.04
	Difflmport	58.52	59.39	66.38	79.33	94.12	129.08	112.00	109.71	139.69	135.34	134.66	115.50	125.79	94.41	75.98	78.40	75.07	74.82	73.97	63.12	83.64	75.07	74.97	54.49	55.83	45.58	59.24	49.62	44.28	26.83	22.86	27.05	27.54	32.05
	ImportS	83.74	81.27	93.84	100.71	122.36	158.56	136.73	134.84	163.54	164.92	169.50	156.84	151.86	112.62	94.41	89.34	87.11	83.92	83.34	71.56	91.20	83.42	82.44	61.65	65.71	52.93	64.95	57.04	49.07	32.70	27.25	30.87	30.52	35.49
	ImportG	25.22	21.88	27.46	21.38	28.24	29.48	24.73	25.13	23.85	29.58	34.84	41.34	26.08	18.22	18.43	10.94	12.04	9.10	9.38	8.44	7.56	8.36	7.47	7.16	9.88	7.35	5.71	7.42	4.79	5.86	4.38	3.82	2.98	3.44
	Difference	na	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.83	-20.00	10.34	-9.38	00.00	19.56	-100.27	0.29	-5.21	20.59	6.98	0.00	3.74	-31.82	4.14	8.93	-1.84	-5.42	24.61	-14.72	-5.30		
Rest rate	Gambia [na	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00	-19.56	93.37	-0.29	5.80	-9.17	-1.23	0.00	0.94	-2.50	4.14	0.16	1.84	0.00	-0.47	2.44	3.85		
NORTHINAL INTE	Senegal	na	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.83	0.0	10.34	-9.38	0.00	0.00	-0.90	00.0	0.59	11.41	5.75	0.00	4.69	-34.33	00.0	9.09	0.00	-5.42	24.14	-12.28	-1.46		
Campia	R Growth		0.0	0.0	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00	-19.56	93.37	-0.29	5.80	-9.17	-1.23	0.0	0.94	-2.50	4.14	0.16	1.84	0.00	-0.47	2.44	3.85		
campia	с	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	18.00	18.00	18.00	18.00	14.48	28.00	27.92	29.54	26.83	26.50	26.50	26.75	26.08	25.00	25.04	25.50	25.50	25.38	26.00	27.00		
Senegai	R Growth		0.00	0.00	0.00	0.00	0.0	00.0	0.00	0.00	0.0	0.00	20.83	0.00	10.34	-9.38	0.00	0.0	-6.90	00.00	0.59	11.41	5.75	0.00	4.69	-34.33	0.00	60.6	0.0	-5.42	24.14	-12.28	-1.46		
senegai	с	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	14.50	14.50	16.00	14.50	14.50	14.50	13.50	13.50	13.58	15.13	16.00	16.00	16.75	11.00	11.00	12.00	12.00	11.35	14.09	12.36	12.18		
		1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004

Appendix T	able C2	- Data and	working	tables for	chapter :
Tuppondia i		putu unu	THO I KING		onaptor

YEAR	EXPG D (Mill)	ExpGW D (Mill)	Direction of Trade Gambia/Sene	ALPG gal	Credit D (Mill)	CGRATIOG %	GDPG D (Mill)	GDPG Dalasi	PCGDPG D (Mill)	POPNG	DoabsG D (Mill)	EXRATEG
1070	0.11			0.00	17 85	0.22	81 90	8190000	176 51	0.46	115.83	2.09
1071	0.11			0.00	10 02	0.22	81.40	81400000	160.01	0.48	123 55	1.06
1972	0.11			0.00	15.47	0.14	108.80	108800000	219 69	0.50	142.95	2 13
1973	0.14			0.00	20.94	0.19	109.80	109800000	214 25	0.51	149 46	1 72
1974	0.51			0.00	24.08	0.15	158 40	158400000	298 77	0.53	197 51	1 70
1975	0.36			0.00	22.96	0.10	221.20	221200000	403.65	0.55	210.54	1.98
1976	0.12			0.00	39.12	0.14	278.30	278300000	491.11	0.57	323.21	2.35
1977	0.13			0.00	53.74	0.15	355.10	355100000	606.67	0.59	373.63	2.10
1978	0.25			0.00	75.70	0.21	360.70	360700000	597.27	0.60	506.10	1,97
1979	0.07			0.00	83.50	0.20	425.00	425000000	682.81	0.62	490.62	1.80
1980	0.61			0.00	99.04	0.24	411.60	411600000	642.12	0.64	491.40	1.68
1981	0.44			0.00	105.31	0.23	451.40	451400000	684.42	0.66	534.22	2.10
1982	0.50			0.00	104.28	0.20	522.10	522100000	770.31	0.68	584.38	2.48
1983	2.47			0.00	138.99	0.23	599.40	599400000	855.06	0.70	635.19	2.76
1984	0.53			0.00	159.65	0.21	748.50	748500000	1,041.04	0.72	809.13	4.32
1985	1.65			0.00	213.94	0.25	869.50	869500000	1,167.11	0.75	652.30	3.46
1986	3.62			0.00	194.02	0.18	1,085.20	1085200000	1,402,57	0.77	1,268.74	7.43
1987	1.61			0.00	186.78	0.13	1,486.00	1486000000	1,845.05	0.81	1,555.44	6.44
1988	0.60			0.00	211.50	0.13	1,635.50	1635500000	1,946.35	0.84	1,684.96	6.66
1989	1.12			0.00	237.44	0.12	1,942.30	1942300000	2,210.40	0.88	2,311.23	8.32
1990	1.11	42.7	0.026	6 0.00	289.8	0.15	1977.4	1977400000	2,147.01	0.92	2663.1	7.50
1991	1.00	102.3	0.010	0.00	337.5	0.15	2177.9	2177900000	2,263.01	0.96	2917.1	8.96
1992	1.00	105.8	0.009	9 0.00	184.9	0.08	2434.1	2434100000	2,427.84	1.00	3290.1	9.22
1993	1.00	110.7	0.009	0.00	336.2	0.13	2647.1	2647100000	2,542.16	1.04	3681.7	9.54
1994	0.18	89.2	0.002	2 0.00	414.6	0.15	2854.2	2854200000	2,647.24	1.08	3846.3	9.58
1995	0.16	82.3	0.002	2 0.00	453.3	0.15	2969.5	2969500000	na	na	4489.6	
1996	0.16	80.3	0.002	2 0.00	339.6	0.10	3238.6	3238600000	na	na	na	
1997	0.98	78.4	0.013	3 0.00	390.9	0.12	3395.5	3395500000	na	na	na	
1998	3.00	130.4	0.023	3 0.00	515	0.13	3913.1	3913100000	3,218.27	1.2159	4789.6	
1999	0.77	120.2	0.006	5 0.00	623	0.14	4350.1	4350100000	3,382.13	1.2862	5210.4	
2000	0.38	126.6	0.003	5 0.00	687	0.15	4/36.1	4/36100000	3,5/5.22	1.3247	5824.8	
2001	0.46	102.1	0.00	0.00	1/5	0.13	5953.1	5953100000	4,3/1.49	1.3018	0910.6	
2002	0.66	109.3		o na	1335	0.20	0096.2	0042100000	4,/53.86	1.3972	10052.0	
2003	0.10	101	0.00	na na	19//	0.22	9000.3 10008 F	10008500000	1121	112	10952.9	
2004	0.13	127	0.00	na	10/7	0.15	10900.5	1090000000	na	na	14109.4	

Source: IMF IFS and Country Statistics Missing data for exports to Senegal for 1995, 1997 and 2001 are the average between the year before and the one after Missing data for 2004 is that of 2003

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YEAR	Ghana DOT	value	Guinea DOT	Guinea value	G/ Bissau DOT	G/Bissau Value	EU DOT	EU Value	US DOT	US value	Japan Dot	Japan Value	China DOT	China Value
<u>,</u>			,								******			
1070														
1970														
1972														
1973														
1974														
1975														
1976														
1977														
1979														
1980														
1981														
1982														
1983														
1984														
1985														
1987														
1988														
1989	0.0020	0.0001	0.0420	0.0015										
1990	0.0020	0.0001	0.0400	0.0016										
1991	0.0020	0.0001	0.0450	0.0012										
1992	0.0040	0.0000	0,0350	0.0003										
1993	0.0060	0.0002	0.0570	0.0017	1									
1995	0.0020	0.0000	0.0010	0.0000	I									
1996	0.0030	0.0000	0.0010	0.0000	e t									
1997	na	na	na	na										
1998	0.0100	0.0000	0.0250	0.0000	0.0025	0.0000	0.8010	0.0007	0.0040	0.0000	0.0170	0.0000	0.0220	0.0000
1999	0.0180	0.0006	0.0420	0.0014	0.0028	0.0001	0.7070	0.0239	0.0320	0.0011	0.0220	0.0007	0.0150	0.0005
2000	0.0040	0.0001	0.0020	U.0000	0.0060	0.0001	0.6770	0.0142	0.0070	0.0001	0.0800	0.0017	0.0010	0.0000
2001	0.0070	na	0.0010	na	0.0110	na 0000	0.6/00		0.0210	na	0.0210	na	0.0000	na 0.0000
2002	0.0070	0.0000	0.0010	0.0000	0.0120		0.7630		0.0100	0.0000	0.0000	0.0000	0.0000	0.0000
2004	0.0090	0.0000	0.0010	0.0000	0.0140	0.0000	0.5320	0.0000	0.0120	0.0000	0.0220	0.0000	0.0050	0.0000

