

UNIVERSITY OF CAPE COAST

ACCUMULATION OF INTERNATIONAL RESERVES AND ECONOMIC
GROWTH IN THE WEST AFRICAN MONETARY ZONE

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

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Supervisor's Declaration


We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

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ABSTRACT

This study mainly sought to find out (i) the factors that have influenced the demand for international reserves in the WAMZ (ii) the effect of international reserves accumulation on economic growth and (iii) whether there is a threshold effect in the international reserves-economic growth nexus. Using quarterly data from 1984 to 2009, it adopted both the parametric and non-parametric estimation methods. The results indicated that the mercantilist motives as well as the precautionary motives are the main drivers in the long run.

Furthermore, the results confirmed the validity of Mrs. Machlup Wardrobe and the related Joneses argument, the monetary approach to balance of payments as well as the threshold effect in the demand for international reserves. Finally, the results indicated that there is a positive long run relationship between economic growth and international reserves for all the five countries meaning that accumulation of international reserves promotes economic growth and that there exists a threshold effect in the economic growth-international reserves nexus.

A U-shaped relationship between economic growth and international reserves was established, a result which is quite new to the literature on economic growth and international reserves. To reduce the impact of a crisis and increase export competitiveness, it is recommended that the monetary authorities of WAMZ hold significant amount of reserves. It is also, recommended that international reserves be used as a tool to promote economic growth in the West African Monetary Zone.

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DEDICATION

To my wife, Patience and lovely children, Marian Selly, Emmanuel Isaac and

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CHAPTER ONE

INTRODUCTION

This chapter covers the background to the study, problem statement, objectives of the study and the statement of the hypotheses. In addition, the significance of the study and the organisation of the chapters are also considered.

Background to the study

Economic integration among nation states is encouraged because it remains an important route to economic growth and development. It is a process by which a group of countries comes together to forge a larger economic environment in order to enhance economic growth and development. Monetary integration is an important dimension of economic integration which involves the establishment of a central monetary authority, a unified monetary policy, a single currency or a mechanism by which all the national currencies are made convertible to one another.

Given the importance of monetary integration to the economic development of the West African sub-region, the Authority of Heads of State and Government of the Economic Community of West African States (ECOWAS) in 1975 created the West African Clearing House (WACH) as a payment mechanism to facilitate intra-regional trade within the sub-region. In 1986 WACH was restructured and metamorphosed into the West African Monetary Agency (WAMA) with an expanded mandate of promoting trade liberalization and monetary cooperation. In addition, it is expected to ensure the establishment of a single monetary zone by creating the necessary

conditions leading to the implementation of uniform monetary policy and creation of a single currency.

In furtherance of the monetary integration initiatives, the Authority of Heads of State and Government at the Abuja (Nigeria) Summit in 1987 adopted the ECOWAS Monetary Cooperation Programme (EMCP). The main objective is to achieve a harmonised monetary system through the observance of a set of macroeconomic convergence criteria that would ultimately result in the strengthening of the economies of member states. The convergence criteria consist of four primary criteria and eight secondary criteria which ECOWAS member countries are expected to observe before they can join the single monetary union in 2005. The primary convergence criteria are reduction budget deficit to GDP ratio to a maximum of 3 percent; reduction of central bank deficit financing to a ceiling of 10 per cent of a previous year's fiscal revenue; maintenance of a maximum 5 percent inflation rate; and maintenance of gross international reserves to cover at least six months of import.

In generic terms, international reserves are defined as those assets that a country's monetary authorities can use either directly or by converting them into other assets to support the exchange rate when the country's balance of payments move into deficit. They exist in every independent economy that does not completely close its door for international transactions, though the amounts held by the authorities in different economic regions are varied with an array of policy-determined and objective factors. According to Heller (1966), international reserves possess two qualities. First, they are acceptable at all times to foreign economic agents for payment of financial obligations. Second, their value, expressed in foreign units of account, should be known

with certainty. In the Breton Woods period (late 1940s to the early 1970s) when exchange-rate rigidity prevailed, those assets were mainly used, directly or through assured convertibility into other assets, to support currency exchange rates in times of external payments deficit.

Many developing countries including Latin American and sub-Saharan African countries, have recorded paltry growth since the beginning of the 1980s, (UNCTAD, 2003). Some of these economies have, since the mid-1990s but particularly the end of the South East Asian financial crisis of 1997-1998, amassed large amounts of international reserves. Latin America, for example, by 2005 had accumulated 63.4 per cent more international reserves than it had in 1996, when the Mexican peso crisis concluded. Sub-Saharan Africa accumulated an astonishing 290 per cent during the same period (Cruz & Kriesler, 2008, 2010).

Global foreign currency reserves rose sharply in the years prior to the global economic crisis, and continued to rise in the early months after the onset of the financial crisis, peaking at \$7.15 trillion in July 2008. Between July 2008 and February 2009, during the height of the crisis, foreign currency reserves fell by 5.8 percent, largely as a result of efforts by emerging markets and some advanced economies to stem currency depreciation. Foreign currency reserves resumed their rapid upward rise since then, reaching \$8.1 trillion at the end of 2009. These developments challenge existing approaches to the demand for reserves. Theoretical models as well as empirical estimations of the reserve demand fail to explain this enormous increase in reserves. Hence, this puzzle gave rise to a series of papers that – after

economists had almost ignored the topic for two decades – analyse international reserve holdings, both theoretically and empirically.

Existing theories offer a few reasons for holding international reserves. One common explanation is the precautionary demand motivated by trade financing considerations. The recent literature has extended the precautionary motive and considers accumulation of international reserves a policy to avoid crisis-induced output losses and investment contractions (Jeanne & Rancière 2006; Lee 2004).

Governments accumulate reserves for a variety of reasons. A small amount of foreign currency reserves may be needed for day-to-day transactions including debt repayments, payments to international organizations, and payments for imports. The latter may be most important for low income countries such as the countries of the West African Monetary Zone (WAMZ). Countries with pegged exchange rates need to hold reserves to offset downward pressure on their currencies. Even economies with flexible exchange rates hold some reserves in order to intervene in foreign exchange markets to prevent a disorderly depreciation of their currency. Governments also hold reserves to provide a defense against substantial and rapid capital outflows that could cause a loss of investor confidence and a currency crisis. This self-insurance motive has received the most attention in recent years and is often seen as one reason for the increase in global reserves since the financial crises of the late 1990s. The steep increase in international reserves definitely helps these economies to deter speculative attacks. Nonetheless, the dramatic jumps in international reserve holdings raise concerns in both policy and academic circles. In general, it is perceived that some of these economies

are holding international reserves at levels that are difficult to be rationalized by conventional factors.

There is also the mercantilist motive for hoarding international reserves. According to Dooley, Folkerts-Landau and Garber (2004) international reserve accumulation is a by-product of the development strategy that promotes exports with an undervalued currency. Apart from these economic reasons, one seemingly non-economic reason, the so-called Mrs. Machlup's Wardrobe hypothesis and the related keeping up with the Joneses argument may help account for the part of international reserve accumulation that is not explained by standard macroeconomic variables. Machlup (1966) argued that the behaviour of monetary authorities with regards to reserve accumulation was very much like that of his wife with regards her wardrobe. Irrespective of how many clothes she possessed, Machlup observed her tendency to add to her stock of them year upon year. This became known as the Mrs. Machlup's Wardrobe Theory of International Reserves. On his wife's dress need, Machlup (1966, p. 26) suggests that it depends "on the Joneses with whom she wishes to keep up." That is, besides some fundamental considerations, the buildup of international reserves depends on the behavior of neighboring economies.

There have been divergent views about reserves holding. For those who criticize the accumulation of reserves (such as Cruz & Kriesler, 2008, 2010; Cruz & Walters, 2008), the reasons for the large hoardings of foreign currency, particularly for developing economies, are mainly underpinned by the so-called precautionary, mercantilist and policy autonomy motives (Aizenman, 2007, 2006, Aizenman & Lee, 2007, Bird & Mandarilas, 2005).

There is, nevertheless, no guarantee that these aims can be achieved and accumulating reserves for their own sake generates direct and potential costs both for the domestic and for the global economy. Moreover, there is no theoretical justification for the large quantities of foreign resources being amassed (Cruz & Walters, 2008, García & Soto, 2004, Mohanthy & Turner, 2006, Schiller, 2007, Wheatley, 2007).

The international implications of countries building up excess international reserves also need to be noted. In some cases, reserves accumulate as a result of intentional policy decisions (as is the case for the countries of West African Monetary Zone (WAMZ)), that reduce domestic growth and increase net exports. When one country increases its reserves, effective demand is reduced elsewhere. In particular, the buildup of reserves is associated with lower rates of growth of output, but also of imports. As a result, a general build up of reserves of the kind noted will be associated with lower levels of global demand and, therefore, lower levels of world economic activity. So, the build-up of reserves is associated with lower levels of both domestic and international demand. To the extent that poor growth in capitalist economies is due to insufficient levels of aggregate demand, the excess of international reserves can be used to stimulate aggregate demand through any or some of its components. Developing economies, on the other hand, lack sufficient productive capacity, so here demand can be boosted through further levels of investment. In these economies, the expansion of physical capacity occupies a central role 'in the interplay of linkages that make up a virtuous growth regime' (UNCTAD, 2003, p. 61), and therefore provides the basis for long-term growth.

In sum, the concern of the critics of reserves holdings is about the cost of holding reserves which is investment nations must forego in order to accumulate reserves. They are of the view that hoarding of international reserves crowd out public investment in the sense that it prevents governments from spending on public infrastructure which is very critical as far as promotion of economic growth is concerned and that holding of international reserves represents a potential source to boost growth. They further, argue that the resources being amassed largely overwhelm protective needs, and the excess reserves could be used to promote growth.

The supporters of reserves holding, however, argue that the cost of reserves holding is small compared to the economic consequences of exchange rate variations. For instance, depreciation in the value of the currency, caused by either financial crises or other internal or external shocks, may raise a country's costs of paying back debt denominated in foreign currency as well as its costs of imported items. Apart from that, it also creates high inflation expectations. Many of the currency and financial crises of the last ten years have been associated with the contractionary effects of currency depreciation, with substantial output losses, especially through balance sheet channels (for example, Choi & Cook, 2004, and Frankel, 2005).

Reddy (2006) summarizes the benefits of holding foreign exchange reserves: "In any country risk analysis by rating agencies and other institutions, the level of reserves generally has high weights. Moreover, it is essential to keep in view some hidden benefits which could accrue to a country holding reserves, which may, inter alia, include: maintaining confidence in monetary and exchange rate policies; enhancing the capacity to

intervene in foreign exchange markets; limiting external vulnerability so as to absorb shocks during times of crisis; providing confidence to the markets that external obligations can always be met; and reducing volatility in foreign exchange markets.”

Polterovich and Popov (2003), also, argue in favour of reserve accumulation that it appears that under certain conditions (externalities associated with international trade and/or various kinds of traps in which developing countries often find themselves due to market failures), the authorities/central bank can boost economic growth by building up the stock of foreign exchange reserves instead of using them for consumption. The reasons offered to explain why exchange rate under-valuation can promote long-term economic growth are:

First, accumulation of foreign exchange reserves has the conventional short-term expansionary effect – relative prices of tradables increase with respect to prices of non-tradables and wages. In the long run this effect disappears as increased profits are invested and lead to increased demand for nontradables and labor. But if there are subsequent unexpected rounds of foreign exchange reserves build up, the long-term growth rates may increase. Second, undervaluation of the currency stimulates the increase in exports. This increase in exports raises accumulated knowledge due to learning from external trade and therefore economic productivity as well. The rate of growth rises and this outweighs the potential gain from spending reserves for current needs.

Third, undervaluation lowers foreign currency prices of domestic real assets and thus attracts foreign direct investment. Besides, continuing foreign

exchange reserves build up (especially in periods of trade deterioration) gives a powerful signal to investors that the government is in full control of the situation and can afford costs for the sake of pursuing a consistent policy. Even if foreign exchange reserves accumulation outweighs the FDI flow, FDI externalities may be strong enough to accelerate growth. For obvious reasons technologically backward countries have much more to gain from export externality and from the inflow of foreign direct investment and that is why the benefits of reserve accumulation should be especially promising for developing countries.

Statement of the problem

One puzzle of the international financial system is the enormous increase in international reserve holdings by central banks since the demise of the Bretton Woods system. In contrast to economic theory, the transition to de-jure more flexible exchange rate regimes was not accompanied by a permanent reduction in the level of reserves. Theory predicts that floating exchange rate would eliminate the nth country or reserve currency problem.

Haberler (1977) speculated that a nation's reserve demand should decrease after exchange rates are allowed to fluctuate in response to changes in trade. Thus exchange rate flexibility should reduce the demand for international reserves. Global holdings of international reserves have however, increased rapidly in recent years. Emerging markets have accumulated reserves well above the levels suggested by traditional rules of thumb based on current account transactions and short-term external liabilities.

An evaluation of the dynamics of the accumulation process in the post Bretton Wood period of flexible global exchange rates for a sample of 139 countries by Bastourre, Carrera and Ibarlucia (2006) revealed that even when total stock of reserves is highly influenced by major countries which are well known accumulators like Japan, Korea, China, Taiwan, India or Russia, accumulation is widely diffused across countries. African countries have accumulated substantial foreign currency reserves in recent years, mostly from higher commodity exports as well as aid flows. In the context of macroeconomic stabilization, which remains at the forefront of national economic policy making and aid conditionality, African countries are induced to hold reserves to allow monetary authorities to intervene in markets to influence the exchange rate and inflation. Adequate reserves also allow the country to borrow from abroad and to hedge against instability and uncertainty of external capital flows. However, reserve accumulation can have high economic and social costs, including a high opportunity cost emanating from low returns on reserve assets, losses due to reserve currency depreciation, and forgone gains from investment and social expenditure that could be financed by these reserves. Therefore, African countries need to have a better understanding of the determinants and the effects of reserve accumulation on some key factors that promote economic growth and economic costs of reserve accumulation and to design optimal reserve management strategies to minimize these costs.