YEAR	S Exports	ALPS	CREDITS	CGRATIOS	GDPS	PCGDPS	PCGDPS	POPNS	DOABSS	DOABS	EXRATES
		Senegal	Senegal	Senegal	Senegal	(BIII CFA)	Senegal	Senegal	Senegal		Senegal
1970	0.11	398.18	136.07	0.16	869.83	240,100	56.23	4,270	904.21	249.59	276.03
1971	0.11	421.13	152.43	0.16	946.29	247,200	56.18	4,400	957.06	250.01	261.23
1972	0.11	461.63	184.57	0.17	1,068.54	273,600	60.80	4,500	1,123.17	287.59	256.05
1973	0.17	476.15	269.68	0.23	1,182.09	278,300	59.21	4,700	1,374.61	323.62	235.43
1974	0.20	465.03	403.43	0.26	1,524.62	338,800	70.00	4,840	1,500.62	333.47	222.22
1975	0.14	720.65	476.84	0.26	1,812.10	406,400	81.61	4,980	1,995.80	447.60	224.27
1976	0.08	489.08	490.64	0.27	1,848.36	459,300	89.71	5,120	2,076.15	515.90	248.49
1977	0.19	543.60	614.75	0.30	2,072.26	487,500	92.86	5,250	2,090.35	491.76	235.25
1978	0.11	554.95	938.47	0.40	2,364.11	494,100	91.50	5,400	2,470.54	516. 34	209.00
1979	0.38	507.18	1,114.03	0.39	2,891.04	581,100	104.70	5,550	3,014.57	605.93	201.00
1980	4.12	502.33	1,158.19	0.42	2,779.45	627,600	110.11	5,700	3,489.82	788.00	225.80
1981	6.56	389.53	1,090.68	0.47	2,330.55	669,800	114.30	5,860	2,959.15	850.46	287.40
1982	16.66	380.97	1,008.06	0.39	2,559.70	860,700	142.74	6,030	2,900.18	975.19	336.25
1983	9.33	420.21	853.25	0.36	2,375.83	991,600	154.94	6,400	2,782.73	1,161.43	417,37
1984	3.33	404.50	737.30	0.35	2,085.70	1,000,300	157.03	6,370	2,558.12	1,226.88	479.60
1985	4.28	587.05	1,049.57	0.35	2,979.76	1,126,500	171.98	6,550	2,867.35	1,084.00	378.05
1986	2.50	753.12	1,213.76	0.32	3,808.52	1,229,200	182.92	6,720	3,967.66	1,280.56	322.75
1987	4.15	1,131.65	1,511.84	0.29	5,177.15	1,382,300	200.04	6,910	4,937.10	1,318.21	267.00
1988	5.39	1,168.14	1,433.11	0.29	4,896.19	1,483,300	208.92	7,100	5,297.85	1,604.98	302.95
1989	5.84	1,214.08	1,535.80	0.30	5,099.86	1,475,900	202.18	7,300	4,879.94	1,412.25	289.40
1990	6.07	1,400.84	1,604.60	0.27	6,053.42	1,552,400	206.99	7,500	6,037.83	1,548.40	256.45
1991	3.32	1,580.33	1,531.27	0.26	5,984.17	1,549,900	203.99	7598	5,875.93	1,551.50	259.00
1992	3.32	1,599.45	1,525.08	0.26	5,856.97	na	na	7713	4,306.47	1,595.40	275.33
1993	3.32	1,444.70	1,447.18	0.27	5,420.31	na	na	7937	4,412.17	1,537.80	294.78
1994	3.32	974.57	658.81	0.17	3,782.83	na	na	8230	4,124.28	2,022.30	534.60
1995						na	na	8361		2,360.30	
1996						na	na	8597		2,601.50	
1997						na	na	8767		2,746.50	
1998						na	na	9234		2,980.80	
1999						na	na	9483.3		3,200.10	
2000						na	na	9739.4		3,458.60	
2001						0	0.00	10028.7		3,665.90	
2002						0	0.00	10289		3,860.00	
2003						0	0.00	10549.3		4,208.50	
2004							na				

G/B Imports/World Imports

	nAB	5.52	5.52	5.66	5.78	5.81	6.10	6.25	6.20	6.25	6.41	6.67	6.75	6.88	7.06	7.11	6.99	7.16	7.18	7.38	7.25	7.34	7.35	7.37	7.34	7.61	7.77	7.86	7.92	8.00	8.07	8.15	8.21	8.26	8.34	ğ
	CGDP	2.98	2.84	3.35	3.02	3.21	3.56	3.22	3.12	2.76	2.79	2.56	2.56	2.69	2.51	2.57	2.39	2.67	2.98	2.91	2.92	2.70	2.58	3.26	2.71	2.54	2.46	2.81	2.68	2.52	2.41	2.35	2.42	1.95	1.85	-
	Ē	5.87	5.83	6.09	6.06	6.39	6.69	6.89	7.10	7.09	7.22	7.16	7.22	7.34	7.44	7.64	7.76	7.94	8.21	8.27	8.39	8.36	8.40	8.48	8.53	8.57	8.58	8.63	8.65	8.77	8.84	8.88	9.08	9.15	9.44	na
	ЫLР	11.62	11.62	11.62	11.85	13.14	12.81	11.70	11.78	12.41	11.14	13.33	12.99	13. 13	14.72	13.18	14.31	15.10	14.29	13.30	13.93	13.92	13.81	13.81	13.81	12.09	12.01	11.99	13.80	14.91	13.55	12.85	13.04	13.39	11.52	11.75 na
	Щ		•	·			•	•	•		•				•	•	•	•	•	Ì	•	•	•	,	•		•		•	•			`	•		•
irsion X		0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.0	0.00	0.0	0.00	0.00	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.0	0.00	0.00	0.00	0.0	0.0
Dive	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Jummy	MO																																			
Sambia 1 Credit	E E	17.85	19.92	15.47	20.94	24.08	22.96	39.12	53.74	75.70	83.50	99.04	105.31	104.28	138.99	159.65	213.94	194.02	186.78	211.50	237.44	289.80	337.50	184.90	336.20	414.60	453.30	339.60	390.90	515.00	623.00	687.00	775.00	1,335.00	1,977.00	1,677.00
Senegal (Dom Abs (AB 0	249.59	250.01	287.59	323.62	333.47	447.60	515.90	491.76	516.34	605.93	788.00	850.46	975.19	1,161.43	1,226.88	1,084.00	1,280.56	1,318.21	1,604.98	1,412.25	1,548.40	1,551.50	1,595.40	1,537.80	2,022.30	2,360.30	2,601.50	2,746.50	2,980.80	3,200.10	3,458.60	3,665.90	3,860.00	4,208.50	0.00
enegal er C GDP	CGDP	19.78	17.06	28.40	20.46	24.81	35.16	25.11	22.58	15.78	16.35	12.97	13.00	14.77	12.30	13.04	10.91	14.46	19.76	18.41	18.62	14.82	13.17	25.96	15.02	12.71	11.73	16.56	14.65	12.45	11.13	10.43	11.30	7.06	6.36	na
L Pro	ď	353.017	339.882	439.374	428.505	597.544	807.299	982.230	1213.333	1194.549	1365.615	1284.243	1368.833	1540.618	1710.128	2082.087	2334.228	2805.149	3690.092	3892.704	4420.799	4294.028	444 694	4799.467	5048.625	5271.094	5315.569	5624.498	5726.327	6413.620	6934.818	7167.661	8757.819	9419.705	12566.160	na
otal Gam Ga xports AV	×	16.86	13.40	19.21	24.92	42.96	44.24	34.70	47.47	39.21	58.16	31.00	27.00	44.00	48.00	49.00	43.00	35.00	40.00	58.00	27.00	31.00	38.00	57.00	67.00	35.00	16.00	21.00	15.00	21.00	12.00	15.00	10.00	12.00	8.00	10.00
am-Sen I ports E	μ Γ	111,700.00	111,700.00	111,715.36	140,324.04	510,421.61	364,862.42	120,711.49	130,529.78	245,442.52	68,863.81	613,035.18	439,127.86	504,019.37	2,467,326.80	527,564.65	1,646,987.00	3,621,165.77	1,606,598.70	598,095.96	1,118,460.61	1,110,600.00	995,500.00	995,500.00	995,500.00	178,400.00	164,600.00	160,600.00	980,000.00	2,999,200.00	769,280.00	379,800.00	459,450.00	655,800.00	101,000.00	127,000.00
EX EX EX	Year E	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004

Test assumption: Linear determin	listic trend in the	data			Log likelihood	178.18		·			
Series: DLNE DDDLNLP DLNAB Lags interval: 1 to 1	DM DV DCR				Normalized (Cointegrating	Coefficients: 3	Cointegratin	g Equation(s)		
					DLNE D	DDLNLP DL	NAB DM	2	DCR	С С	
Eicomotrio Botio	ercent 1 Perc	cent F	Hypothesized		1.0000	0.00	0.00	0.22	9,142.78 0.125.17	0.0	-0.62
					0.0000	1.00	0.00	2 0 0 0 0 0	-9,125.17 1,325.30	00.0 00.0	-0.03
0.9181 156.1333	94.1500	103.1800	None **					-0.01	-566.86	0.00	
0.7334 83.5857	68.5200	76.0700	At most 1 **		0.0000	0.0	1.00	0.04	229.12	0.00	-0.11
0.5763 45.2463 0.3618 20.3444	47.2100 29.6800	54.4600 35.6500	At most 2 At most 3					-0.02	-985.16	0.00	
0.1866 7.3220	15.4100	20.0400	At most 4	-	Log likelihc	190.64					
0.0449 1.3329	3.7600	6.6500	At most 5								
*(**) denotes rejection of the hypo	othesis at 5%(1%	5) significal	nce level	-	Normalized (Cointegrating	Coefficients: 4	Cointegratin	g Equation(s)		
L.R. test marcates z connegraming	aduationitis) at c				DLNE D	ODLNLP DL	NAB DM	2	DCR	C	
Unnormalized Cointegrating Coefi	fficients:				1.0000	0.00	0.00	0.00	7,951.94	0.00	1.56
								<u>.</u>	1,808.00	0.02	1
DLNE DDDLNLP DLN] 9000 0	JV [140 4330	JCR	0.0000	00.1	0.00	0.00	-669.43	8.0	0.03
0.1116 -2./311 0.2314 0.7337	0.2782 1.9921	0.0136	-1,419.4330 5.857.5420	0.0013	0.0000	00.0	1.00	0.0	5,267.17 2.260.23	00.0	-0.45
-0.2411 1.1718	2.5212	0.1358	-2,483.8210	-0.0002				ļ	4,056.40	0.00	2
0.0629 0.3672	1.0771	0.0853	-19,931.9300	-0.0016	0.0000	0.00	0.00	1.00 -34	2,878.30	-0.03	9.67
-0.0063 -0.2483	0.5077	-0.4344	-1,458.2110	-0.0015				ğ	7,755.00	-0.07	
-0.0037 -0.1921	0.7187	2060.0	4,852.6010	-0.0030	Log likelihc	197.15					
Normalized Cointegrating Coeffici	ients: 1 Cointegr	rating Equ	ation(s)	-	Normalized (Coofficients: E	Cointecrotion	r Equivilan(a)		
DLNE DDDLNLP DLN	IAB DM	L	2) CR C				con regram			
1.0000 -24.4723 -4.0731	2.4928 -1.8200	0.0050 -0.2348	-12,719.0900 -11,113.8000	0.0076 -0.1636 -0.0021	DLNE D 1.0000	DDLNLP DLI	NAB DM 0.00	0.00 DV	DCR 0.00	ပ 000000000000000000000000000000000000	-0.15
1 on likelihood 159 0149					00000	100	000	00 0	000	0.0	001
										0.00	
Normalized Cointegrating Coeffice	sients: 2 Cointegr	rating Equi	ation(s)		0.0000	0.00	1.00	0.00	0.00	00.0	- 0.09
DLNE DDDLNLP DLN.	IAB DM 7 0086	[0.0627		DCR C	0.0000	0.00	0.00	1.00	0.00	000	-0.43
	-1.8650	-0.2047	-9,684.3500	-0.0018	0.000	0.00	0.00	0.00	1.00	0.00	0.00

Error Correction Terms

E InE DINE PCGDP InPCGDP DINPCGDP 1970 111,700.00 11.62 na 19.78 2.98 na	E InE DINE PCGDP INPCGDP DINPCGDP 111,700.00 11.62 na 19.78 2.98 na	InE DINE PCGDP INPCGDP DINPCGDP 11.62 na 19.78 2.98 na	DinE PCGDP inPCGDP na 19.78 2.98 na	PCGDP InPCGDP DInPCGDP 19.78 2.98 na	PCGDP DInPCGDP 2.98 na	NnPCGDP na		LP 353.02	5.87	dinip C na	Dinip do na	ldinip a na	linab na	CR 17.85	dcr na	DM DV 0.00 0.00	ECT1 na	ECT2 na
								•										
1971 111,700.00 11.62 0.00 17.06 2.84 -0.	111,700.00 11.62 0.00 17.06 2.84 -0.	11.62 0.00 17.06 2.84 -0.	0.00 17.06 2.84 -0.	17.06 2.84 -0.	2.84 -0.	Ģ	15	339.88	5.83	-0.04 n	en e	_	0.00	19.92	2.07	0.00 0.00	na	na
1972 111,715.36 11.62 0.00 28.40 3.35 C	111,715.36 11.62 0.00 28.40 3.35 0	11.62 0.00 28.40 3.35 0	0.00 28.40 3.35 0	28.40 3.35 C	3.35 C	0	.51	439.37	6.09	0.26	0.29 na	_	0.14	15.47	-4.45	0.00 0.00	na L	na
1973 140,324.04 11.85 0.23 20.46 3.02 .	140,324.04 11.85 0.23 20.46 3.02	11.85 0.23 20.46 3.02 .	0.23 20.46 3.02 .	20.46 3.02 .	3.02	•	0.33	428.50	9.00	-0.03	-0.28	-0.58	0.12	20.94	5.47	0.00 0.00	-8.28	-2.52
1974 510,421.61 13.14 1.29 24.81 3.21	510,421.61 13.14 1.29 24.81 3.21	13.14 1.29 24.81 3.21	1.29 24.81 3.21	24.81 3.21	3.21		0.19	597.54	6.39	0.33	0.36	0.64	0.03	24.08	3.14	0.00 0.00	5.76	-0.64
1975 364,862.42 12.81 -0.34 35.16 3.56	364,862.42 12.81 -0.34 35.16 3.56	12.81 -0.34 35.16 3.56	-0.34 35.16 3.56	35.16 3.56	3.56		0.35	807.30	6.69	0.30	-0.03	-0.39	0.29	22.96	-1.12	0.00 0.00	7.30	4.13
1976 120,711.49 11.70 -1.11 25.11 3.22	120,711.49 11.70 -1.11 25.11 3.22	11.70 -1.11 25.11 3.22	-1.11 25.11 3.22	25.11 3.22	3.22		-0.34	982.23	6.89	0.20	-0.10	-0.07	0.14	39.12	16.16	0.00 0.00	-9.95	-4.61
1977 130,529.78 11.78 0.08 22.58 3.12	130,529.78 11.78 0.08 22.58 3.12	11.78 0.08 22.58 3.12	0.08 22.58 3.12	22.58 3.12	3.12		-0.11	1,213.33	7.10	0.21	0.02	0.12	-0.05	53.74	14.62	0.00 0.00	-2.64	-1.84
1978 245,442.52 12.41 0.63 15.78 2.76	245,442.52 12.41 0.63 15.78 2.76	12.41 0.63 15.78 2.76	0.63 15.78 2.76	15.78 2.76	2.76		-0.36	1,194.55	2.09	-0.02	-0.23	-0.24	0.05	75.70	21.96	0.00 0.00	-8.53	-2.44
1979 68,863.81 11.14 -1.27 16.35 2.79	68,863.81 11.14 -1.27 16.35 2.79	11.14 -1.27 16.35 2.79	-1.27 16.35 2.79	16.35 2.79	2.79		0.04	1,365.62	7.22	0.13	0.15	0.38	0.16	83.50	7.80	0.00 0.00	-1.00	-4.47
1980 613,035.18 13.33 2.19 12.97 2.56	613,035.18 13.33 2.19 12.97 2.56	13.33 2.19 12.97 2.56	2.19 12.97 2.56	12.97 2.56	2.56		-0.23	1,284.24	7.16	-0.06	-0.20	-0.34	0.26	99.04	15.54	0.00 0.00	-4.39	-2.24
1981 439,127.86 12.99 -0.33 13.00 2.56	439,127.86 12.99 -0.33 13.00 2.56	12.99 -0.33 13.00 2.56	-0.33 13.00 2.56	13.00 2.56	2.56		0.00	1,368.83	7.22	0.06	0.13	0.32	0.08	105.31	6.27	0.00 0.00	-0.66	-2.79
1982 504,019.37 13.13 0.14 14.77 2.69	504,019.37 13.13 0.14 14.77 2.69	13.13 0.14 14.77 2.69	0.14 14.77 2.69	14.77 2.69	2.69		0.13	1,540.62	7.34	0.12	0.05	-0.07	0.14	104.28	-1.03	1.00 0.00	12,721.86	-20,957.22
1983 2,467,326.80 14.72 1.59 12.30 2.51	2,467,326.80 14.72 1.59 12.30 2.51	14.72 1.59 12.30 2.51	1.59 12.30 2.51	12.30 2.51	2.51		-0.18	1,710.13	7.44	0.10	-0.01	-0.07	0.17	138.99	34.71	1.00 0.00	12,715.43	-20,957.95
1984 527,564.65 13.18 -1.54 13.04 2.57	527,564.65 13.18 -1.54 13.04 2.57	13.18 -1.54 13.04 2.57	-1.54 13.04 2.57	13.04 2.57	2.57		0.06	2,082.09	7.64	0.20	0.09	0.11	0.05	159.65	20.66	1.00 0.00	12,718.57	-20,959.39
1985 1,646,987.00 14.31 1.14 10.91 2.39	1,646,987.00 14.31 1.14 10.91 2.39	14.31 1.14 10.91 2.39	1.14 10.91 2.39	10.91 2.39	2.39		-0.18	2,334.23	7.76	0.11	-0.08	-0.17	-0.12	213.94	54.29	1.00 0.00	12,715.74	-20,957.07
1986 3,621,165.77 15.10 0.79 14.46 2.67	3,621,165.77 15.10 0.79 14.46 2.67	15.10 0.79 14.46 2.67	0.79 14.46 2.67	14.46 2.67	2.67		0.28	2,805.15	7.94	0.18	0.07	0.15	0.17	194.02	-19.92	1.00 0.00	12,726.29	-20,955.81
1987 1,606,598.70 14.29 -0.81 19.76 2.98	1,606,598.70 14.29 -0.81 19.76 2.98	14.29 -0.81 19.76 2.98	-0.81 19.76 2.98	19.76 2.98	2.98		0.31	3,690.09	8.21	0.27	0.09	0.02	0.03	186.78	-7.24	1.00 0.00	12,725.72	-20,956.99
1988 598,095.96 13.30 -0.99 18.41 2.91	598,095.96 13.30 -0.99 18.41 2.91	13.30 -0.99 18.41 2.91	-0.99 18.41 2.91	18.41 2.91	2.91		-0.07	3,892.70	8.27	0.05	-0.22	-0.31	0.20	211.50	24.72	1.00 0.00	12,715.59	-20,960.17
1989 1,118,460.61 13.93 0.63 18.62 2.92	1,118,460.61 13.93 0.63 18.62 2.92	13.93 0.63 18.62 2.92	0.63 18.62 2.92	18.62 2.92	2.92		0.01	4,420.80	8.39	0.13	0.07	0.29	-0.13	237.44	25.94	1.00 0.00	12,720.02	-20,956.06
1990 1,110,600.00 13.92 -0.01 14.82 2.70	1,110,600.00 13.92 -0.01 14.82 2.70	13.92 -0.01 14.82 2.70	-0.01 14.82 2.70	14.82 2.70	2.70		-0.23	4,294.03	8.36	-0.03	-0.16	-0.23	0.09	289.80	52.36	0.00 0.00	-6.25	-5.02
1991 995,500.00 13.81 -0.11 13.17 2.58	995,500.00 13.81 -0.11 13.17 2.58	13.81 -0.11 13.17 2.58	-0.11 13.17 2.58	13.17 2.58	2.58		-0.12	4,444.69	8.40	0.03	0.06	0.22	0.00	337.50	47.70	0.00 0.00	-3.40	-4.16
1992 995,500.00 13.81 0.00 25.96 3.26	995,500.00 13.81 0.00 25.96 3.26	13.81 0.00 25.96 3.26	0.00 25.96 3.26	25.96 3.26	3.26		0.68	4,799.47	8.48	0.08	0.04	-0.02	0.03	184.90 -	152.60	0.00 0.00	17.13	6.29
1993 995,500.00 13.81 0.00 15.02 2.71	995,500.00 13.81 0.00 15.02 2.71	13.81 0.00 15.02 2.71	0.00 15.02 2.71	15.02 2.71	2.71		-0.55	5,048.62	8.53	0.05	-0.03	-0.07	-0.04	336.20	151.30	0.00 0.00	-14.22	-9.20
1994 178,400.00 12.09 -1.72 12.71 2.54	178,400.00 12.09 -1.72 12.71 2.54	12.09 -1.72 12.71 2.54	-1.72 12.71 2.54	12.71 2.54	2.54		-0.17	5,271.09	8.57	0.04	-0.01	0.02	0.27	414.60	78.40	0.00 0.00	-7.03	-9.54
1995 164,600.00 12.01 -0.08 11.73 2.46	164,600.00 12.01 -0.08 11.73 2.46	12.01 -0.08 11.73 2.46	-0.08 11.73 2.46	11.73 2.46	2.46		-0.08	5,315.57	8.58	0.01	-0.03	-0.03	0.15	453.30	38.70	0.00 0.00	-2.80	-4.87
1996 160,600.00 11.99 -0.02 16.56 2.81	160,600.00 11.99 -0.02 16.56 2.81	11.99 -0.02 16.56 2.81	-0.02 16.56 2.81	16.56 2.81	2.81		0.35	5,624.50	8.63	0.06	0.05	0.08	0.10	339.60 -	113.70	0.00 0.00	8.59	3.67
1997 980,000.00 13.80 1.81 14.65 2.68	980,000.00 13.80 1.81 14.65 2.68	13.80 1.81 14.65 2.68	1.81 14.65 2.68	14.65 2.68	2.68		-0.12	5,726.33	8.65	0.02	0.04	-0.09	0.05	390.90	51.30	0.00 0.00	-1.75	-2.85
1998 2,999,200.00 14.91 1.12 12.45 2.52	2,999,200.00 14.91 1.12 12.45 2.52	14.91 1.12 12.45 2.52	1.12 12.45 2.52	12.45 2.52	2.52		-0.16	6,413.62	8.77	0.11	0.10	0.13	0.08	515.00	124.10	0.00 0.00	-3.84	-7.59
1999 769,280.00 13.55 -1.36 11.13 2.41	769,280.00 13.55 -1.36 11.13 2.41	13.55 -1.36 11.13 2.41	-1.36 11.13 2.41	11.13 2.41	2.41		-0.11	6,934.82	8.84	0.08	-0.04	-0.13	0.07	623.00	108.00	0.00 0.00	-4.99	-9.14
2000 379,800.00 12.85 -0.71 10.43 2.35	379,800.00 12.85 -0.71 10.43 2.35	12.85 -0.71 10.43 2.35	-0.71 10.43 2.35	10.43 2.35	2.35		-0.06	7,167.66	8.88	0.03	-0.05	-0.01	0.08	687.00	64.00	0.00 0.00	-2.97	-6.22
2001 459,450.00 13.04 0.19 11.30 2.42	459,450.00 13.04 0.19 11.30 2.42	13.04 0.19 11.30 2.42	0.19 11.30 2.42	11.30 2.42	2.42		0.08	8,757.82	9.08	0.20	0.17	0.21	0.06	775.00	88.00	0.00 0.00	1.40	-6.43
2002 655,800.00 13.39 0.36 7.06 1.95	655,800.00 13.39 0.36 7.06 1.95	13.39 0.36 7.06 1.95	0.36 7.06 1.95	7.06 1.95	1.95		-0.47	9,419.71	9.15	0.07	-0.13	-0.29	0.05 1	,335.00	560.00	0.00 0.00	-14.26	-31.07
2003 101,000.00 11.52 -1.87 6.36 1.85	101,000.00 11.52 -1.87 6.36 1.85	11.52 -1.87 6.36 1.85	-1.87 6.36 1.85	6.36 1.85	1.85		-0.10	12,566.16	9.44	0.29	0.22	0.34	0.09 1	,977.00	642.00	0.00 0.00	-8.01	-37.89
2004 127,000.00 11.75 0.23 na na	127,000.00 11.75 0.23 na na	11.75 0.23 na na	0.23 na na	na na	na		na	na	na	na	na	na	na 1	,677.00 -	300.00	0.00 0.00	na	na