The convergence criterion of gross reserves of at least three months import cover by the end of 2000 and six months by the end of 2003 for member countries of the West African Monetary Zone has been very

challenging if not difficult. Member countries are striving to build up more reserves in order to meet the criterion. As at the end of June 2006, Gambia had external reserves equivalent to 4.1 months of import cover, Sierra Leone had 2.1 months of import cover , Ghana had 3.6 months of import cover, Guinea, two months and Nigeria had 23 months of import cover and the region as a whole had 20 months of import cover (WAMI 2006). Apart from Nigeria, the other countries reserve position fell far short of the six months import cover targeted for 2003.

According to World Bank (2012) estimates, by the close of 2009, Gambia had external reserves equivalent to 7.4 months of import cover, Sierra Leone had 7.2 months of import cover, Ghana had 3.6 months of import cover, Guinea, two months and Nigeria had 9.3 months of import cover and the region as a whole had 20 months of import cover. The crave for international reserves accumulation even in the face of challenges associated with low investment, culminating in low economic growth in the sub-region brings to mind new questions to be answered by international macroeconomics literature. There appears to be some peer pressure on each member country to meet this criterion and to keep up with the other members of the monetary zone. Common to every economic phenomenon, these developments have earned the praises of many as they equally have drawn severe criticisms from others who question the rationale for building reserves in the face of crippling domestic economic activities and high incidence of poverty in these countries.

Furthermore, a review of the empirical literature shows that the numerous studies done on the demand for international reserves as well as the determinants of economic growth have all used parametric estimation. One of

the major disadvantages of the parametric estimation is that it imposes functional forms, thus exposing researchers to potential misspecification problems. Testing for model (mis)specification exposes researchers to possibilities of Type 1 error. These problems can be avoided if one resorts to non-parametric estimation. Non-parametric estimation is seen to be more superior in the sense that it makes no assumptions about the form of the relationship and allows the form to be discovered using the data itself. Also, none of the studies make any attempt to find out the possibility of a threshold effect in the demand for international reserves as well as the international reserves-economic growth nexus.

Using both the parametric and non-parametric estimation, the study addresses the following questions.

1. What are the macroeconomic factors/variables that influence the accumulation of international reserves in the West African Monetary Zone (WAMZ)?
2. Are the precautionary and mercantilist motives relevant in explaining the reserve hoarding behavior of the countries in the WAMZ?
3. Are the Mrs. Machlup-Wardrobe theory and the related keeping up with the Joneses argument valid in the WAMZ?
4. Does the monetary approach to balance of payment help to explain the international reserve holding behavior in WAMZ?
5. Are there threshold effects in international reserves holdings in the WAMZ?
6. To what extent do the international reserves of these countries depart from their respective optimal levels?

7. What is the relationship between international reserves accumulation and economic growth?
8. Is there a threshold effect in the international reserves-economic growth nexus?

Objectives of the study

The principal objective of this study is to use parametric and non-parametric estimation to examine the international reserves-economic growth nexus in the West African Monetary Zone.

The specific objectives are to:

1. determine the factors that influence international reserves accumulation in WAMZ.
2. find out whether the precautionary and mercantilist motives are relevant in explaining the reserve hoarding behaviour in WAMZ.
3. test whether monetary authorities exhibit a Mrs. Machlup syndrome and the related Joneses effect.
4. find the implications of monetary approach to balance of payments for reserves holding behaviour in WAMZ.
5. find out if there are threshold effects in the demand for international reserves.
6. determine the extent to which the international reserves of these countries depart from their respective optimal levels.
7. establish the magnitude of the long-run effects of international reserves on economic growth.

8. determine whether there is a threshold effect in the international reserves-economic growth nexus.

Statement of hypotheses

The specific hypotheses to be tested in this study are:

1. The precautionary and mercantilist motives are not relevant in explaining the reserve hoarding behavior in WAMZ.
2. The monetary authorities in WAMZ do not exhibit a Mrs. Machlup syndrome and the related Joneses effect.
3. The monetary approach to balance of payments does not explain international reserves holding behaviour in WAMZ.
4. There are no threshold effects in the demand for international reserves.
5. There is no long run relationship between international reserves and economic growth.
6. There is no threshold effect in the international reserves-economic growth nexus.

Significance of the study

In spite of the importance of the on-going debate on the issue of international reserves accumulation, no serious attempt has been made to work on the factors that influence international reserves accumulation in the WAMZ. This study therefore, helps identify the significant factors that influence international reserves accumulation in the WAMZ. The study also tests the validity of a very important theory in international economics namely the Mrs. Machlup Wardrobe theory of international reserves and the related

keeping up with the Joneses argument. The results of this test will indicate whether countries of WAMZ exhibit Mrs. Machlup Wardrobe syndrome and the Joneses effect as far as international reserves holding is concerned. The study will therefore, contribute to literature on international reserves accumulation.

Furthermore, the contribution of the study to literature can be seen in terms of the methodology adopted in the study. This study will be one of the very few studies if there are any at all, that has adopted both the parametric and non-parametric estimation methods to examine the dynamics of international reserves hoarding behavior and to find out the existence of threshold effect in the demand for international reserves, an approach which is very new to the literature on international reserves demand. Also, the study will be one of the very few studies, if not the only study so far, that has adopted both the parametric and non-parametric estimation methods to examine the relationship between economic growth and international reserves and also to find out the existence of a threshold effect. Furthermore, none of the studies done elsewhere, as reviewed in the literature, has adopted the panel data unit root and panel cointegration tests to examine the long run effect of international reserves accumulation on economic growth as this study has done. The study therefore, helps bridge the research gap and expands the frontiers of knowledge.

International reserves accumulation has been one of the preferred policies put in place by member economies of WAMZ to achieve financial stability culminating in the introduction of a single currency. The aim of this policy is to increase liquidity and thus reduce the risk of suffering a

speculative attack. However, no analysis has been done to find out whether this strategy is, or could be, more broadly supportive of economic growth and development, an issue that must be of central interest for the countries of WAMZ. This study therefore, helps throw some light on the relationship between international reserves accumulation and economic growth and by so doing contribute to the on-going debate on international reserves accumulation i.e. whether it is necessary for countries in WAMZ to accumulate international reserves.

The results of the study will inform policy makers on the appropriate policy direction to follow concerning the issue of international reserves accumulation. If international reserves accumulation is proven to be supportive of economic growth and development in WAMZ then that will give a very strong indication to policy makers to put in place appropriate policy measures that will help promote a sustained increase in the reserve holdings of the countries of WAMZ. On the other hand, if international reserves accumulation is proven to be non-supportive of economic growth and development in WAMZ then the convergence criterion concerning reserve accumulation will have to be revisited.

Organisation of the study

The thesis is made up of eight related chapters. Chapter Two takes a look at the regional integration efforts and the adequacy of the international reserves in the West African Monetary Zone using the standard measures or benchmarks. Chapter Three covers an overview of the economies of the five countries making up the West African Monetary Zone namely Ghana, Nigeria,

The Gambia, Sierra Leone and Guinea. These two chapters provide the needed background for the kind of analysis to be carried out later on.

In the fourth chapter, theoretical postulates and empirical findings on the demand for international reserves and the effect of international reserves accumulation on economic growth are reviewed with the view to identifying the possible relevant variables for the demand for international reserves and also the key variables that influence economic growth. The empirical literature review also assists in identifying some gaps in the literature and helps position this research in its right place. Chapter Five focuses on the specification of the models and the methodology for our estimation. Data descriptions and sources are also covered in this chapter. The various tests conducted such as the tests for unit root, cointegration, Joneses and threshold effects, the analysis and interpretations of the results are covered in chapters six and seven. Chapter six does the analysis and interpretations of the results of the demand for international reserves whereas chapter seven considers the analysis of the effects of international reserves accumulation on economic growth. Chapter Eight presents the summary, conclusions, policy implications and recommendations of the study.

CHAPTER TWO

**REGIONAL INTEGRATION EFFORTS AND INTERNATIONAL
RESERVES ADEQUACY IN THE WEST AFRICAN MONETARY
ZONE**

This chapter covers the regional integration efforts of the West African sub-region. It presents issues concerning ECOWAS, the rationale for the West African Monetary Zone, and the macroeconomic convergence criteria of the West African Monetary Zone. Lastly, the assessments of the adequacy of the international reserves using the standard measures or benchmarks are also considered.

Regional integration in West Africa

Regional economic integration, simply defined, is an agreement among contiguous nations to allow for the free flow of ideas, investment funds, technology, goods and services, and free movement of persons within the region in which a single large market subsists with the benefits of comparative advantage and economies of scale. Regional economic cooperation has gained momentum partly as a strategy to cope with global economic problems and partly to enhance domestic economic growth and development. As many countries are not strong enough on their own to cope with the rapid changes in the global economy, groups of countries use regional integration to achieve the necessary conditions for sustainable growth and development.

The major potential cost of economic integration is the uneven sharing of gains from the integration process, but compensation schemes are usually designed to equalise the gains over time. Other costs include loss of

discretionary use of macroeconomic policy instruments for stabilisation purposes by individual members of the union and a partial loss of sovereignty. Monetary integration as a major policy in the economic integration process usually involves the establishment of convergence criteria, a common central bank, a unified monetary policy, and a single currency (or at least a mechanism by which all the national currencies of the group are made convertible to each other).

There are two prominent monetary unions in Africa. The West African CFA zone, known as WAEMU, comprises Benin, Burkina Faso, Côte d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo. WAEMU and the Central African CFA zone, known as CAEMC, comprises Cameroon, Central African Republic, Chad, Equatorial Guinea, Gabon, and the Republic of the Congo. They operate almost identically. They were established by France and survived after independence, unlike their counterpart in the anglophone countries, which was broken up after the independence of the members.

The WAEMU and CAEMC countries each use a single currency (a variant of the CFA franc) and have a common central bank, Banque Centrale des Etats de l'Afrique de l'Ouest (BCEAO) and Banque des Etats de l'Afrique Centrale (BEAC), respectively. The CFA franc was pegged to the French franc prior to 1999 and is now pegged to the euro. WAEMU has a common pool of reserves which under an agreement are kept with and managed by the French Treasury. WAEMU is required to hold external assets at least equal to 20% of its sight deposits. Policy actions are required if that threshold is not being met. A regional council of ministers and the BCEAO decide on monetary targets based on input from national monetary authorities. Monetary

financing of governments is limited to 20% of the previous year's budgetary revenues while both current and capital account convertibility is operated in principle but with occasional restrictions. Capital mobility is low in practice.

The Economic Community of West African States (ECOWAS)

Regional alliances are common in Sub-Saharan Africa (SSA), and there are substantial initiatives to promote integration as a means of stimulating economic development. The recently restructured African Union (AU) and the New Economic Partnership for African Development (NEPAD) exemplify this growing commitment towards African cooperation and unity. On a smaller geographic level, the Economic Community of West African States (ECOWAS) is one of the most advanced partnerships on the continent. Since its creation in 1975, ECOWAS has espoused the objective of increasing trade liberalization, and the organization has recently intensified its move towards financial integration.

ECOWAS was founded by all the West African countries, and includes the francophone (WAEMU) countries, the anglophone countries (the Gambia, Ghana, Guinea, Liberia, Nigeria and Sierra Leone) and Portuguese-speaking Cape Verde. The ECOWAS Monetary Cooperation Programme (EMCP) is the most prominent scheme for monetary integration in the West African sub-region. It was originally scheduled for between 1991 and 1994, but was extended to the year 2000. It was further extended in December 1999 to 2004.

The specific objectives of the EMCP were to be implemented in three phases. In the short term, the aim was to strengthen the existing payment mechanism of the West African Clearing House (WACH) through the

settlement of outstanding payment arrears in the clearing mechanism; introducing new payment instruments such as the traveller's cheque; introducing a credit guarantee fund facility to support the clearing mechanism; and removing all non-tariff barriers that tend to restrict the use of national currencies to effect payments for some current transactions such as hotel bills and air tickets.

In the medium term, the EMCP was expected to achieve limited regional convertibility of national currencies by removing existing restrictions on their use. In the long run however, the ultimate goal of the EMCP is the establishment of a single ECOWAS monetary area involving the use of a common convertible currency, the establishment of a common central bank, the pooling of foreign exchange reserves and the negotiation of an external convertibility guarantee with an appropriate international agency. To facilitate these objectives, member states were to embark on an economic policy reform programme to achieve macroeconomic convergence. The policy reform programme was to embrace:

- a. realignment of exchange rates and the adoption of a market-based exchange rate policy;
- b. removal of exchange control regimes; and
- c. minimising of fiscal deficits and their financing through the rationalisation of government expenditure and tax reform.

The short-term objectives of the EMCP have not been fully achieved, as exemplified by the failure to clear the arrears in the clearing house mechanism, the delay in introducing new payment instruments, the problems with the newly introduced ECOWAS traveller's cheques and the

unwillingness of members to remove non-tariff barriers to intraregional trade and other transactions. The medium- to long-term objectives of the EMCP have also not been fully attained, leading to the deferral of the establishment of the single monetary zone.

Achieving the ECOWAS single monetary zone: the second monetary zone option

The failure of the ECOWAS integration process to make significant progress since its inception in 1975 was one of the motivating factors behind the “fast track” approach to monetary integration in the sub-region. It was generally felt that the non-existence of parallel and competing monetary arrangements in the sub-region had been a major factor militating against the movement towards a single monetary zone.

On the one hand, the CFA zone has appeared to be a solid arrangement, especially with the backing of France and the European Union. On the other hand, the countries outside the CFA zone have different national currencies. The challenge of accelerated integration in the sub-region has therefore fallen more on these latter countries. Consequently, the political commitment to renewed economic cooperation spearheaded by Ghana and Nigeria since December 1999, and accepted by Guinea, the Gambia, Sierra Leone and Liberia, made the idea of the fast track approach to integration a feasible proposition. The idea has crystallised into the formation of the West African Monetary Zone (WAMZ) with the aim of merging it with the CFA zone in 2004.