/Bissau		27.3391 31.0574	32.0403	43.9116	43.1082	37.7595	36.5972	36.7139	60.7099	55.0000	50.0000	50.0000	55.0000	48.0000	60.0000	60.0000	70.0000	66.0000	69.0000	86.0000	76.0000	96.0000	61.0000	164.0000	133.0000	87.0000	89.0000	63.0000	51.0000	59.0000	62.0000	58.0000	65.0000	96.0000
Iniea		78.0000	107.0000	185.0000	160.0000	216.0000	283.0000	247.0000	360.0000	351.0000	296.0000	267.0000	438.0000	448.0000	451.0000	468.0000	605.0000	589.0000	723.0000	735.0000	740.0000	730.0000	706.0000	818.5080	647.6620	619.7020	536.5790	555.9250	612.0000	601.0000	667.0000	640.0000	690.0000	0.0000
GL		410.6190 430.2070	290.7570	451.9920	820.6090	790.6960	862.3480	1,037.6500	852.4360	129.0000	,106.0000	705.0000	,248.0000	608.0000	866.0000	,046.0000	,156.0000	905.0000	,273.0000	,205.0000	,055.0000	, 169,0000	,575.0000	2, 108.0000	,906.0000	, 108.0000	,326.0000	,563.0000	1,480.0000	,973.0000	154.0000	,720.1140	1,210.1600	I,073.9420
egal Gh		193.9440 218.9730	279.9140	360.6720	497.5520	583.3250	635.5240	764.0710	930.7000	052.0000	076.0000	992.0000	,025.0000	981.0000	826.0000	961.0000	,024.0000	,080.0000	,221.0000	,219.0000	,173.0000	,034.0000	,087.0000	022.0000	,412.0000	,436.0000 2	,335.0000 2	,455.0000	,564.0000	,519.0000	,730.0000	031.0000	,391.5340	848.8130
Vorld xports Sen		317000	419000	580000	840000	877000	992000	1128000	1659000	2034000	2010000 1	1883000	1846000 1	1956000	1954000	2138000	2516000 1	2869000 1	3098000 1	3449000 1	3515000 1	3766000 1	3781000 1	4325000 1	5162000 1	5401000 1	5589000 1	5499000 1	5713000 1	6451000 1	6184000 1	6484000 2	7572000 2	9191000 2
Vorld V mports E		329000	433000	595000	861000	912000	1026000	1171000	1694000	2075000	2066000	1941000	1890000	2014000	2015000	2206000	2582000	2963000	3201000	3550000	3633000	3882000	3876000	4428000	5282000	5545000	5740000	5681000	5919000	6724000	6482000	6734000	7855000	9545000
Gambian V Exports I		16.8576 13 3971	19.2131	24.9161	42.9623	44.2420	34.6977	47.4715	58.1620	31.0000	27.0000	44.0000	48.0000	49.0000	43.0000	35.0000	40.0000	58.0000	27.0000	31.0000	38.0000	57.0000	67.0000	35.0000	16,000	21.0000	15.0000	21.0000	12.0000	15.0000	10.0000	12.0000	8.0000	10.0000
ambian nports		17.9664 21 3326	24.7665	31.1300	46.5141	59.6607	74,1384	77.6009	141.1890	165.0000	126.0000	103.0000	115.0000	100.0000	93.0000	104.0000	127.0000	138.0000	161.0000	188.0000	202.0000	218.0000	260.0000	212.0000	182.0000	258.0000	278.0000	228.0000	192.0000	187.0000	134.0000	147.8090	156.9990	228.7570
ts to G		0.00	0.0	0.00	0.00	00.0	0.00	0.0	00.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	00.0	0.00	0.00	0.00	0.00	0.00	0.00	2.87	1.80	0.13	0.00	0.0	7.78	0.64
an Expoi Japan (0.00	0000	0.0	0.0	0.0	00'0	0 0 0 0	80	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.0	0.0	2.22	2.64	10.13	2.14	0.55	1.62	2.79
Gambi US		00.0	0.0	0.0	0.00	0.00	0.00	0.0	8.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.0	1.10	2.30	2.20	2.20	2.00	2.80	2.00	2.80	0.30	0.60	0.30	0.10	0.50
G/Bissau		00.0	0.00	00.0	00.0	00.00	0.00	0.00	00.0	0.0	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.33	0.34	0.76	1.12	1.31	2.22	1.78
Guniea (0.000	0000	0.000	0.000	0.000	0.000	0.000	000.0	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.708	4.604	3.703	6.310	0.535	0.082	0.080	0.00	3.260	5.048	0.253	0.102	0.109	0.202	0.127
Ghana		0.0	0.0	0.00	0.00	0.00	0.00	0.0	000	0.0	0,00	0.00	0.00	00.00	0.00	0.00	0.00	0.00	0.00	0.09	0.20	0.42	0.66	0.45	0.16	0.24	0.0	1.30	2.16	0.51	0.71	0.77	1.41	1.14
Senegal (0 11 0	0	0.14	0.51	0.36	0.12	0.13	0.07	0.61	0.44	0.50	2.47	0.53	1.65	3.62	1.61	0.60	1.12	1.11	1.00	1.00	1.00	0.18	0.16	0.16	0.98	3.00	0.69	0.38	0.46	0.66	0.10	0.13
	•	1970 1971	1972	1973	1974	1975	1976	1977	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004