At a mini-summit of heads of state and government of member countries in Bamako in late 2000, the critical decisions were adopted with the intention to formally establish the West African Monetary Zone, with a common central bank, and to introduce a single currency in the zone by 2003. The West African Monetary Institute (WAMI), domiciled in Accra, Ghana, was set up as an institutional vehicle to establish the WAMZ and make necessary preparations for the emergence of the common central bank and the introduction of a single currency as planned. It became operational in January 2001.

Rationale for the West African Monetary Zone

The need for the second monetary union arose largely as a result of inadequate political will to forge a strong monetary integration between the CFA zone and the non-CFA zone under the aegis of the EMCP. The emergence of the WAMZ as a successful monetary union is thus likely to prevent a total collapse of the EMCP. It may indeed facilitate the movement towards a single monetary zone in the sub-region since negotiations will take place between two groups of countries in contrast to the current situation characterised by uncertainties about the integration process of the sub-region. Even if the eventual merger of the two monetary zones takes more time to materialise than presently envisaged, the convergence of the two groups of countries will be less cumbersome than the convergence of many countries with various currencies.

The primary economic policy objectives of WAMZ are to ensure price stability, sound fiscal and monetary conditions and a sustainable balance of

payments in the member states. To this end, the WAMZ is enjoined to adopt a regional economic policy for the zone through effective coordination of member states' economic policies, conduct the regional economic policy in the context of an open market economy and specifically design and implement common monetary and exchange rate policies in the zone.

The WAMZ is also to put into force a multilateral surveillance system to ensure close coordination of member states' economic policies and sustained convergence of economic indicators of member states. To undertake this function, the key institutions of the WAMZ - the Convergence Council, Technical Committee, WAMI and the West African Central Bank - are to formulate broad guidelines for the design of economic policies of member states.

Macroeconomic convergence criteria of the West African Monetary Zone

Although ECOWAS was conceived with the possible future of monetary integration in mind, it was not until near the end of the 1990s that concrete steps were taken towards achieving this goal. It was planned that the WAMZ would merge with the CFA zone in January 2004 in accordance with the EMCP, thus creating the long-awaited single monetary zone in the sub-region.

However, before this goal is realised, the member states of the WAMZ are to comply with some convergence criteria, which will ensure macroeconomic stability and reasonable growth in the member states. The quantitative primary convergence criteria are:

- (a) single digit inflation rate by 2000 and 5% by 2003;

- (b) budget deficit (excluding grants) of not more than 5% of GDP by 2000 and 4% by 2002;
- (c) central bank financing of budget deficit to be limited to 10% of previous year's tax revenue; and
- (d) gross external reserves to cover at least three months of imports by end-2000 and six months by end-2003.

Additionally, there are six secondary criteria, which will be observed in support of the primary criteria. These are:

- (a) prohibition of new domestic debt arrears and liquidation of all existing arrears;
- (b) tax revenue to be more than 20% of GDP;
- (c) wage bill to be less than 35% of total tax revenue;
- (d) public investment to be more than 20% of tax revenue;
- (e) maintenance of real exchange rate stability in the context of an exchange rate mechanism; and
- (f) maintenance of positive real interest rates.

An analysis of the performance of member states as far as the convergence criteria are concerned indicates that the performance has been mixed. As at the end of 2009, Ghana and Gambia had met three of the primary criteria. However, Guinea experienced its worst performance since December 2005, as it did not meet any criterion in 2009. Nigeria sustained its performance by maintaining three criteria as at June 2010, while Sierra Leone met only one criterion at the end of the 2009 period.

At the 34th meeting of the Technical Committee of the West African Monetary Zone, (WAMZ) in Abuja, Acting Director General of the West

African Monetary Institute (WAMI) John Kitcher disclosed that none of the countries in West Africa satisfied all the four primary monetary convergence criteria in their performance for the first half of 2012. Four countries (The Gambia, Liberia, Guinea and Nigeria) complied with three criteria, while one country (Sierra Leone) satisfied two criteria and one country (Ghana) achieved one criterion. The inflation and fiscal deficit criteria were the most challenging for the member states. On the secondary convergence criteria, four countries (the Gambia, Guinea, Nigeria and Sierra Leone) complied with two out of the six criteria, while one country (Ghana) satisfied one criterion, and one country (Liberia) met none.

As of the end of 2012, none of the six-member countries of the West Africa Monetary Zone (WAMZ) had met all the four primary convergence criteria necessary for the adoption and implementation of a common currency in the region. Fiscal slippages continue to make it impossible for member-countries to achieve all targets at a time and/or maintain them.

With regard to other areas of the convergence process, notable progress continued to be registered, including improvements in trade relations within the WAMZ and the wider ECOWAS as all member states have adopted the ECOWAS protocols on trade and trade-related issues and are at different stages of implementation. On the financial sector integration, efforts are underway to further integrate the various stock exchanges in the ECOWAS region while cooperation in cross-border banking supervision is being pursued vigorously, particularly under the auspices of the College of Supervisors of WAMZ (CSWAMZ).

The inability of member countries to meet the convergence criteria has warranted the postponement of the launch date on a number of occasions, from 2003 to 2005, 2009, and now to 2015. The member countries have set a deadline of 2015 for the launch of ECO, a common currency to replace the individual national currencies of member countries.

The success or otherwise of the ECOWAS as a trading bloc will depend in large part on the extent of convergence and integration. The greater the degree of convergence, the more likely it is that the pursuit of common policies, including a single currency and interest rate, will benefit all economies. If all members have similar economies and react to the external shocks in a similar way, it should be relatively easy to decide on, for example, one interest rate for the whole area. If, however, the economies differ in a notable way, as is the case now, then different policy measures might be needed for each economy. Applying the same measure in such a situation is likely to result in some economies becoming deflated while others become overheated.

Moreover one of the main criticisms to the convergence criteria set is based on the so-called “one size fits all” nature of the policy. The interest rate decided by the West African Central Bank applies to all the countries in the WAMZ. There is a risk that an interest rate that may be appropriate for the area as whole may be inappropriate for some individual member countries. Those member countries with overheating economies and high inflation will have low real rates of interest when they need high real interests, while economies with high levels of unemployment and low inflation will have high real interest rates. If all the economies were operating at a similar point in the

economic cycle, having the same interest rate would not be a problem. In practice however, there are still significant differences in the WAMZ economies.

The convergence criteria are geared towards stability both at home and abroad. Stability abroad is equivalent to exchange rate stability and stability at home means domestic monetary developments are consistent with stable domestic cost and prices. The stability of exchange rates, cost and prices is seen as essential precondition for further economic integration in the sub-region for economic and for the narrowing of differences in the standards of living.

This means that, a limit has to be placed on the budget deficits that governments can operate in a single currency to ensure price stability and economic growth. It is true that, if a government, or group of governments, operates large budget deficits they will add to aggregate demand and possibly the money supply. This is likely to put downward pressure on the Eco that may generate inflationary pressures and result in a higher rate of interest for all member countries.

ECOWAS as an Optimum Currency Area

Introducing a common currency bears with it economic benefits as well as challenges, which can be weighed against each other to determine the economic rationale for aiming for monetary unification for a given region. These benefits and challenges are given by the theory of Optimum Currency Areas (OCA). OCA theory identifies certain criteria that a region should fulfill for it to be economically optimal to let go of the adjustment tool of a national

currency. These criteria include whether the countries have similar production and trade patterns, whether economic supply and demand shocks are likely to be asymmetric across the countries and whether economic cycles are symmetric across borders. OCA theories identify three core aspects of successful integration 1) economic convergence and synchronization of business cycles; 2) trade liberalization and reinforcement of intraregional trade; and 3) fiscal control. The set of OCA criteria is very restrictive. However, it has often been argued that once a common currency is introduced, the synchronization of economic cycles will follow due to the derived boost of trade integration.

Given the limited progress ECOWAS has made towards fulfilling its convergence criteria, a traditional conception of OCA theory would suggest that the timeline for integration should be reconsidered. However, in light of Mundell II and the experience of CFA countries, it becomes evident that heterogeneity does not necessarily undermine the importance of adopting a common currency, and may in some ways even strengthen the reasoning behind it.

Measuring the adequacy of international reserves in the West African Monetary Zone

Table 1 shows the descriptive statistics of the five countries of WAMZ as far as their reserve holdings are concerned. Over the period, 1984 – 2009, Nigeria as it is expected has the highest mean amount of reserves. This is followed by Ghana, Guinea, Gambia and Sierra Leone in that order. The mean amount of reserves for the WAMZ as a group is \$13396.59 million. The

Gambia registered the lowest amount of reserves of \$1.73 million in the period under consideration. This is followed by Sierra Leone with an amount of \$3.73 million. The high standard deviations can be interpreted as indicating a lot of variations/ volatility in the international reserve holdings behavior of these countries. This is quite understandable given their characteristics/nature as less developed/developing countries which depend a lot/ highly on the export revenues from mainly primary commodities which face fluctuating world market prices.

The issue of reserve adequacy has gained widespread attention in international circles. According to Fischer (2001), the level of reserves can be an important factor in explaining and predicting currency crisis. Various benchmarks have been used to measure the adequacy of international reserves. These include reserves to import ratio, reserves to short term external debt ratio, and reserves to broad money supply ratio.

Reserves to import ratio

Contemporary literature considers reserve-to-import (R/M ratio) a proper measure of reserve adequacy and three months prospective level of imports cover became rule of thumb to judgment (Fischer, 2001). This three month import cover criterion is one of the convergence criteria set by the countries of the West African Monetary Zone for the introduction of a single currency. This amount of import cover is seen as a guarantee of no hindrance in external trade transaction even in a case of complete cut off from foreign flows.

Table 1: International reserves (in millions of US Dollars) 1984 – 2009

	N	Descriptive Statistics			
		Minimum	Maximum	Mean	Std. Deviation
Ghana	26	195.13	3200.00	884.60	848.58773
Nigeria	26	651.15	53001.77	12189.6	16709.31354
Gambia	26	1.73	224.18	84.3650	49.82974
Guinea	26	62.81	388.10	164.58	97.56940
Sierra Leone	26	3.73	404.96	73.4366	94.80027
WAMZ	26	1034.80	55723.89	13396.59	17683.74915

Source: Author's calculations based on WDI data

This benchmark is especially relevant to low-income countries exposed to current account shocks, such as a fall in the price of a country's main export or a drop in tourism receipts due to natural disaster and also to low-income countries without significant access to capital markets. Table 2 shows the descriptive statistics of the five countries of WAMZ as far as this criterion of three-month import cover is concerned. International reserves in month of import cover have ranged from as low as 0.18 to as high as 11.64 months within the period 1984 to 2009. Three countries, Guinea, Gambia and Sierra Leone, at one time or the other, registered international reserves of less than a month of import cover with Sierra Leone, in this case, registering the lowest amount of reserves 0.18 months. Nigeria, an oil exporting country, again tops the list with a maximum of 11.64 months and a mean of about 5 months over the period. The WAMZ as a group has a minimum of 8.74 and a maximum of

30.6 and a mean amount of reserves of approximately 17 months of import cover. This puts the group in a stronger position than the individual countries.

Table 2: International reserves (in months of imports), 1984 – 2009

	Descriptive Statistics				
	N	Minimum	Maximum	Mean	Std. Deviation
Ghana	26	1.07	6.96	3.3465	1.57984
Nigeria	26	1.25	11.64	5.0008	3.22600
Gambia	26	.22	7.85	3.8735	1.99560
Guinea	26	.93	4.87	2.2577	.95789
Sierra Leone	26	.18	9.08	2.4480	2.17341
WAMZ	26	8.74	30.60	16.9265	5.83962

Source: Author's calculations based on WDI data

Figures 1 up to 6 below show the international reserves holdings in terms of months of imports of the five countries and the WAMZ as a group measured against the three month benchmark. It can be seen from Figure 1 that the stock of Ghana's international reserves has been fluctuating around the three month of imports benchmark. The stock of international reserves touched the maximum of about seven months of import value in the years 1985 and 1986, few years after the implementation of the Economic Recovery Programme (ERP) and the attendant liberalization of the exchange rate market. The international reserves saw a very sharp decline in 1988 to about three months of import cover. The worst performance as far as reserves accumulation is concerned occurred between 1998 and 2002 where reserves

holdings ranged from equivalent of approximately a month of import in 1998 to about two months in 2002.

The lowest amount of reserves was registered in 2000 with reserves of about a month of import cover. This situation was attributed to external factors such as fall in prices of Ghana's main export commodities, cocoa and gold and increase in oil prices. The financial crisis which started in the late 2007 and reached its peak in 2008, even though affected Ghana's international reserves it performed better than the year 2000 with import cover of about two months. Out of the twenty-six year period under study, fourteen of them witnessed reserves of at least three months while twelve of them had reserves of less than three months of import cover.

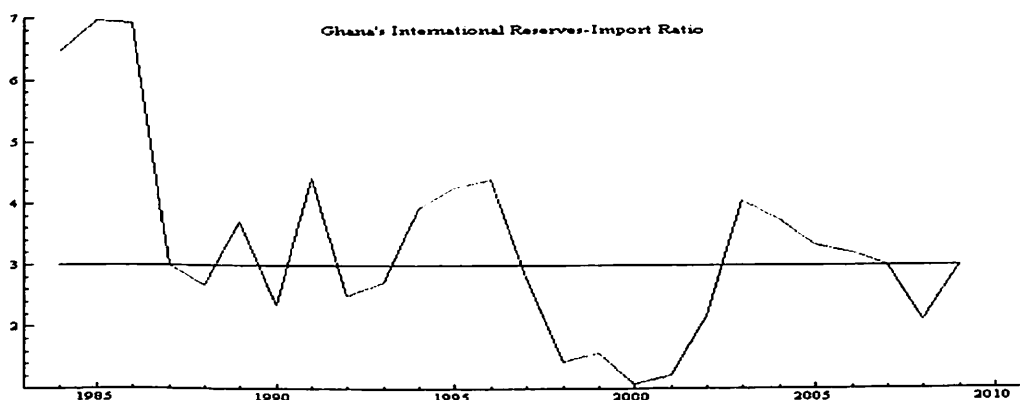


Figure 1: Ghana's international reserves-import ratio

Source: Author; Based on World Bank Data

In the case of Nigeria, shown in Figure 2, apart from the period before 1996 where there were fluctuations around the three month benchmark, it has consistently registered reserves of more than the benchmark. International reserves accumulation reached its nadir in 1992 with reserves of about a month of import cover. It resumed its upward trend up to 2000 with reserves of about eight months of imports. Since 2000 the lowest level of international reserves has occurred in 2003 with about four months of import cover.

Nigeria's high amount of international reserves is attributable to increases in oil prices.

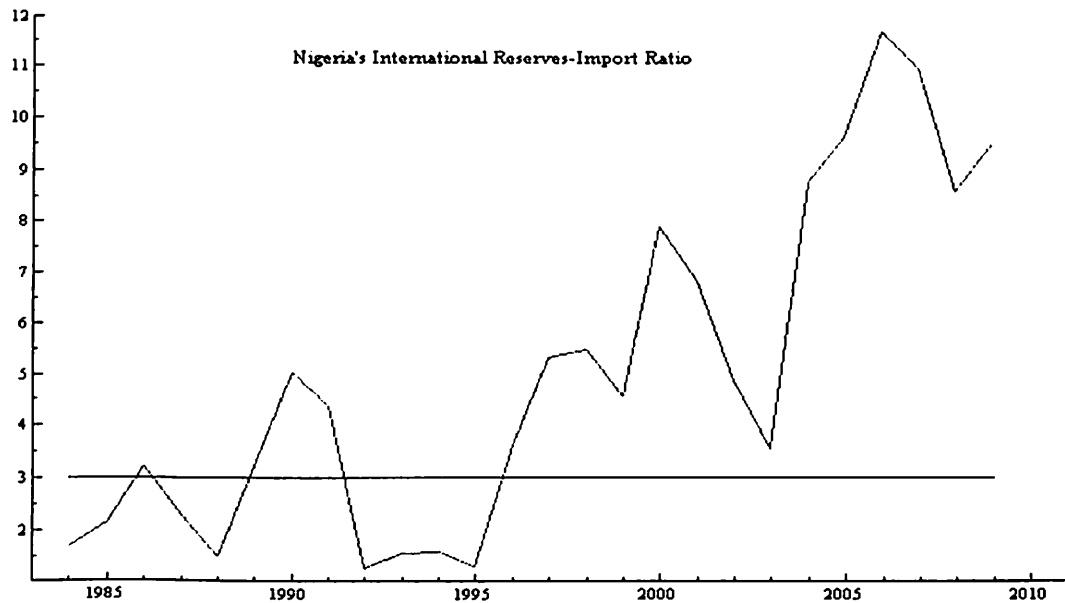


Figure 2: Nigeria international reserves-import ratio

Source: Author; Based on World Bank Data

The case of The Gambia is shown in Figure 3. Prior to 1990, Gambia's international reserve holdings were consistently below the three months import cover benchmark. The worst periods were 1984 and 1985 where reserves were less than a month of import cover. Post 1990 has consistently registered international reserves of more than the benchmark. In 2001, Gambia recorded international reserves equivalent of about seven months of import cover but declined to approximately three months in 2003. International reserves accumulation resumed its upward trend reaching an amount of approximately eight months of imports although there was dip in 2008 which was attributable to the financial crisis.

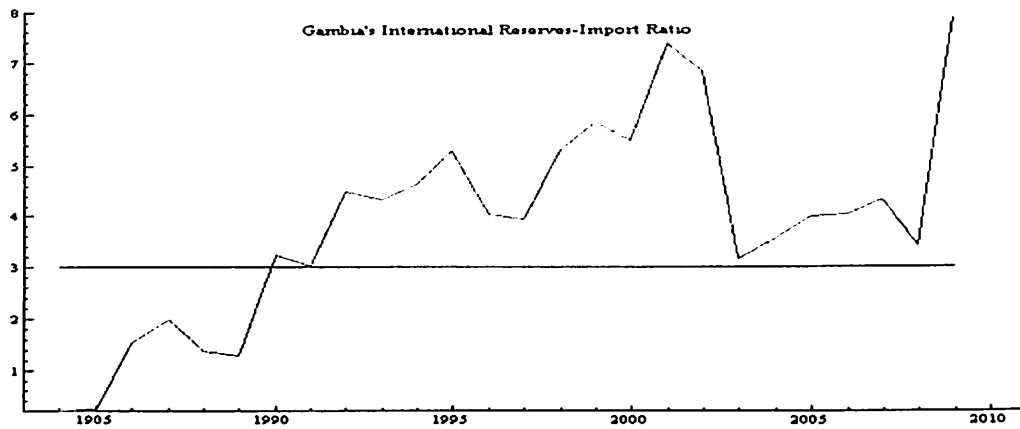


Figure 3: The Gambia international reserves-import ratio

Source: Author; Based on World Bank Data

Guinea's international reserves holdings can be described as very precarious. The reserves have been below the three-month benchmark for many years as Figure 4 portrays. The worst periods have been between 1994 and 1996 with reserves of less than a month of import cover. Political instability was seen as the major factor for this state of affairs. Numerous coup detas negatively affected their exports and also donor inflows thereby reducing their reserve accumulation. The best period however, has been 2006 where international reserves reached its peak of approximately five months of imports.

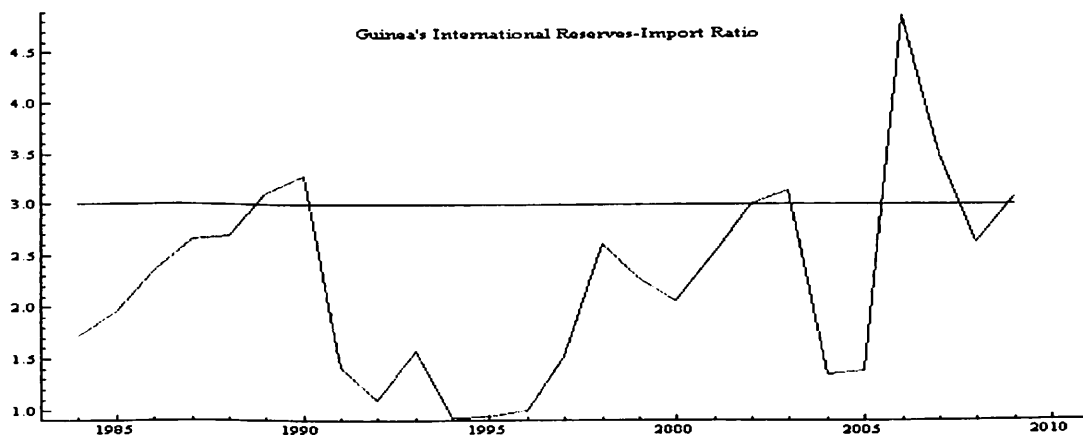


Figure 4: Guinea international reserves-import ratio

Source: Author; Based on World Bank Data

Sierra Leone has also been struggling to meet the three month benchmark as depicted in Figure 5. The reserves have been below the three-month benchmark for many of the years under study. The best performance as far as reserve accumulation is concerned occurred in 1986 with an equivalent of about eight months of imports. The worst periods, after 1986, occurred between 1987 and 1992, which marked the onset of the civil war in the country. In the post conflict period, the lowest reserves have been registered in 2003 with an equivalent of approximately two months.

The case of WAMZ as a group appears healthy as shown in Figure 6. The minimum level of reserves occurred in 1988 with an import cover of about nine months which is far above the three months import cover benchmark. It is significant to note that all the five countries suffered a decline in international reserves holdings from their previous higher levels in 2008, the height of the global financial crisis and food crisis which hit some parts of the world and the effects transmitted into some African countries; these five countries not being exempted from those shocks. However, the effect on Nigeria can be said to be quite minimal as it benefited from increased oil prices around the same time.

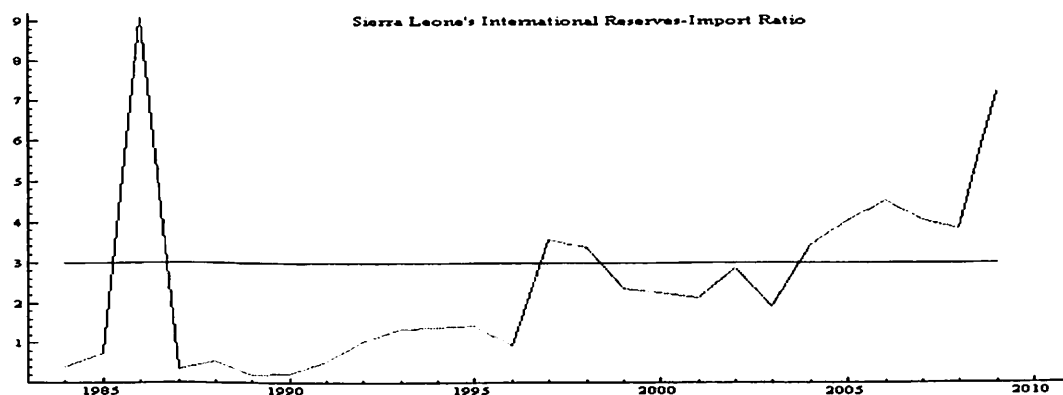


Figure 5: Sierra Leone international reserves-import ratio

Source: Author; Based on World Bank Data

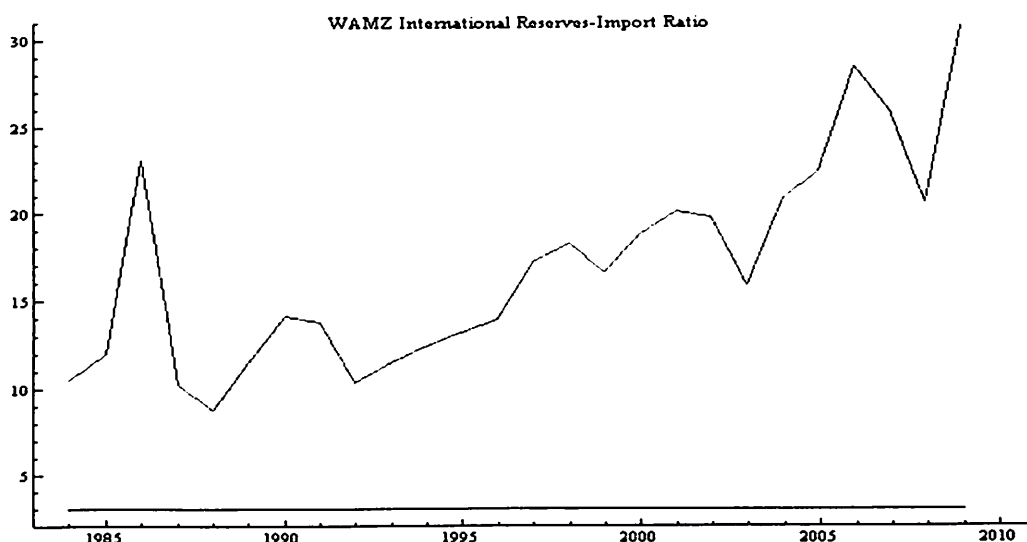


Figure 6: The WAMZ international reserves-import ratio

Source: Author; Based on World Bank Data

Reserves to short-term external debt ratio

Countries that may be vulnerable to a capital account crisis can benefit from holding reserves sufficient to cover all debt obligations falling due within the coming year. This benchmark, referred to as the Greenspan-Guidotti rule, – named after Alan Greenspan and Pablo Guidotti, a former Argentine finance official, who called for developing countries to amass reserves equal to all external debt coming due within the next year – is the most widely preferred benchmark for measuring vulnerability to capital account crisis, and its relevance to currency crisis prevention, has the strongest empirical support (Bussière & Mulder 1999; García & Soto 2004; Jeanne & Rancière 2005). Bird and Rajan (2003) assert that the ratio of reserves–to–short-term external debt offers an important indicator of the minimum point at which foreign investors lose confidence. The fundamental idea behind this benchmark is that the existing stock of reserves should allow a country to live without any foreign borrowing at least up to one year (De Beaufort Wijnholds & Kapteyn,

2001; Jeanne, 2007). Figures 7 up to 12 below show how the international reserves holdings of the five countries and the WAMZ as a group compare with their respective short term external debts.

As Figure 7 reveals, Ghana has been meeting this minimum benchmark rule of thumb from 1984 till 1990 where the short-term debt outweighed the international reserves. Similar situations of the short-term debt outweighing the international reserves was also witnessed in 1992, 1993 and between 1997 and 2002. Since 2002 international reserves have consistently been above the short term debt. By this minimum benchmark rule of thumb, it can generally be said that Ghana has been keeping a comfortable amount of international reserves in most cases (seventeen out of twenty-six-year period).