Part A

								Å	art B							
							Senegal			Ghana			U	Suinea		
	mports of JK	SU	Japan	China	Exports	Xij/Xi B/N	Mj-Xij Q-B	Xw-Xi P-N	Intensity	Mj-Xij R-C	Xw-Xi P-N	ntensity X D	N/I		ii iX-w N-c	ntensity
1970	21,871.2000	42389	18881	2279	151.89	0.01	193.83	316,983.14	10.84	410.62	316,983.14	0.00	0.00	78.00	316,983.14	0.00
1971	23,858.3000	48342	19712	2129	125.28	0.01	218.86	353,986.60	13.49	430.21	353,986.60	0.00	0.0	80.00	353,986.60	0.00
1972	27,660.7000	58862	23863	2851	216.04	0.01	279.80	418,980.79	8.71	290.76	418,980.79	0.0	0.0	107.00	418,980.79	0.00
1973	38,528.1000	1 73199	38389	5208	195.37	0.0	360.53	579,975.08	90.6	451.99	579,975.08	0.0	0.0	185.00	579,975.08	0.00
19/4	54,190.3000	C/2011	01948	1.877	391.14 404.05	5.6	491.04	839,957,04	20.02	19.022	839,957.04 876 055 70			160.00	839,957.04	0.0
1975	53,340.9000	132408	000/C	1 920	401.05 485.16	50	06.30C	0/0,900./0 001 065 30	14.7 7.43	1 3U./U 862 35	0/0,900./0 001 065 30	0.0		283.00	0/0,900./0 001 065 30	8.0
1977	63 191 3000	160411	71340	7148	623.80	800	763.94	1 127,952 53	4.06	1 037 65	1 127 952 53	000	0000	247,00	1 127 952 53	
1978	75,813,0000	186045	79922	11131	449.36	0.01	754.49	1,306,960.79	10.84	1,005.86	1,306,960.79	0.0	0.0	272:00	1,306,960.79	0.0
1979	99,599.8000	22228	109831	15621	535.25	0.0	930.63	1,658,941.84	2.11	852.44	1,658,941.84	0.00	0.00	360.00	1,658,941.84	0.00
1980	115,545.0000	256984	141296	19941	477.00	0.02	1,051.39	2,033,969.00	38.26	1,129.00	2,033,969.00	0.00	0.00	351.00	2,033,969.00	0.00
1981	102,708.0000	273352	142866	22014	500.00	0.02	1,075.56	2,009,973.00	30.39	1,106.00	2,009,973.00	0.00	0.00	296.00	2,009,973.00	0.0
1982	99,646.0000	254884	131499	19285	548.00	0.01	991.50	1,882,956.00	21.75	705.00	1,882,956.00	0.00	00.00	267.00	1,882,956.00	0.00
1983	100,080.0000	1 269878	126437	21390	618.00	0.05	1,022.53	1,845,952.00	92.80	1,248.00	1,845,952.00	0.0	0.00		1,845,952.00	0.00
1984	104,725.0000	346364	136176	27410	634.00	0.0	980.47	1,955,951.00	21.48	608.00	1,955,951.00	0.0	0.0	448.00	1,955,951.00	0.00
1985	108,957.0000	352463	130488	42252	562.00	0.04	824.35	1,953,957.00	90.79	866.00	1,953,957.00	0.0	0.0	451.00	1,953,957.00	0.00
1986	126,330.0000	382295	127553	42904	625.00	0.10	957.38	2,137,965.00	231.05	1,046.00	2,137,965.00	0.0	0.0	468.00	2,137,965.00	0.00
1987	154,407.0000	424442	151033	43216 55260	606.00	0.0	1,022.39	2,515,960.00	98.84	1,156.00	2,515,960.00	0.0	0.0	605.00	2,515,960.00	0.0
1989	169,340.000C	408042	209715	59142	00.186 693.00	0.0	1,0/9.40	3 097 973 00	105.20	903.00 1.273.00	3.097.973.00	000		209.00	3 097 973 00	000
1990	222,977,0000	516987	235368	53345	761.00	0.04	1,217.89	3,448,969.00	101.46	1,204.91	3,448,969.00	7.89	0.06	733.29	3,448,969.00	259.14
1991	209,947.0000	508363	236999	63791	701.00	0.03	1,172.00	3,514,962.00	78.57	1,054.80	3,514,962.00	17.94	0.12	735.40	3,514,962.00	579.03
1992	221,551.0000	553923	233246	80585	673.00	0.02	1,033.00	3,765,943.00	63.67	2,168.58	3,765,943.00	12.89	0.06	726.30	3,765,943.00	336.85
1993	209,318.0000	0 603438	241624	103959	707.00	0.0	1,086.00	3,780,933.00	51.73	2,574.34	3,780,933.00	14.56	60.0	699.69	3,780,933.00	508.91
1994 1005	234,076.0000	770852	22522/2	CLOCT1	00.19/	5.6	28.120,1 1 411 84	4,324,965.00 5 161 084 00	10.12	CC. 101.2	4,324,905.00 5 161 084 00	20.15 27 86		817.9/ 647.58	4,324,965.00 5 161 084 00	C8.08
1996	287.332.0000	822025	349152	138833	986.00	0.01	1,435,84	5.400.979.00	28.77	2.107.76	5,400,979,00	29,39	00.0	619.62	5.400.979.00	33.33
1997	307,518.0000	899020	338754	142370	905.00	0.07	1,334.02	5,588,985.00	273.72	2,326.00	5,588,985.00	0.0	0.00	536.58	5,588,985.00	0.00
1998	321,231.0000	944353	280484	140237	968.00	0.14	1,452.00	5,498,979.00	540.88	2,561.70	5,498,979.00	133.29	0.16	552.67	5,498,979.00	1,544.61
1999	324,893.0000	0.1059440	309995	165699	1,027.00	0.06	1,563.31	5,712,988.00	210.13	3,477.84	5,712,988.00	296.18	0.42	606.95	5,712,988.00	3,959.88
2000	343,781.0000	1259300	379511	225094	920.00	0.03	1,518.62	6,450,985.00	107.56	2,972.49	6,450,985.00	73.27	0.02	600.75	6,450,985.00	181.26
2001	333,003.0050	1179180	349089	243553	1,003.00	0.05	1,729.54	6,183,990.00	164.28	3,153.29 0 740 05	6,183,990.00 6,183,990.00	140.16	0.0	666.90 200.00	6,183,990.00 6,155,555,55	94.67
2002	346,316.5260 201 063 7410	1200230	33/194	2951/U	1,06/.00	0.0 0.0	2,030,34	6,483,988.00 7 571 992 00	39.97	2,719.33 3.208.75	6,483,988.00 7 571 992 00	152.UZ	500	639.89	6,483,988.UU 7 571 992 00	92.29 277 17
2004	470,632,4260	1525516	454542	561229	1 467.00	200	2.848.69	9 190 990 00	40.98	4 072 80	9 190 990 00	257 94	0.01	-0.13	9 190 990 00 -	919 099 00