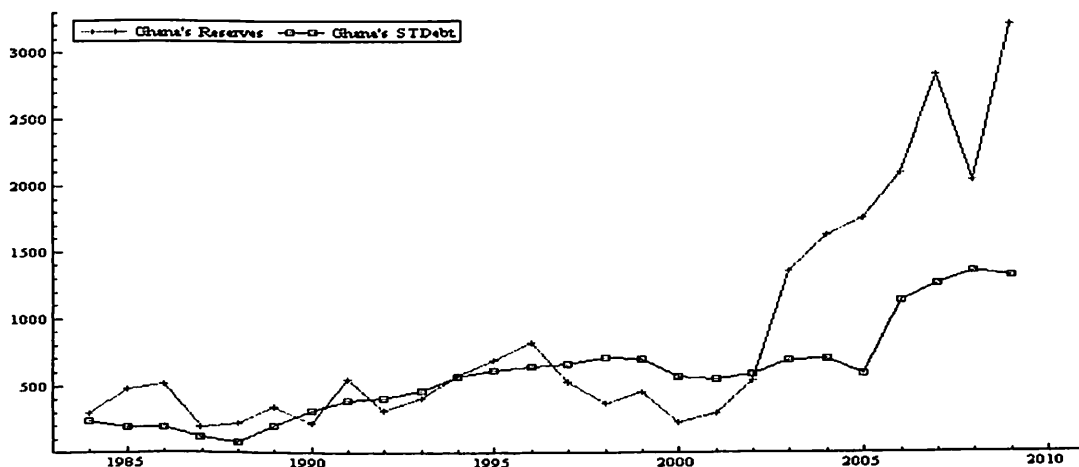


Figure 7: Ghana's reserves to short-term external debt ratio

Source: Author; Based on World Bank Data

Figure 8 shows that Nigeria, from 1984 to 1988 and 1992 to 1996, failed to meet this minimum benchmark rule of thumb. In all those years, the short-term debt outweighed the international reserves. However, since 2000 international reserves have consistently been far above the short term debt. It can also be generally said that Nigeria has been keeping a comfortable amount

of international reserves in most cases (fourteen out of twenty-six-year period) especially from 2000 onwards.

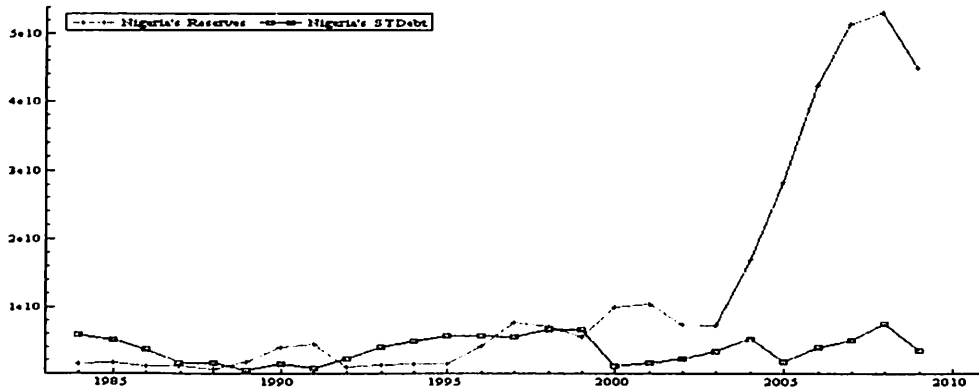


Figure 8: Nigeria's reserves to short-term external debt ratio

Source: Author; Based on World Bank Data

The Gambia's international reserves position in relation to its short term debt has been very strong and very encouraging as Figure 9 reveals. Apart from 1984 to 1986 where the short-term debt outweighed the international reserves, the reserves have been consistently above the short term debt.

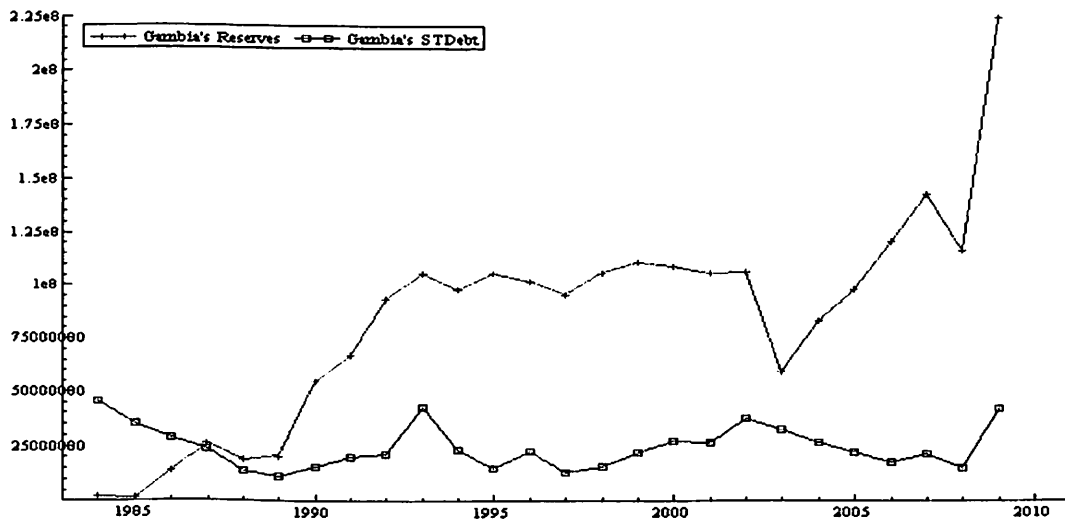


Figure 9: The Gambia's reserves to short-term external debt ratio

Source: Author; Based on World Bank Data

Guinea's position as far as the international reserves – short term external debt ratio benchmark rule of thumb is concerned is very weak as Figure 10 indicates. For the twenty-six year period under study, sixteen of them registered short-term external debts which were above the international reserves holdings. This makes Guinea's international reserves position precarious but the encouraging thing is that since 2003 Guinea has managed to keep reserves consistently above the short-term external debts.

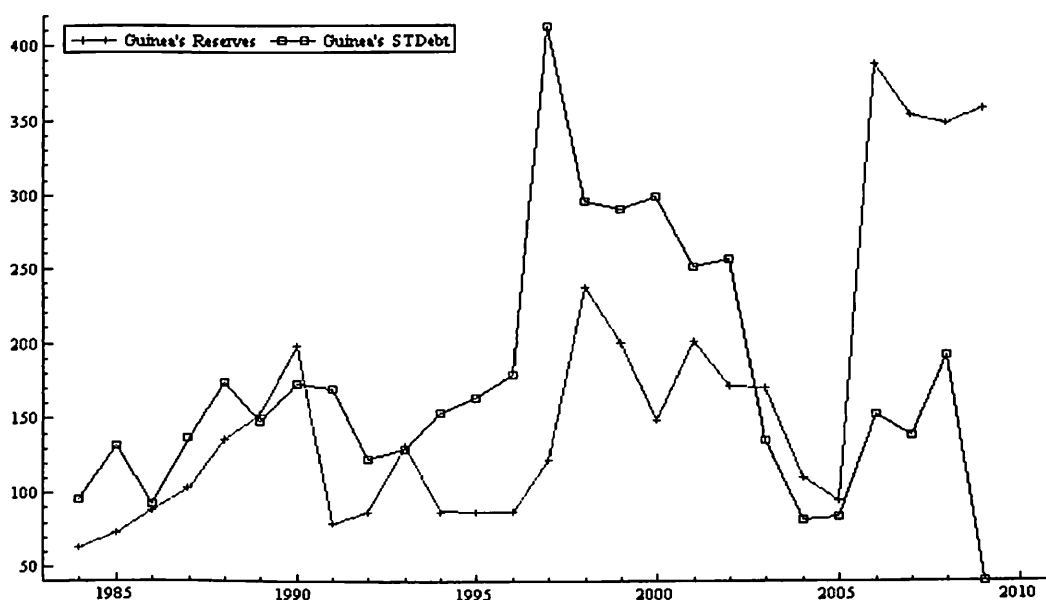


Figure 10: Guinea's reserves to short-term external debt ratio

Source: Author; Based on World Bank Data

Figure 11 shows the case of Sierra Leone. From 1984 to 1993, Sierra Leone failed to meet this minimum benchmark rule of thumb. In all those years, the short-term debt outweighed the international reserves. However, since 1994 international reserves have consistently been above the short term debt. Over the twenty-six-year period, Sierra Leone has managed to keep a comfortable amount of international reserves in most cases. The case of WAMZ is shown in Figure 12. Fourteen out of the twenty-six year period saw international reserves for the group being greater than the short-term external

debts. The international reserves holdings have been consistently above the short term external debt since 2000. It is quite obvious from Figure 12 that the case of WAMZ as a group can be said to be almost synonymous with that of Nigeria shown in Figure 8. This gives a clear indication that Nigeria is a very important member of the group as far as international reserves accumulation is concerned. The reasons for this state of affairs are not far-fetched as Nigeria is well-known to be one of the major oil-exporting countries of the world.

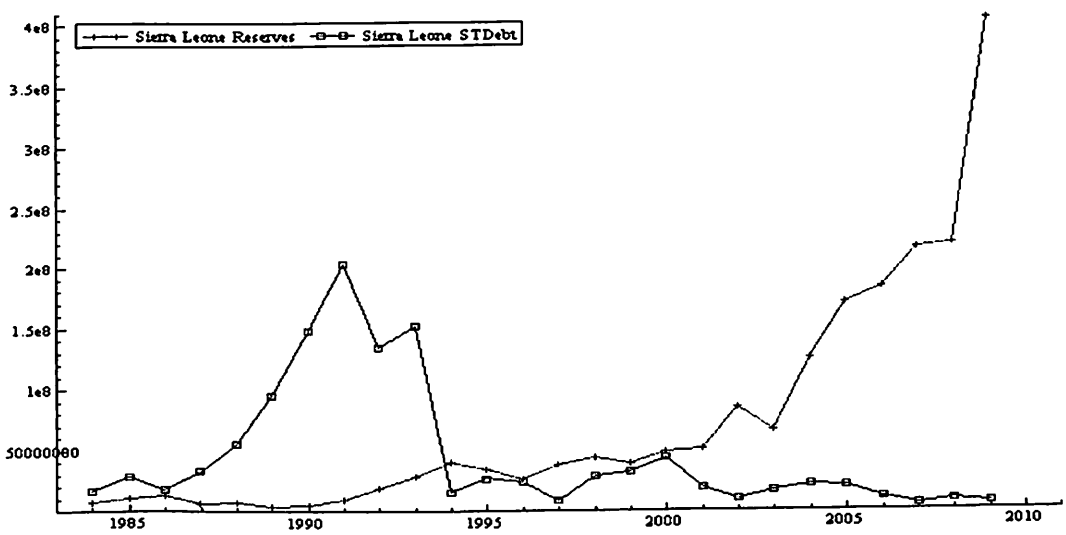


Figure 11: Sierra Leone’s reserves to short-term external debt ratio

Source: Author; Based on World Bank Data

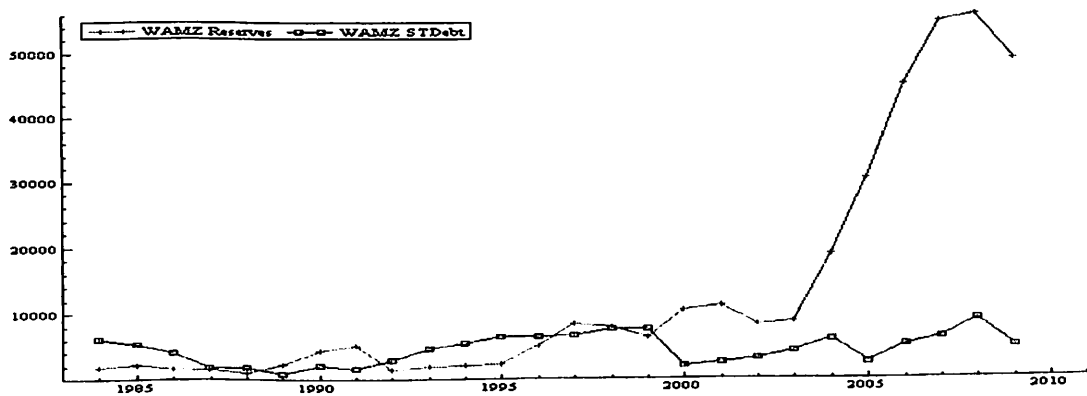


Figure 12: The WAMZ reserves to short-term external debt ratio

Source: Author; Based on World Bank Data

Reserves to broad money supply ratio

One of the criticisms leveled against the ratio of reserves to short-term external debt is that even though it offers a better indication of the vulnerability to an ‘external drain’, it fails to capture the risk of an ‘internal drain’ associated with capital flight by residents (De Beaufort Wijnholds & Kapteyn, 2001; Bird & Rajan, 2003). The issue of capital flight and the associated risk of ‘internal drain’ are best captured by an indicator constructed based on broad money supply. According to Calvo (1996), a country’s vulnerability to financial crisis should be assessed, in part, by the size of its money supply, since broad money reflects a country’s exposure to the sudden withdrawal of assets. A low and falling reserves-to-broad money ratio is said to be a leading indicator of a currency crisis and a conventional range for this ratio is said to be 5 to 15% (Kaminsky & Reinhart, 1999).

Economies that need to shore up confidence in the value of local currency and reduce the risk of capital flight may find this benchmark useful. Countries facing a risk of capital flight may follow money-based measures, as reserve balances held against a portion of the monetary base can increase confidence in the value of local currency. Given the difficulty in measuring capital flight there is no conventional minimum adequate level of reserves, but De Beaufort and Kapteyn (2001), suggest reserves equivalent to 5-20% of M2, depending on the exchange rate regime, as an appropriate buffer. Wijnholds and Kapteyn argue that the risk that residents will wish to convert domestic into foreign liquidity will be greater for countries with a currency peg than for countries with a flexible exchange rate. Fixed exchange rates rely in part on

the credibility of the central bank's ability to maintain a specific parity. Less flexible exchange rates necessitate higher reserves relative to M2.

Figures 13 up to 18 below show reserves to broad money supply ratios of the five countries and the WAMZ as a group compared with the range of 5% to 25%. Considering this benchmark, it can be seen that all the five countries are not doing badly since the ratios in most of the cases are not too low (below 5%) and falling.