5

Popn Popn ALP GDP

Gambia

Intensity

XwrXi P-N

Intensity Xij/Xi Mj-Xij I/N X-I

Japan Intensity Xij/Xi Mj-Xij Xw-Xi Ir H/N W-H P-N

> X-wX P-N

> XIJ/XI E/N

G/Bissau Mj-Xij

uS i Xw-Xi Intensity Xij/Xi Mj-Xij P-N G/N V-G

China

Part C

	000 232,000	000 239,495	,000 247,625	,000 256,240	,000 265,085	000 274,000	000 283,335	000 292,665	000 301,955	000 311,215	000 320,500	000 329,770	000 338,890	000 350,500	000 359,495	000 372,500	000 386,860	000 402,700	000 420,145	000 439,355	000 460,500	000 490,000	000 507,160	000 524,321	000 541,481	000 558,642	000 575,802	000 592,963	000 610,123	000 627,284	000 660,759	000 679,747	000 705,128	000 723,077	000
	2 81,900	3 81,400	7 108,800	0 109,800	158,400	0 221,200	3 278,300	355,100	360,700	2 425,000	411,600	3 451,400	2 522,100	3 599,400	9 748,500	869,500	5 1,085,200	9 1,486,000	0 1,635,500	0 1,942,300	3 1,977,400	9 2,177,900	2,434,100	2,647,100	9 2,854,200	2,969,500	3,238,600	3,395,500	2 3,913,100	2 4,350,100	3 4,736,100	2 5,953,100	6,642,100	9,086,300	10,908,500
	353.02	339.88	439.37	428.5(597.54	807.3(982.23	1,213.33	1,194.55	1,365.62	1,284.24	1,368.83	1,540.62	1,710.13	2,082.09	2,334.23	2,805.15	3,690.05	3,892.70	4,420.80	4,294.03	4,444.69	4,799.47	5,048.62	5,271.05	5,315.57	5,624.50	5,726.33	6,413.62	6,934.82	7,167.66	8,757.82	9,419.71	12,566.16	na
	6 464000	8 478990	0 495250	1 512480	3 530170	5 548000	7 566670	9 585330	0 603910	2 622430	4 641000	6 659540	8 677780	0 701000	2 718990	5 745000	7 773720	1 805400	4 840290	8 878710	2 921000	6 962390	0 1002580	4 1041280	8 1078180	0 1114299	0 1151628	0 1190208	2 1215900	9 1286200	2 1324700	6 1361800	0 1397200	0 1426000	0 1464502
	1970 0.4	1971 0.4	1972 0.5	1973 0.5	1974 0.5	1975 0.5	1976 0.5	1977 0.5	1978 0.6	1979 0.6	1980 0.6	1981 0.6	1982 0.6	1983 0.7	1984 0.7	1985 0.7	1986 0.7	1987 0.8	1988 0.8	1989 0.8	1990 0.9	1991 0.9	1992 1.0	1993 1.0	1994 1.0	1995 0.0	1996 0.0	1997 0.0	1998 1.2	1999 1.2	2000 1.3	2001 1.3	2002 1.4	2003 0.0	2004 0.0
	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.0	0.00	0.13	0.22	0.39	0.92	0.63	1.16	0.55	1.26	0.10	0.31	0.14	0.07	0.30
	316,983.14	353,986.60	418,980.79	579,975.08	839,957.04	876,955.76	991,965.30	1,127,952.53	1,306,960.79	1,658,941.84	2,033,969.00	2,009,973.00	1,882,956.00	1,845,952.00	1,955,951.00	1,953,957.00	2,137,965.00	2,515,960.00	2,868,942.00	3,097,973.00	3,448,969.00	3,514,962.00	3,765,943.00	3,780,933.00	4,324,965.00	5,161,984	5,400,979	5,588,985	5,498,979	5,712,988	6,450,985	6,183,990	6,483,988	7,571,992	9,190,990
	42,389.00	48,342.00	58,862.00	73,199.00	110,875.00	105,880.00	132,498.00	160,411.00	186,045.00	222,228.00	256,984.00	273,352.00	254,884.00	269,878.00	346,364.00	352,463.00	382,295.00	124,442.00	159,542.00	<u> 1</u> 92,922.00	516,987.00	508,363.00	553,921.90	503,435.70	89,212.80	770,850	822,023	899,017	944,351	1,059,437	1,259,300	1,179,179	1,200,230	1,303,050	1,525,516
	00.00 00.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.02	0.00 0.03 6	0.00 0.06 6	0.00 0.14	0.00 0.10	0.00 0.19	0.14 0.10	0.15 0.23	0.01 0.02	0.00 0.06	0.00 0.03	0.97 0.01	0.06 0.05
	316983	353987	418981	579975	839957	876956	991965	1127953	1306961	1658942	2033969	2009973	1882956	1845952	1955951	1953957	2137965	2515960	2868942	3097973	3448969	3514962	3765943	3780933	4324965	5161984	5400979	5588985	5498979	5712988	6450985	6183990	6483988	7571992	9190990
	00 2279	00 2129	00 2851	00 5208	00 7791	00 7926	00 6660	00 7148	00 11131	00 15621	00 19941	00 22014	00 19285	00 21390	00 27410	00 42252	00 42904	0 43216	00 55268	0 59142	0 53345	00 63791	00 80585	00 103959	0 115615	0 132084	0 138833	0 142370	14 140234	15 165697	1 225094	0 243553	0 295170	97 412752	JG 561228
	0.00 0.0	0.00	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00 0.0	0.00	0.00 00.0	0.00 0.0	2.07 0.	4.06 0.	11.48 0.0	3.80 0.0	0.88 0.0	3.99 0.9	5.65 0.0
	316983	353987	418981	579975	839957	876956	991965	1127953	1306961	1658942	2033969	2009973	1882956	1845952	1955951	1953957	2137965	2515960	2868942	3097973	3448969	3514962	3765943	3780933	4324965	5161984	5400979	5588985	5498979	5712988	6450985	6183990	6483988	7571992	9190990
	18881	19712	23863	38389	61948	57860	64895	71340	79922	109831	141296	142866	131499	126437	136176	130488	127553	151033	187378	209715	235368	236999	233246	241624	275235	335882	349152	338754	280482	309992	379501	349087	337193	382928	454539
•	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	2.05 0.11	2.64 0.22	9.13 0.68	8.66 0.21	1.67 0.05	0.92 0.20	3.70 0.28
	14	60	19	80	8	76	30	53	- 10	84	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	00 1,36	00 3,16	00 5,60	00 11,40	00 12,50	00 33,50	00 17,34
	316,983.	353,986.	418,980	579,975	839,957	876,955	991,965	1,127,952	1,306,960	1,658,941	2,033,969.	2,009,973.	1,882,956	1,845,952	1,955,951.	1,953,957.	2, 137,965.	2,515,960.	2,868,942	3,097,973.	3,448,969.	3,514,962	3,765,943.	3,780,933.	4,324,965.	5,161,984.	5,400,979.	5,588,985.	5,498,979.	5,712,988.	6,450,985.	6,183,990.	6,483,988.	7,571,992	9,190,990
	27.34	31.06	32.04	43.91	43.11	37.76	36.60	36.71	49.27	60.71	55.00	50.00	50.00	55.00	48.00	60.00	60.00	70.00	66.00	69.00	86.00	76.00	96.00	61.00	164.00	133.00	87.00	89.00	62.67	50.66	58.24	60.88	56.69	62.78	94.22
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.0	0.00	0,00	0.00	0.00	0.00	0.02	0.03	0.05	0.11	0.11	0.28	0.18
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Labour Force from FAO ESS database																																			
------------------------------------	-------------	-------------------	--------------	--	--																														
	Agriculture	Agri. L/F as % of	Total																																
	L/Force	Total L/F	Labour F																																
1979- 81	283000	84	336905																																
1989 - 91	383000	82	467073																																
1991	390,581	81	482199																																
1992	398,163	81	491559																																
1993	405,744	81	500918																																
1994	413,325	81	510278																																
1995	420,907	81	519638																																
1996	428,488	. 81	528997																																
1997	436,069	81	538357																																
1998	443,650	81	547717																																
1999	451,232	81	557076																																
2000	522000	79	660759																																
2001	537000	79	679747																																
2002	550000	78	705128																																
2003	564000	78	723077																																
		81	for 1991-200																																

Data from IMF's Statistical Appendix Reports for Senegal and Gambia

Senegal	(billion CF	FA)					
	Exports	Imports	Imports	GDP	Dom Abs	Popn	Private Sec
	fob	fob	cif	at factor		('000)	Credit
1990							
1991	226.5	314.3	357.2		1551.5	7598	
1992	219.1	315.5	358.5	1595.4	1595.4	7713	
1993	200.3	307.7	349.6	1537.8	1537.8	7937	252.1
1994	439.1	567.4	644.8	2022.3	2022.3	8230	275.6
1995	483.4	607.2	690	2242.9	2360.3	8361	283.8
1996	505.4	646.6	734.8	2459.2	2601.5	8597	344.7
1997	544.2	686.4	780	2639.1	2746.5	8767	392.7
1998	575.7	755.5	858.6	2796.5	2980.8	9234	437.1
1999	644.7	845.3	962.7	3000	3200.1	9483.3	483
2000	648	951.5	1081.3	3192	3458.6	9739.4	622.2
2001	735.2	1047	1189.7	3342.7	3665.9	10028.7	651.8
2002	743	1118		3472.7	3860	10289	682
2003	731	1201		3725.4	4208.5	10549.3	782.1
2004							

Gambia	(Million Da	lasi)					
	Exports	Imports	Imports	GDP	Dom Abs	Popn	Private Sec
	fob	fob	cif	at factor		('000,000)	Credit
1990	42.7	122.8		1977.4	2663.1		289.8
1991	102.3	136.6		2177.9	2917.1		337.5
1992	105.8	140.5		2434.1	3290.1		184.9
1993	110.7	151.9		2647.1	3681.7		336.2
1994	89.2	138.8		2854.2	3846.3 [.]		414.6
1995	82.3	108.5		2969.5	4489.6		453.3
1996	80.3	139		3238.6			339.6
1997	78.4	130.5		3395.5			390.9
1998	130.4		209.3	3913.1	4789.6	1.2159	515
1999	120.2		188.9	4350.1	5210.4	1.2862	623
2000	126.6		189.9	4736.1	5824.8	1.3247	687
2001	102.1		152.11	5953.1	6910.6	1.3618	775
2002	109.3		171.6	6642.1	7978	1.3972	1335
2003	101		161	9086.3	10952.9		1977
2004	127		235.5	10908.5	14159.4		1677

Appendix Table D1.2 - Results for Method 2 - GPPP	
Test assumption: Linear deterministic tren Series: DALCFA CPI Lags interval: 1 to 1	Test assumption: No deterministic trend in the data Series: DALCFA CPI Lags interval: 1 to 1
Likelihood5 Percent1 PercentHypothesizedEigenvalueRatioCritical Value Critical Value No. of CE(s)	Likelihood5 Percent1 PercentHypothesizedEigenvalueRatioCritical Value Critical Value No. of CE(s)
0.280322 11.58857 15.41 20.04 None 0.021973 0.733186 3.76 6.65 At most 1	0.267609 12.30985 12.53 16.31 None 0.059727 2.032304 3.84 6.51 At most 1
*(**) denotes rejection of the hypothesis at 5%(1%) significance level L.R. rejects any cointegration at 5% significance level	*(**) denotes rejection of the hypothesis at 5%(1%) significance leve L.R. rejects any cointegration at 5% significance level
Unnormalized Cointegrating Coefficients:	Unnormalized Cointegrating Coefficients:
DALCFA CPI -0.019096 0.785527 -0.001809 0.266606	DALCFA CPI -0.019047 0.823166 0.000306 0.066594
Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)	Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)
DALCFA CPI C 1 -41.13612 -2.696534 -2.80703	DALCFA CPI 1 -43.2185 -1.20658
Log likelihood -110.3174	Log likelihot -111.3057

Appendix Table D1.3 - Results on convergence in inflation

LS // Dependent Variable is DALCFA Included observations: 35 after adjusting endpoints

Variable	Coefficien S	Std. Error	t-	Statistic	Prob.	
CPI	42.4437	0.98384	43	43.14076	0	
R-squared	0.90967	Mean dependent va	ır		84.68674	
Adjusted R-squared	0.90967	S.D. dependent var	•		42.77647	
S.E. of regression	12.8562	Akaike info criterio	n		5.135804	
Sum squared resid	5619.56	Schwarz criterion			5.180242	
Log likelihood	-138.539	Durbin-Watson stat	t		0.911943	