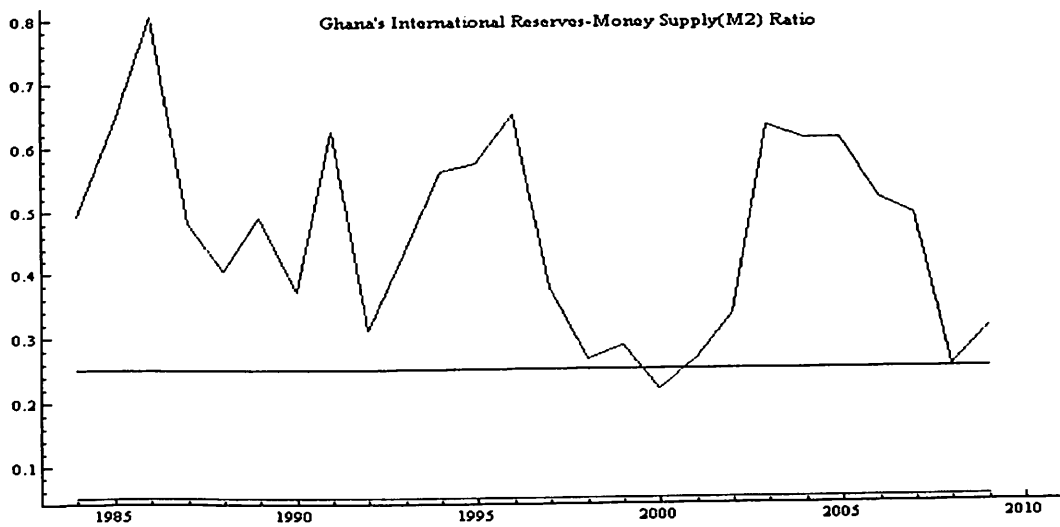


Figure 13: Ghana's reserves to broad money supply ratio

Source: Author; Based on World Bank Data

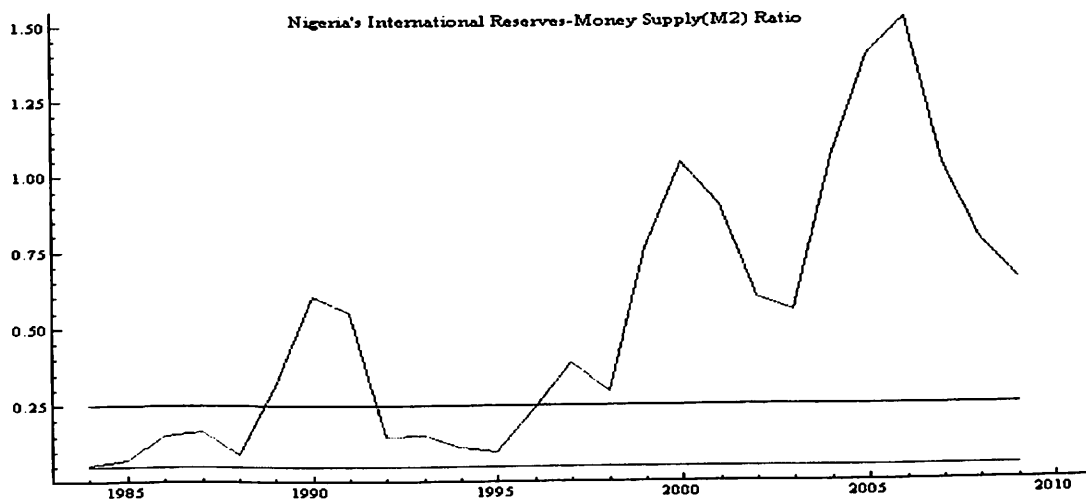


Figure 14: Nigeria's reserves to broad money supply ratio

Source: Author; Based on World Bank Data

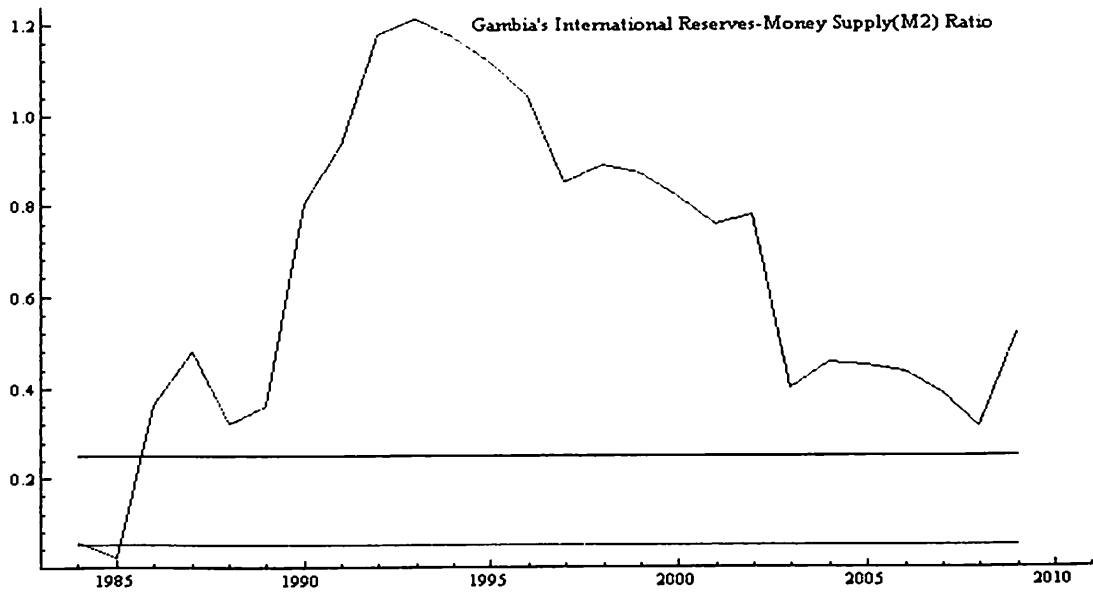


Figure 15: The Gambia's reserves to broad money supply ratio

Source: Author; Based on World Bank Data

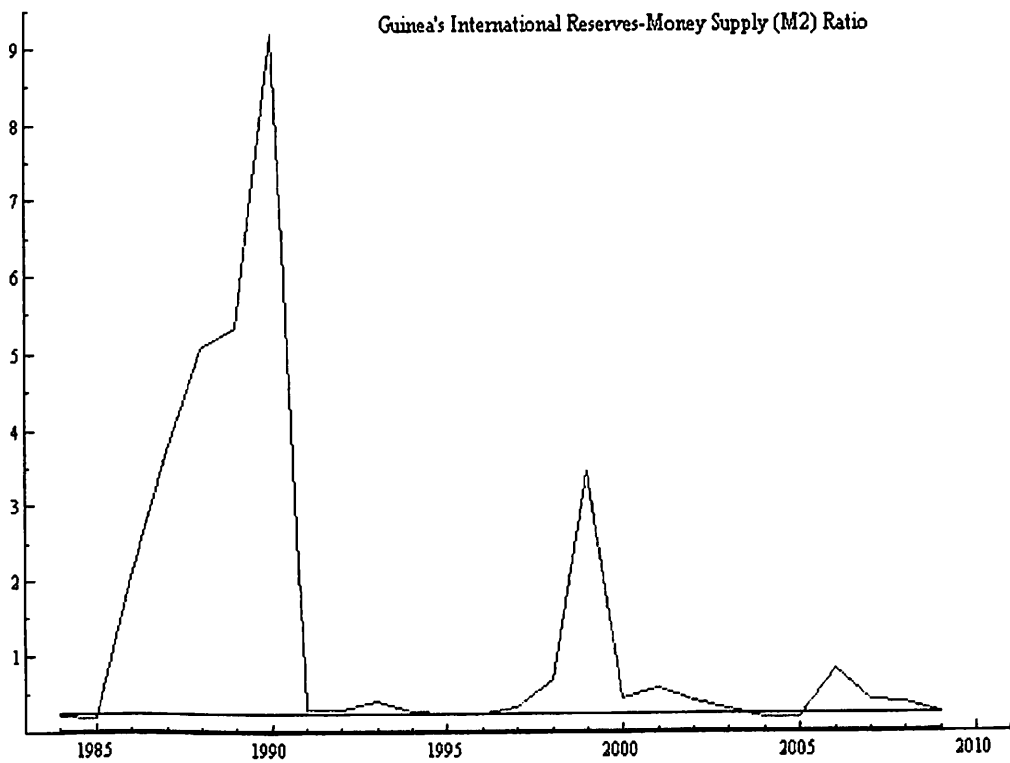


Figure 16: Guinea's reserves to broad money supply ratio

Source: Author; Based on World Bank Data

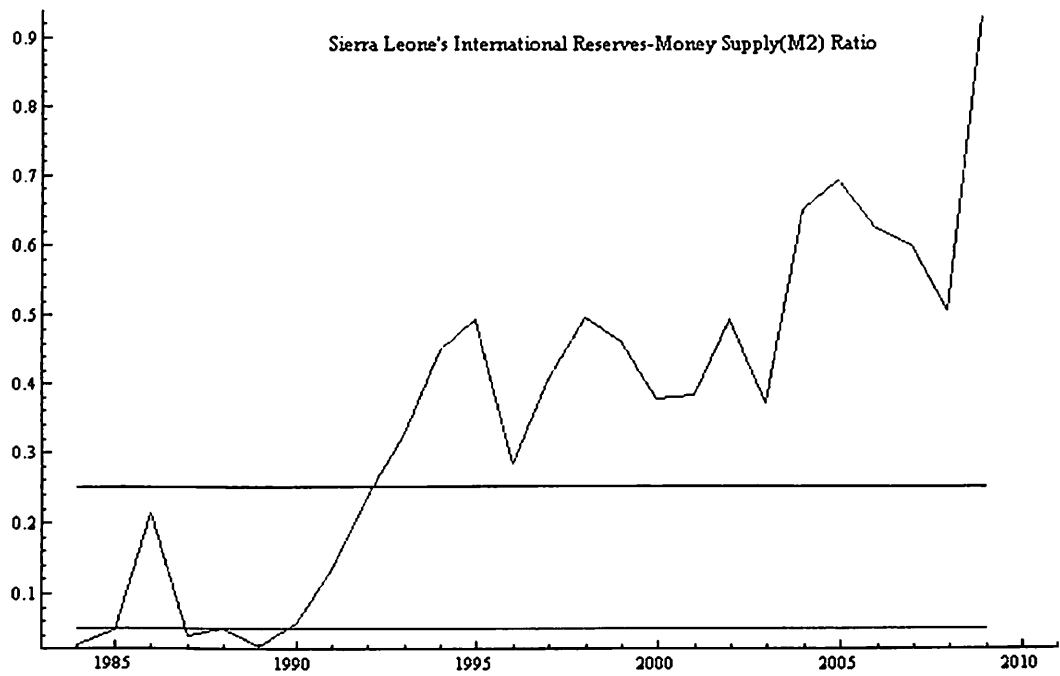


Figure 17: Sierra Leone's reserves to broad money supply ratio

Source: Author; Based on World Bank Data

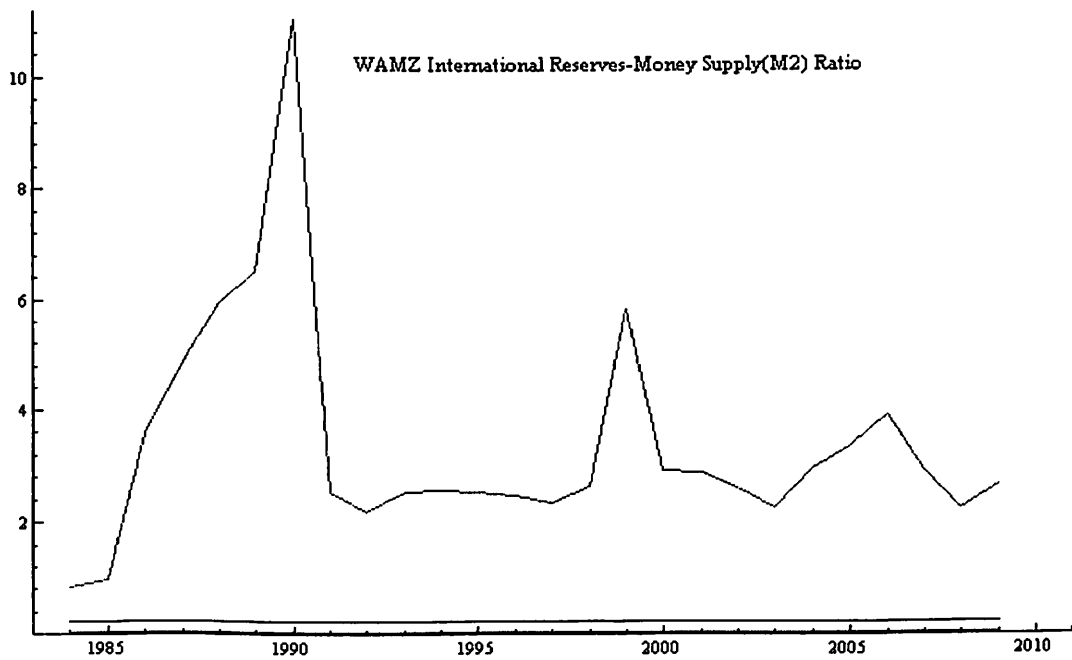


Figure 18: The WAMZ's reserves to broad money supply ratio

Source: Author; Based on World Bank Data

Summary

Two components seem to be required for the successful introduction of the single currency. First, it is crucial that participating member states work diligently to achieve a high degree of sustainable convergence in terms of low inflation, sound public finances and exchange rate stability. Secondly, the existence of prolonged periods of macroeconomic stability, during which policy makers do not have to conduct day-to-day macroeconomic crisis management and instead can focus on longer-term priorities.