ECT

	Gam	bia	Senegal		
Year	Value	Percent	Value	Percent	Total
1970	17.966	8.478	193.944	91.522	211.910
1971	21.333	8.877	218.973	91.123	240.306
1972	24.767	8.129	279.914	9 1. 8 71	304.681
1973	31.130	7.945	360.672	92.055	391.802
1974	46.514	8.549	497.552	91.451	544.066
1975	59.661	9.279	583.325	90.721	642.986
1976	74.138	10.447	635.524	89.553	709.662
1977	77.601	9.220	764.071	90.780	841.672
1978	100.415	11.742	754.733	88.258	855.148
1979	141.189	13.172	930.700	86.828	1071.889
1980	165.000	13.558	1052.000	86.442	1217.000
1981	126.000	10.483	1076.000	89.517	1202.000
1982	103.000	9.406	992.000	90.594	1095.000
1983	115.000	10.088	1025.000	89.912	1140.000
1984	100.000	9.251	981.000	90.749	1081.000
1985	93.000	10.120	826.000	89.880	919.000
1986	104.000	9.765	961.000	90.235	1065.000
1987	127.000	11.034	1024.000	88.966	1151.000
1988	138.000	11.330	1080.000	88.670	1218.000
1989	161.000	11.650	1221.000	88.350	1382.000
1990	188.000	13.362	1219.000	86.638	1407.000
1991	202.000	14.691	1173.000	85.309	1375.000
1992	218.000	17.412	1034.000	82.588	1252.000
1993	260.000	19.302	1087.000	80.698	1347.000
1994	212.000	17.180	1022.000	82.820	1234.000
1995	182.000	11.418	1412.000	88.582	1594.000
1996	258.000	15.230	1436.000	84.770	1694.000
1997	278.000	17.235	1335.000	82.765	1613.000
1998	228.000	13.547	1455.000	86.453	1683.000
1999	192.000	10.934	1564.000	89.066	1756.000
2000	187.000	10.961	1519.000	89.039	1706.000
2001	134.000	7.189	1730.000	92.811	1864.000
2002	147.809	6.784	2031.000	93.216	2178.809
2003	156.999	6.160	2391.534	93.840	2548.533
2004	228.757	7.433	2848.813	92.567	3077.570
Average		11.790	· · ·	88.210	

Appendix Table D2.1: Total Imports in to SeneGambia (US\$ Millions)

Source: International Financial Statistics, IMF

	Ga	mbia	Senegal	· ·· ·	
Year	Value	Percent	Value	Percent	Total
1970	16.858	9.990	151.885	90.010	168.743
1971	13.397	9.661	125.275	90.339	138.672
1972	19.213	8.167	216.038	91.833	235.251
1973	24.916	11.311	195.365	88.689	220.281
1974	42.962	9.897	391.143	90.103	434.105
1975	44.242	8.756	461.049	91.244	505.291
1976	34.698	6.674	485.163	93.326	519.861
1977	47.472	7.072	623.803	92.928	671.275
1 978	39.214	8.026	449.357	91.974	488.571
1979	58.162	9.801	535.253	90.199	593.415
1 980	31.000	6.102	477.000	93.898	508.000
1981	27.000	5.123	500.000	94.877	527.000
1982	44.000	7.432	548.000	92.568	592.000
1983	48.000	7.207	618.000	92.793	666.000
1984	49.000	7.174	634.000	92.826	683.000
1985	43.000	7.107	562.000	92.893	605.000
1986	35.000	5.303	625.000	94.697	660.000
1 98 7	40.000	6.192	606.000	93.808	646.000
. 1988	58.000	8.937	591.000	91.063	649.000
1989	27.000	3.750	693.000	96.250	720.000
1990	31.000	3.914	761.000	96.086	792.000
1991	38.000	5.142	701.000	94.858	739.000
1992	57.000	7.808	673.000	92.192	730.000
1993	67.000	8.656	707.000	91.344	774.000
1994	35.000	4.237	791.000	95.763	826.000
1 995	16.000	1.586	993.000	98.414	1009.000
1996	21.000	2.085	986.000	97.915	1007.000
1997	15.000	1.630	905.000	98.370	920.000
1998	21.000	2.123	968.000	97.877	989.000
1999	12.000	1.155	1027.000	98.845	1039.000
2000	15.000	1.604	920.000	98.396	935.000
2001	10.000	0.987	1003.000	99.013	1013.000
2002	12.000	1.112	1067.000	98.888	1079.000
2003	8.000	0.632	1257.000	99.368	1265.000
2004	10.000	0.677	1467.000	99.323	1477.000
Average		6.582		93.418	

Appendix Table D2.2: Total Exports from SeneGambia (US\$ Millions)

Source: International Financial Statistics, IMF

Appendix Table D2.3 - Market Potential in SeneGambia								
					-		Exports	
Voor	Cambia	Imports	Total	Cambia	Exports	Total	as % or	
1070	17 07	103 0/	211 01	16.86	151 80	168 74	71.67	
1970	21 33	218.07	211.91	13.40	121.09	138.67	52.13	
1072	21.33	210.97	304.68	10.40	216.04	735.07	70.01	
1972	24.77	260.67	201.00	24.02	105.27	255.25	10.91	
1975	51.15 46.51	300.07 407.55	544.07	4.92	201.14	424.11	49.00	
1974	40.31	497.33	642.00	42.90	391.14	434.11	71.09	
1975	59.00 74.14	625.55	700.66	44.24	401.03	510.86	/1./0 69.27	
1970	74.14	764.07	709.00 941.67	34.70	403.10	519.00	00.57	
1977	100.42	764.07	055 15	47.47	023.80	0/1.2/	/4.11	
1978	100.42	/34./3	855.15	59.21	449.30	488.57	52.55	
19/9	141.19	930.70	1,0/1.89	21.00	335.25	508.00	49.94	
1980	105.00	1,052.00	1,217.00	27.00	477.00	508.00	39.19	
1981	120.00	1,070.00	1,202.00	27.00	500.00	527.00	41.00	
1982	105.00	992.00	1,095.00	44.00	548.00	592.00	50.05	
1983	115.00	1,025.00	1,140.00	48.00	618.00	666.00	54.21	
1984	100.00	981.00	1,081.00	49.00	634.00	683.00	58.65	
1985	93.00	826.00	919.00	43.00	562.00	605.00	61.15	
1986	104.00	961.00	1,065.00	35.00	625.00	660.00	58.69	
1987	127.00	1,024.00	1,151.00	40.00	606.00	646.00	52.65	
1988	138.00	1,080.00	1,218.00	58.00	591.00	649.00	48.52	
1989	161.00	1,221.00	1,382.00	27.00	693.00	720.00	50.14	
1990	188.00	1,219.00	1,407.00	31.00	761.00	792.00	54.09	
1991	202.00	1,173.00	1,375.00	38.00	701.00	739.00	50.98	
1992	218.00	1,034.00	1,252.00	57.00	673.00	730.00	53.75	
1993	260.00	1,087.00	1,347.00	67.00	707.00	774.00	52.49	
1994	212.00	1,022.00	1,234.00	35.00	791.00	826.00	64.10	
1995	182.00	1,412.00	1,594.00	16.00	993.00	1,009.00	62.30	
1996	258.00	1,436.00	1,694.00	21.00	986.00	1,007.00	58.21	
1997	278.00	1,335.00	1,613.00	15.00	905.00	920.00	56.11	
1998	228.00	1,455.00	1,683.00	21.00	968.00	989.00	57.52	
1999	192.00	1,564.00	1,756.00	12.00	1,027.00	1,039.00	58.49	
2000	187.00	1,519.00	1,706.00	15.00	920.00	935.00	53.93	
2001	134.00	1,730.00	1,864.00	10.00	1,003.00	1,013.00	53.81	
2002	147.81	2;031.00	2,178.81	12.00	1,067.00	1,079.00	48.97	
2003	157.00	2,391.53	2,548.53	8.00	1,257.00	1,265.00	49.32	
2004	228.76	2,848.81	3,077.57	10.00	1,467.00	1,477.00	47.67	
Average			- - -				56.28	

Source: Central Statistics Department, Gambia; WTO ITS Database

	Senegal	Ghana	Guniea	G/Bissau	US	Japan	China
1070	10.84						
1071	12.40	-				-	
1072	0.49 -	-				-	
1972	9.06 -	-				-	
1974	20.08 -	-				- -	
1975	12.41 -	-					
1976	5.43 -	-				. .	
1977	4.06 -	-				. 	
1978	10.84 -	-		·		. _	
1979	2.11 -	-				 .	
1980	38 26 -	_				-	
1981	30.39 -	-				. _	
1982	21 75 -	-				. _	
1983	92.80 -	-				. _ .	
1984	21.48 -	_				<u>.</u>	
1985	90.79 -	-				-	
1986	231.05 -	-	'				
1987	98.84 -	-			<u> </u>	-	
1988	27.41 -	-					
1989	105.20 -	-				-	
1990	101.46	7.89	259.14			- ,	
1991	78.57	17.94	579.03			-	
1992	63.67	12.89	336.85		0.13 -	-	
1993	51.73	14.56	508.91	<u></u>	0.22 -		 .
1994	21.57	26.15	80.85		0.39 -	-	
1995	37.61	27.86	41.00		0.92 -		
1996	28.77	29.39	33.33		0.63 -		
1997	273.72	0.00	0.00		1.16 -		
1998	540.88	133.29	1544.61	1362.05	0.55	2.07	0.14
1999	210.13	296.18	3959.88	3162.64	1.26	4.06	0.15
2000	107.56	73.27	181.26	5609.13	0.10	11.48	0.01
2001	164.28	140.16	94.67	11408.66	0.31	3.80	0.00
2002	174.53	152.02	92.29	12501.67	0.14	0.88	0.00
2003	39.97	417.09	277.17	33500.92	0.07	3.99	0.97
2004	40.98	257.94	-919099.00	17343.70	0.30	5.65	0.06

Appendix Table D2.4 - Export Intensities

Source: Author's computation

Table D2.5a - Detailed Results of the ADF Unit root tests - Credit (level)

ADF Test Statistic	0.517838	1% Critical Value*	-3.6422
		5% Critical Value	-2.9527
		10% Critical Value	-2.6148

*MacKinnon critical values for rejection of hypothesis of a unit root.

Variable	Coeff.	S/Error	t-Statistic	Prob.
CR(-1)	0.081391	0.15718	0.517838	0.6084
D(CR(-1))	-0.01568	0.42241	-0.037121	0.9706
C	24.84088	42.1491	0.589357	0.56
R-squared	0.035941			
Adjusted R-squared	-0.02833			
S.E. of regression	165.6155			
Sum squared resid	822854.5			
Log likelihood	-213.871			
Durbin-Watson stat	1.73433			
Akaike info criterion	10.30585			

ADF Test Statistic	-6.96031	1% C	ritical Value*	-3.6576
		5% C	ritical Value	-2.9591
		10% C	ritical Value	-2.6181
*MacKinnon critical	values for re	ejection of	hypothesis of a	unit root.
Variable	Coeff.	S/Error	t-Statistic	Prob.
D(DCR(-1))	-2.59399	0.37268	-6.96031	0
D(DCR(-1),2)	1.17726	0.24861	4.73538	0.0001
С	20.0243	29.6539	0.675266	0.505
R-squared	0.63646			
Adjusted R-squared	0.61049			
S.E. of regression	160.091			
Sum squared resid	717618			
Log likelihood	-199.758			
Durbin-Watson stat	2.44779			

10.2433

Akaike info criterion

Table D2.5b - Detailed Results of the ADF Unit root testsCredit (First Diff)

Table D2.5c - Detailed Results of the ADF Unit root testsAverage Labour Productivity

ADF Test Statistic	3 418922	1% Critical Value*	-3 6496
	5.110/22		0.0550
		5% Critical Value	-2.9558
		10% Critical Value	-2.6164

Variable	Coeff.	S/Error	t-Statistic	Prob.
APL(-1)	0.148104	0.04332	3.418922	0.0019
D(APL(-1))	-0.134623	0.33779	-0.398546	0.6931
С	-96.83142	150.471	-0.64352	0.5249
R-squared	0.35262			
Adjusted R-squared	0.307973			
S.E. of regression	499.4143		•	
Sum squared resid	7233025			
Log likelihood	-242.6609			
Durbin-Watson stat	1.385453			•
Akaike info criterion	12.51593			

Table D2.5d - Detailed Results of the ADF Unit root testsAverage Labour Productivity - First Difference

ADF Test Statistic	2.02592	1% Critical Value*	-3.6576
		5% Critical Value	-2.9591
		10% Critical Value	-2.6181

*MacKinnon critical values for rejection of hypothesis of a unit roc

Variable	Coeff.	S/Error	t-Statistic	Prob.
DAPL(-1)	0.57422	0.28344	2.025921	0.0524
D(DAPL(-1))	-1.35615	0.2308	-5.875848	0
С	-40.3696	107.829	-0.374387	0.7109
R-squared	0.58095			
Adjusted R-squared	0.55102	•		
S.E. of regression	402.576			
Sum squared resid	4537894			
Log likelihood	-228.344			
Durbin-Watson stat	1.9237			
Akaike info criterion	12.0875			

Table D2.5e - Detailed Results of the ADF Unit root testsAverage labour productivity - Second difference

ADF Test Statistic	-3.24023	1%	Critical Value*	-3.6661
		5%	Critical Value	-2.9627
		10%	Critical Value	-2.62

*MacKinnon critical values for rejection of hypothesis of a unit root.

Variable	Coeff.	S/Error	t-Statistic	Prob.
DDAPL(-1)	-1.60031	0.49389	-3.240234	0.0032
D(DDAPL(-1))	-0.29069	0.28511	-1.019555	0.317
С	106.412	80.7598	1.317634	0.1987
R-squared	0.80959			
Adjusted R-squared	0.79549			
S.E. of regression	430.233			
Sum squared resid	4997722			
Log likelihood	-222.918			
Durbin-Watson stat	1.84444			
Akaike info criteri	12.2233			

Table D2.5f - Detailed Results of the ADF Unit root testsAverage labour productivity - Third difference

ADF Test Statistic	-9.71188	1% Critical Value*	-3.6752
		5% Critical Value	-2.9665
		10% Critical Value	-2.622

Variable	Coeff.	S/Error	t-Statistic	Prob.
DDDAPL(-1)	-3.44368	0.35458	-9.711883	0
D(DDDAPL(-1))	0.80413	0.20862	3.854472	0.0007
С	67.7427	76.7814	0.882281	0.3857
R-squared	0.94093			
Adjusted R-squared	0.93639			
S.E. of regression	412.171			
Sum squared resid	4417014			
Log likelihood	-214.188			
Durbin-Watson stat	1.63239			
Akaike info criterion	12.1406			

Table D2.5g - Detailed Results of the ADF Unit root testsDomestic absorption - Levels

ADF Test Statistic	-1.21865	1% Critical Value*	-3.6422
		5% Critical Value	-2.9527
	· · ·	10% Critical Value	-2.6148

Table D2.5h - Detailed Results of the ADF Unit root testsDomestic absorption - First difference

-4.31658	1% Critical Value*	-3.6576
	5% Critical Value	-2.9591
	10% Critical Value	-2.6181
	-4.31658	-4.31658 1% Critical Value* 5% Critical Value 10% Critical Value

Variable	Coeff.	S/Error	t-Statistic	Prob.
D(LNAB(-1))	-1.21369	0.28117	-4.31657	5 0.0002
D(LNAB(-1),2)	0.08373	0.18589	0.45040	0.6559
C	0.10529	0.0307	3.42992	1 0.0019
R-squared	0.56483			
Adjusted R-squared	0.53375			
S.E. of regression	0.10224			
Sum squared resid	0.29267			
Log likelihood	28.2848			
Durbin-Watson stat	2.0369			
Akaike info criterio	-4.46916			

Table D2.5i - Detailed Results of the ADF Unit root testsPer capita GDP - First difference

ADF Test Statistic	-5.85288	1%	Critical Value*	-3.6576
		5%	Critical Value	-2.9591
		10%	Critical Value	-2.6181

Variable	Coeff.	S/Error	t-Statistic	Prob.
DPCGDP(-1)	-1.63399	0.27918	-5.852881	0
D(DPCGDP(-1))	0.22555	0.16961	1.329761	0.1943
С	-0.90466	0.84961	-1.064799	0.2961
R-squared	0.72279			
Adjusted R-squared	0.70299			
S.E. of regression	4.70759			
Sum squared resid	620.519			
Log likelihood	-90.4339			
Durbin-Watson stat	1.89144			
Akaike info criterion	3.19012			

ADF Test Statistic	-3.60665	1% C	ritical Value*	-3.6422
		5% C	ritical Value	-2.9527
		10% C	ritical Value	-2.6148
*MacKinnon critical Variable	values for re Coeff.	jection of	hypothesis of a t-Statistic	a unit root. Prob.
E(-1)	-0.78748	0.21834	-3.606647	0.0011
D(E(-1))	0.091599	0.1818	0.503846	0.618
C	783577.3	333439	2.349984	0.0255

0.366164

0.323908

1453548

6.34E+13

-513.506

1.997063

28.46554

R-squared

Adjusted R-squared

S.E. of regression

Sum squared resid

Durbin-Watson stat

Akaike info criterion

Log likelihood

Table D2.5j- Detailed Results of the ADF Unit root testsExports - Levels

ADF Test Statistic	-6.01929	1% Critical Value*	-3.6496
		5% Critical Value	-2.9558
		10% Critical Value	-2.6164

Table D2.5k - Detailed Results of the ADF Unit root testsExports - First difference

Variable	Coeff.	S/Error	t-Statistic	Prob.	
D(E(-1))	-1.71357	0.28468	-6.019293	0	
D(E(-1),2)	0.315925	0.17652	1.78976	0.0839	
С	5716.399	296962	0.01925	0.9848	
R-squared	0.685811				
Adjusted R-squared	0.664143				
S.E. of regression	1679785				
Sum squared resid	8.18E+13				
Log likelihood	-502.525				
Durbin-Watson stat	2.072669				
Akaike info criterion	28.75741				

Table D2.5l - Detailed	Results of the	ADF Unit	root tests
Trade diversion index			

ADF Test Statistic	-3.70824	1% Critical Value*	-3.6422
		5% Critical Value	-2.9527
		10% Critical Value	-2.6148

*MacKinnon critical values for rejection of hypothesis of a unit root.

Variable	Coeff.	S/Error	t-Statistic	Prob.
DV(-1)	-0.21445	0.05783	-3.708238	0.0008
D(DV(-1))	-0.23936	0.14861	-1.610672	0.1177
С	3.39E-06	1.99E-06	1.707013	0.0982
R-squared	0.34125			
Adjusted R-squared	0.29733			
S.E. of regression	6.09E-06			
Sum squared resid	1.11E-09			
Log likelihood	351.024			
Durbin-Watson stat	2.0771			
Akaike info criterion	-23.9303			

Appendix Table D2.6 - Johanssen Cointegration Test Results

Test assumption	: Lin	ear determin	istic trend in the	e data		
Series: DLNE D	DDI	LNLP DLNA	B DM DV DC	R		
Lags interval: 1	to 1					
		Likelihood	5 Percent	1 Percent	Hypothesized	
Eigenvalue		Ratio	Critical Value	Critical Value	No. of CE(s)	
0.9	9181	156.1333	94.1500	103.1800	None **	
0.7	7334	83.5857	68.5200	76.0700	At most 1 **	
0.5	5763	45.2463	47.2100	54.4600	At most 2	

*(**) denotes rejection of the hypothesis at 5%(1%) significance level L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

DLNE	DDDLNLP	DLNAB I	OM	DV a	DCR
0.1116	-2.7311	0.2782	0.0006	-1,419.4330	0.0009
0.2314	0.7337	1.9921	0.0136	5,857.5420	0.0013
-0.2411	1.1718	2.5212	0.1358	-2,483.8210	-0.0002
0.0629	0.3672	1.0771	0.0853	-19,931.9300	-0.0016
-0.0063	-0.2483	0.5077	-0.4344	-1,458.2110	-0.0015
-0.0037	-0.1921	0.7187	0.0907	4,852.6010	-0.0030

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

DLNE]	DDDLNLP	DLNAB	DM		DV	DCR	C
	1.0000	-24.4723	2.4928		0.0050	-12,719.0900	0.0076	-0.1636
		-4.0731	-1.8200		-0.2348	-11,113.8000	-0.0021	

Log likelihood 159.0149

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

DLNE		DDDLNLP	DLNAB	DM		DV	DCR	С
	1.0000	0.0000	7.9086		0.0527	20,954.8000	0.0060	-1.5273
			-1.8650		-0.2047	-9,684.3500	-0.0018	
	0.0000	1.0000	0.2213		0.0019	1,376.0010	-0.0001	-0.0557
Log likeliho	od	178.18						