In terms of the adequacy of international reserves, the analysis, based on the three standard measures indicates that the Gambia's international reserves position is the strongest of all the five countries whereas Guinea's position is the weakest. Also, the analysis of the data shows that by integrating their economies culminating in the establishment of the monetary zone and a single currency may strengthen the economy of the zone. All the advantages that go with the accumulation of adequate reserves could be gained. The analysis of the graphs for the entire monetary zone in terms of the three standard benchmarks reveals that if the five countries succeed in pooling their resources together to form the monetary union it may be very beneficial to the member countries. The reserves position of the zone will meet all the three standard benchmarks. The economy of WAMZ may be able to withstand any current account shocks, such as a fall in the price of a country's main export which is a major problem facing low income countries including the countries of WAMZ. The economy of WAMZ may also not be vulnerable to capital account crisis and may be in the position to avert any currency crisis and

engender a lot of confidence in the economy of the WAMZ and the single currency, the ECO, that they wish to introduce.

However, the point should also be made that the quantity of reserves holding should not be simply interpreted as an indicator of economic strength. It is determined by a number of factors. To the best of knowledge and as is supported by Chan (2007), there is still no norm for measurement of optimal or maximum reserves in the field of economics, though some demand-for-reserves models and standard reserve adequacy ratios apparently offer certain useful criteria for comparison across countries and sensible explanations for cross-country variation at the level of international reserves.

Given the limited progress ECOWAS has made towards fulfilling its convergence criteria, a traditional conception of OCA theory would suggest that the timeline for integration should be reconsidered. However, in light of Mundell II and the experience of CFA countries, it becomes evident that heterogeneity does not necessarily undermine the importance of adopting a common currency, and may in some ways even strengthen the reasoning behind it.

CHAPTER THREE

ECONOMIC PERFORMANCE OF THE COUNTRIES OF THE WEST AFRICAN MONETARY ZONE

This chapter covers the overview of the economies of the five countries constituting the West African Monetary Zone. It presents descriptions and discussions of the developments in the economies, various significant reform policies and strategies adopted and their consequences.

Economy of Ghana

A proper and adequate account and analysis of the Ghanaian economy within the last three decades cannot be done without recourse to the Economic Recovery Programme embarked upon in the year 1983. In 1983, the government launched the Economic Recovery Program (ERP) under the guidance of the World Bank and the IMF. The overriding purpose of the ERP was to reduce Ghana's debts and to improve its trading position in the global economy. The stated objectives of the program focused on restoring economic productivity at minimum cost to the government and included the following policies: lowering inflation through stringent fiscal, monetary, and trade policies; increasing the flow of foreign exchange into Ghana and directing it to priority sectors; restructuring the country's economic institutions; restoring production incentives; rehabilitating infrastructure to enhance conditions for the production and export of goods; and, finally, increasing the availability of essential consumer goods. In short, the government hoped to create an economic climate conducive to the generation of capital.

The ERP was carried out in roughly three phases. Beginning in 1983, the government focused on reducing its expenditures while creating incentives for private production. Initial expenditure cuts and improved tax collection brought the budget deficit down from 6.3 percent of GDP in 1982 to 0.1 percent by 1986, relieving government pressure on the banking system, while a series of cedi devaluations boosted export activity. During the second phase, which lasted from 1987 to 1989, the government moved to divest itself of many assets through privatization and to institute radical foreign exchange reforms to devalue the cedi further. Although privatization was sluggish, the hard-currency black market was nearly eliminated with the introduction of foreign exchange bureaus in 1988. In the ERP's third phase, the government intensified monetary reforms and reduced private corporate taxes to boost private-sector growth.

By the end of 1991, ERP efforts had improved the country's international financial reputation because of its ability to make loan repayments (although not wipe out foreign debt) and its first entry onto the international capital market in almost two decades. Critics maintained, however, that the ERP had failed to bring about a fundamental transformation of the economy, which still relied on income earned from cocoa and other agricultural commodities. Critics also contended that many Ghanaians had seen few, if any, benefits from the program.

In addition to its focus on stabilizing the country's financial structure, the ERP also aimed to promote production, especially in the export sectors. In 1986 the government began to rebuild infrastructure through a US\$4.2 billion program, more than half of which was provided by external sources. This

amount was divided roughly equally among infrastructure repair, energy imports (oil for machinery), and export industries. Increased imports financed by the IMF, the World Bank, and other sources made possible the rehabilitation and repair of some key parts of the infrastructure through the supply of spare parts and inputs for industry, mining, utilities, and agriculture.

Although the ERP was geared primarily toward restoring the country's international economic standing, it came under popular criticism inside Ghana for ignoring the plight of those not involved in the export sector. The overwhelming shift in resources was toward cocoa rehabilitation and other export sectors, not toward food production. Many government employees lost their jobs. Farmers suffered as the percentage of the total budget devoted to agriculture fell from 10 percent in 1983 to 4.2 percent in 1986 and to 3.5 percent in 1988, excluding foreign aid projects (according to US Library of Congress records). Although cocoa contributed less to Ghana's GDP than food crops, cocoa nonetheless received 9 percent of capital expenditures in the late 1980s; at the same time it received roughly 67 percent of recurrent agricultural expenditures because of its export value.

In response to criticism of such policies, the government initiated the US\$85 million Program of Action to Mitigate the Social Costs of Adjustment (PAMSCAD). Beginning in 1988, the program sought to create 40,000 jobs over a two-year period. It was aimed at the poorest individuals, small-scale miners and artisans in particular, and communities were to be helped to implement labor intensive self-help projects.

As part of PAMSCAD, ₵10 billion was slated in the 1993 budget for the rehabilitation and development of rural and urban social infrastructure.

The new program, organized through PAMSCAD and the new district assemblies, was designed to focus on improving water supply, sanitation, primary education, and health care. An additional ₵51 billion was set aside for redeployment and end-of-service benefits for those who had lost their jobs in civil service and parastatal reorganizations.

In the early 1990s, the government was committed to continuing the policies of the ERP. New agreements were concluded with the World Bank to continue credit arrangements on condition that Ghana review and revise its various economic laws and regulations and support private sector development. In particular, the government agreed to revise or to repeal existing laws and regulations affecting private investment that undermine the spirit of deregulation, economic liberalization, and exchange rate reforms. The government also agreed to develop and to strengthen the institutional framework that would facilitate private investment. Key priorities for 1992 and afterward included giving new impetus to state enterprise reform, broadening the scope of banking-sector reforms, liberalizing the administrative framework, and strengthening public-sector management. Basic education and primary health-care services were to receive attention over the long term as well.

In the early 1990s, Ghana's economic recovery still appeared uneven and was geared primarily to the export rather than domestic market. GDP had risen by an average of 5 percent per year since 1984, inflation had been reduced to about 20 percent, and export earnings had reached US\$1 billion. Most production came from the export sector, and by the 1992-93 crop year, cocoa production surpassed 300,000 tons, placing Ghana third in the world.

By 2009 cocoa production has reached close to one million tonnes. In 1990 exports of minerals--primarily gold but also diamonds, manganese, and bauxite--brought in US\$234 million, an increase of 23.2 percent from the year before. Nevertheless, salaries were low, and because the cost of public services continued to rise, Ghana's poor bore the brunt of the negative effects of the austerity program.

Despite devaluations by the Rawlings regime and rising exports, the government was unable to fulfill a key stabilization goal of reducing the trade and current account deficits. To stimulate production in various sectors, the government incurred loans to finance imports of necessary inputs such as machinery, fertilizer, and petroleum. As a result, the country's foreign debt exceeded US\$4 billion in 1991. According to World Bank estimates, the country's debt continued to rise in 1992, and was equivalent to almost 63 percent of Gross National Product (GNP). In 1992 the debt service ratio (debt service as a proportion of exports) was 27 percent, an improvement on late 1980s levels, which averaged as high as 62.5 percent. To cover the deficits that result from loans and increased imports, the government came to rely on rising levels of foreign aid, with net aid disbursements increasing to an estimated US\$550 million by 1990. Unfortunately, foreign investment, compared with aid, was weak except in the mining sector, and domestic savings were insufficient to finance the country's ambitious development projects.

ERP policies during the 1980s resulted in increased external debts as well as in relatively high inflation rates. Most ERP projects were funded by foreign loans, notably from the IMF. At the same time, the government

repeatedly devalued the country's currency to raise producer prices for exports and to encourage production, but devaluation also led to price rises on all other goods as well. ERP attempts to promote production have, at least in the short term, resulted in higher debts and inflation.

World Bank figures show that Ghana's total external debt exceeded US\$4 billion by 1991; this figure rose to nearly US\$4.3 billion in 1992. The external deficit and requirements for repayments on principal were met through additional loans. The debt figures revealed a strong reliance on official creditors, who accounted for about 92 percent of public disbursed debt, and on concessional funding, which approached 60 percent of total external debt in 1992.

In addition, Ghana began to borrow on international capital markets in 1991. Nevertheless, the country's debt service ratio fell at an annual average of 25 percent in 1991 and 1992, reflecting repayment of large IMF obligations and the ending of the government's use of IMF funding at the end of 1991. An additional factor was debt cancellation by a number of leading bilateral creditors totaling US\$1.5 billion since 1989. Ghana's debt continued to grow reaching about \$5 billion in 1994 and \$6 billion in by 2001. In the year 2001, the heavy debt burden and its attendant servicing compelled the Government to opt for the Highly Indebted Poor Countries' (HIPC) initiative which brought some relief to the country from paying huge amounts in debt servicing. This initiative accounted for the drastic reduction in Ghana's total debt especially in 2006. The external debt has, however, resumed its upward trend since then (see Figure 20).

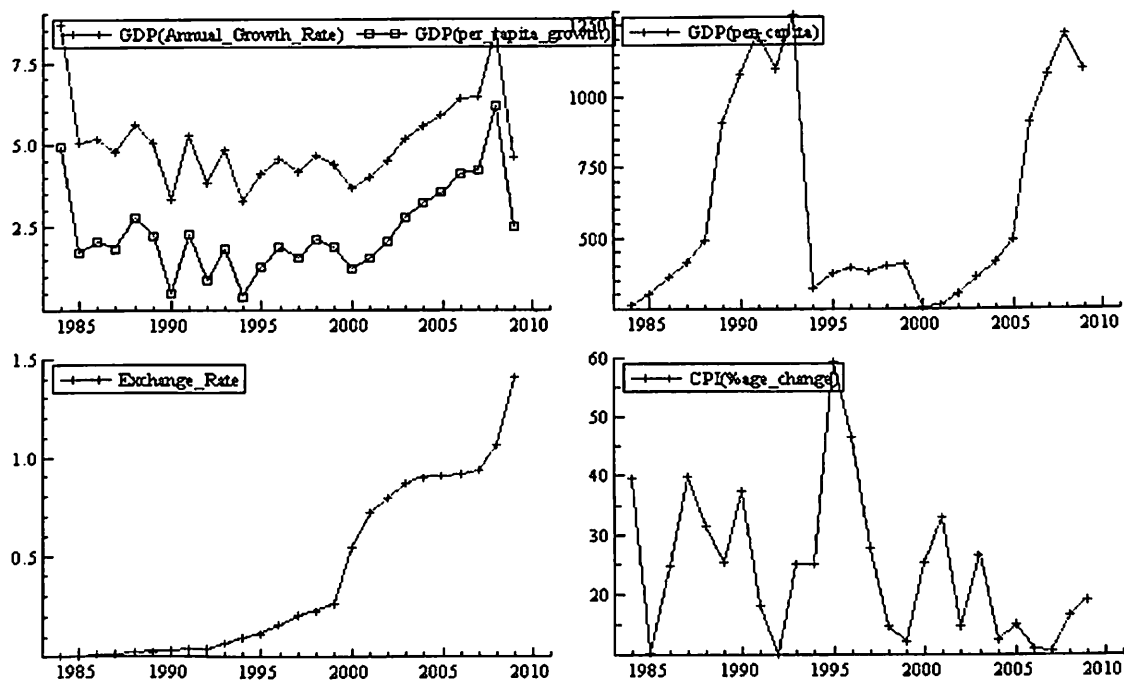


Figure 19: Trends in macroeconomic variables in Ghana, 1984-2009

Source: Author; Based on World Bank Data

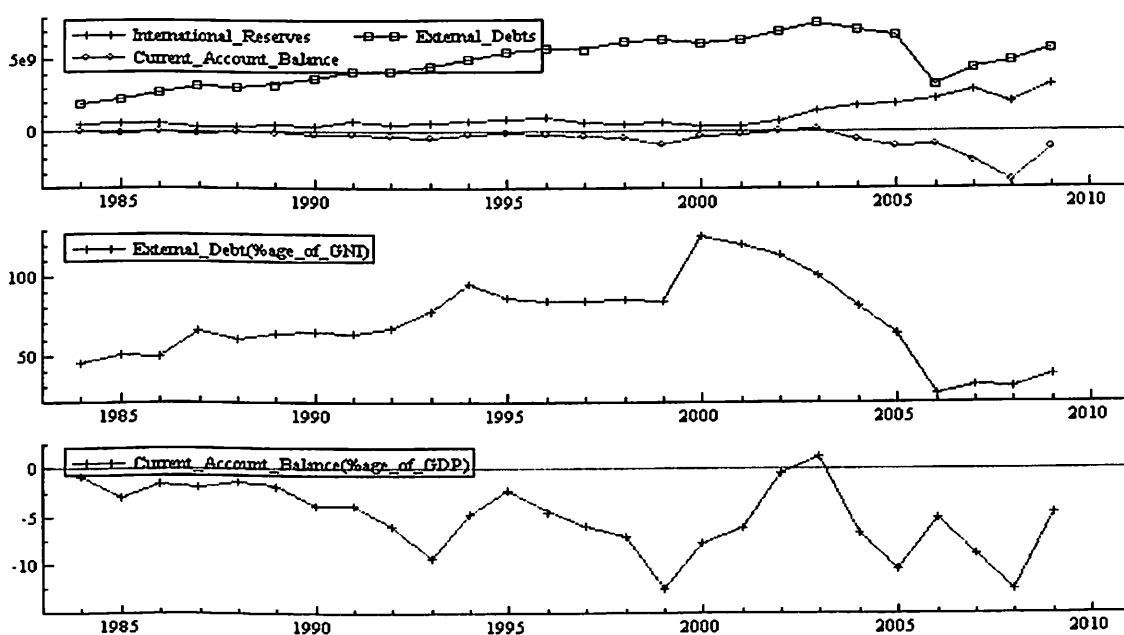


Figure 20: Trends in international reserves, external debts and current account balance in Ghana, 1984-2009

Source: Author; Based on World Bank Data

Gross Domestic Product

Ghana's GDP has been increasing since the last two decades. Significant changes took place in the structure of GDP with the inception of the ERP. Between 1983 and 1991, agriculture continued to be the bedrock of Ghana's economy, accounting for more than 48 percent of GDP in 1991. However, agriculture's long-term importance declined in favor of that of industry, the contribution of which to GDP more than doubled from 1988 to 1991 when it constituted almost 16 percent of GDP, and in favor of services, the contribution of which was 35.3 percent in 1991. Notable changes also occurred within the broader sectors: cocoa's share rose from 5.6 percent in 1983 to 9.5 percent in 1991; manufacturing's contribution increased from 3.9 percent to 8.7 percent; and construction output from 1.5 percent to 3.5 percent. In current prices, Ghana's GDP rose from ₵511 billion in 1986 to ₵3 trillion in 1992. In constant 1987 prices, these GDP figures amounted to ₵713 billion (US\$4.62 billion) in 1986 and ₵934 billion (US\$6.06 billion) in 1992. The GDP continued its upward trend to an extent that by the close of 2009, it had reached an amount of US\$15.62 billion from US\$4.98 billion in 2000 according to the World Bank estimates, a very drastic increase.

During the 1980s, Ghana's economy registered strong growth of approximately 6 percent per year because of a reversal in the steadily declining production of the previous decade. Ghana's worst years were 1982 and 1983, when the country was hit with the worst drought in fifty years, bush fires that destroyed crops, and the lowest cocoa prices of the postwar period. The second phase of reform saw ERP being supplemented with the Structural Adjustment Programme (SAP), geared toward correcting a number of

structural imbalances in order to engender a sustained healthy economic growth. The economy definitely responded positively to ERP/SAP soon after inception. It recovered from its negative growth rate of about 5% in 1983 to a hefty positive rate of 8% in 1984. Growth throughout the remainder of the decade reflected the pace of the economic recovery, but output remained weak in comparison with 1970 production levels. The same was true of consumption, minimum wages, and social services.

Growth fell off considerably in 1990 when another drought caused real GDP growth to decline by nearly two percentage points. Government estimates claimed that real GDP growth in 1993 was 6.1 percent, which reflected a recovery in cocoa output and an increase in gold production. The favourable growth has continued since that time, with relatively little variance, even if there is a slight slowdown in the rate of growth. Figure 1 shows that the most consistent increases in growth occurred between 2000 and 2008. In 2009, however, growth fell drastically to about 4.7% from approximately 8.4% in 2008. This was attributed to the tight monetary and fiscal policies adopted by the new government which had just taken over power.

The growth record, based on per capita income, is similar to that of the GDP illustrated above. As Figure 19 shows, per capita GDP growth closely tracks that of GDP, suggesting that population growth has been rather stable, though the larger gap between them since the 1980s suggests an acceleration in population growth over this period. Since 1984, the per capita GDP has generally maintained its upward trend even though there was a drastic fall in 1994. According to the World Bank records the per capita GDP reached the

highest value of approximately \$1300 in 2008 making Ghana a lower middle income country.

Structure of the Ghanaian economy

Sustained economic growth would normally be accompanied by major structural transformation of the economy. The current and historical pattern of the Ghanaian economy portrays hardly any structural changes as noted by Killick(2000), Round and Powell (2000) and supported by Aryeetey, Fosu and Bawumia (2001). As Table 3 shows, the structure of the economy in the 1990s indicated a shift in dominance from agriculture to services, with little change in the share of industry. While a shift toward a higher-order service could be considered as a positive sign for a possible take-off, this is generally seen as less of a structural change than an indication of the direction of new short-term capital flows to mark the end of stagnation. Indeed, much of the increase in services derives from the relatively low-order sector, Wholesale, Retail, Restaurants and Hotels, whose share as a proportion of GDP increased from 13% in 1989 to 17% in 1996 (ISSER, 1997). Meanwhile, the share of manufacturing has remained about the same. Although the reforms seem to have halted the decline in the manufacturing sector, which reached an abyss of 7.4% of GDP in 1982, manufacturing growth appears to have fallen substantially during the latter part of the reform period (Aryeetey, Fosu & Bawumia, 2001).

Agriculture was about 40% of GDP in the late 1990s and was still above 35% until 2007. In the two years of 2007 and 2008, the share of agriculture fell to below 35% at 34% and 32%, respectively. The decline in the

agricultural GDP share is the result of faster growth in the services, which has increased the share in GDP to 40 or more than 40% in 2007 and 2008(see Table 4). On the other hand, share of the industrial sector in GDP has not changed much after 1990s and share of the manufacturing sector has even declined to less than 10% of GDP in the recent ten years. Such growth patterns in the non-agricultural sector are not consistent with the transformation theory as well as experience of other developing countries in which the role of industry, especially of manufacturing has increased in the development process (Breisinger & Diao, 2008).

Table 3: Sectoral distribution of Ghana's real GDP (period averages (%))

Sector	1983-86	1987-90	1991-95	1995-2000
Agriculture	52	46	42	39.5
Industry	12	14	14	27.5
Services	36	40	44	33

Source: Aryeetey and Kanbur (2005).

Table 4: Sectoral distribution of Ghana's real GDP, 2006-2010 (%)

Sector	2006	2007	2008	2009	2010
Agriculture	40	34	32	30	30.2
Industry	28	26	19	20	18.6
Services	32	40	49	50	51.2

Source: DANIDA (2012).

Ghana's external sector

The promotion of Ghana's foreign trade has been central to all government plans to revive the economy since 1983. Under the ERP, export-

producing industries received the most direct support; they also received the most indirect support through the improvement of their proximate infrastructure. By promoting exports, the government sought to obtain foreign exchange essential to repay debts and to ease the country's restrictions on imports. Imports, of course, are also necessary to upgrade many of the export industries hamstrung for lack of equipment.

Since the start of the ERP in 1983, the government has introduced several policies to adjust the pattern of Ghana's trade structure. These include devaluing the currency as well as raising producer prices for crucial exports such as cocoa to offset the advantages of smuggling such goods across borders. In addition, the government introduced an interbank foreign exchange market to facilitate currency exchange. To ease the importation of essential capital goods, but not necessarily consumer goods, the government revised and reduced numerous import duties and trade taxes.

By the early 1990s, government efforts had resulted in the restoration of many of Ghana's historical trade relationships. Exports were again dominated by cocoa, which earned US\$280 million in 1993. Other significant export commodities in 1993 were gold (US\$416 million) and timber (US\$140 million), followed by electricity, diamonds, and bauxite. Ghana's nontraditional exports, such as furniture, cola nuts, and pineapples, have also increased significantly. On the import side, fuel and energy, mainly oil, accounted for 16 percent of 1990 imports; followed by capital goods, 43 percent; intermediate goods, 28 percent; and consumer goods, 10 percent, according to the World Bank.

In the early 1990s, Ghana continued to trade primarily with the European Community, particularly Britain and Germany. Britain continued to be the principal market for Ghanaian cocoa beans, absorbing approximately 50 percent of all cocoa beans exported. In 1992, Germany was the single most important destination of Ghana's exports, accounting for some 19 percent of all exports. Britain was next, accounting for about 12 percent; followed by the United States, 9 percent; and Japan, 5 percent. The same year, Britain supplied approximately 20 percent of Ghana's imports, followed by Nigeria, which provided 11 percent. The United States and Germany were third and fourth, respectively.

The main components of Ghana's exports continued to be gold and cocoa, and cocoa derivative products followed by timber and timber derivative products in the years after 2000. According to the Bank of Ghana and Ministry of Finance and Economic Planning estimates released in 2011 the joint contribution of gold and cocoa to total exports ranged from 66.1% in 2006 to 75.5% in 2010, and is projected to average 61.6% per annum from 2012 onwards. In terms of individual products, gold remains the major export earner of the economy averaging 42.1% per annum of export earnings between 2006 and 2010. It is projected gold will continue to be the export leader with an estimated contribution of 39.6% in 2011 and projected average contribution of 43.3% per annum in 2012 onwards. The contribution from crude oil production was 7.0% in 2011 and estimated to reach a peak of 9.7% in the first quarter of 2012, thereafter falling to 7.5% in 2015 if there is no production from new oil finds. The contribution of timber to export earnings fell from 5.5% in 2006 to 2.4% in 2010.

The destination of exports from Ghana is fast changing. In 2000, about 72% of Ghana's exports went to the industrialized Western countries. The share of exports to the non-industrialised European countries and the rest-of-the-world were about 11% and 17% respectively. This began to change in the last few years and in 2010, the rest of the world accounted for 68% of the total exports from Ghana while the industrialized countries absorbed only 25%. This was largely due to increased exports to China. The remaining 6.3% of exports went to the non-industrialised European countries. Although total exports from Ghana to the rest of the world have almost doubled since 2000, there has been only marginal increase in the share going to the rest of Africa.

The changing share of exports to the rest of Africa is accounted for by a change in the share that goes to ECOWAS. Among the ECOWAS countries, Benin remains the major destination of exports from Ghana. The main countries of origin of imports (i.e. European Union, China, Nigeria, United States, and India) accounts for 60.2% of imports, and all other origins account for 39.8%.

In addition to supporting traditional export industries such as cocoa and gold, the government also attempted to diversify the content of Ghana's exports. To encourage nontraditional exports in the fishing and agriculture sectors, the government offered to refund 95 percent of import duties on goods destined for re-export and even to cancel sales taxes on manufactured goods sold abroad. In addition, the government devised a scale of tax rebates ranging from 20 percent to 50 percent determined by the volume of total production that was exported. These incentives generated considerable response. By 1988 more than 700 exporters were dealing in 123 export products, the major items

being pineapples, marine and fish products (especially tuna), wood products, aluminum products, and salt. By 1990, the value of nontraditional exports had risen to US\$62 million. According to the Ghana Export Promotion Authority estimates the value of nontraditional exports rose to about US\$1.7 billion in 2010, an increase of about 34.1 per cent in value over that of 2009 and also constituted 27 per cent of the overall export revenue in the country.

Economy of Nigeria

The Nigerian economy has had a truncated history. Despite the oil boom experienced in the 1970s, the private sector remained weak. The existing macroeconomic policies continued to encourage consumption rather than production. The economy was consuming what she was not producing. The austerity measures introduced by the military administration under General Olusegun Obasanjo were short-lived because structural problems were not addressed. GDP, which grew at 10.5 per cent in 1976 declined by 5.7 per cent in 1978 and grew by only 5.9 per cent in 1979. Consequently, the economy entered the recessionary phase, requiring further stabilisation measures to reverse the gloomy situation.

Between 1978 and 1986, except for 1979 and 1985 when GDP showed positive growth, the economy registered negative growth rates, high inflation, high unemployment rate and fiscal imbalance. The stabilisation and austerity measures of the Shehu Shagari regime (1979-83) did not arrest the deepening crisis.

The balance of payment did not improve. There was an increase in external loans which further accelerated the debt over-hang situation. The

country's industrial capacity utilization rate, which was 73.6 per cent in 1981, declined consistently during the period such that by 1989, it was 31 per cent. The growth rate of manufacturing decreased from 14.6 per cent in 1981 to 3.2 per cent in 1989. This poor performance occurred despite various stabilisation policies of the 1980s. The structure of the economy made it vulnerable to external shocks and policies. The problems were so severe that restructuring of the economy was inevitable.

Consequently, a comprehensive economic reform package was introduced in 1986. The package aimed at changing and realigning aggregate domestic expenditure and production patterns so as to minimise dependence on imports; enhance the non-oil export base, and bring the economy back on the path of steady and balanced growth.

The economic reform programme appeared to have intensified speculative and trading activities rather than increasing production. The proliferation of merchant banks, finance houses, de-regulation of interest rates, privatisation of the economy and the new industrial policy did not bring in the needed foreign direct investments. The private sector did not live up to expectations, despite the then favourable environment. During structural adjustment, the private sector was supposed to serve as an engine of growth. Rather sadly, after eight years of structural adjustment measures, the private sector was not able to respond adequately to the desire for increased production, employment and stable prices. The share of manufacturing in GDP was still low, while capacity utilisation was a little above 30 per cent.

Essentially, the performance of the Nigerian private sector vitiated the major assumption that underlies an IMF adjustment programme to the effect

that the private sector has the capacity to respond to supply-side incentives. Regarding privatisation and commercialisation, the public utilities had taken them to mean increased prices without corresponding efficiency and productivity. The unjustifiable price hikes (sometimes in the range of 500-2000 per cent) compounded problems for the industrial sector and the provision of social services.

The increased prices paid by consumers further reduced the latter's already declining real wages. It is not clear why imports were liberalised in an economy that was suffering from inadequate foreign exchange. The reform programme had sought to encourage export promotion, but traditional exports could not bring in the much-needed foreign exchange. Commodity prices fell and for a crop like cocoa, there was a glut in the market. Furthermore, the prices of export commodities were outside the control of the Nigerian economy. Hence, eight years into the adjustment programme, non-oil exports remained insignificant.

Some gains were undoubtedly achieved during the period of Structural Adjustment Programm (SAP). However, the programme brought about a number of problems, some of which were unbearable for the populace. Actually, SAP was intended to be a long-term programme which would gradually restructure the economy and set it on the path of stability and sustainable growth. Unfortunately, the operators of the programme lacked commitment to its long-term achievable goals. The programme was hastily implemented and this brought about endemic inflation (the period witnessed the highest level of inflation as can be seen from Figure 21), shortage of foreign exchange increased unemployment, low capacity utilization of fiscal

deficit and an overall degeneration of the poverty situation in the country. This made an immediate review of the policy imperative.

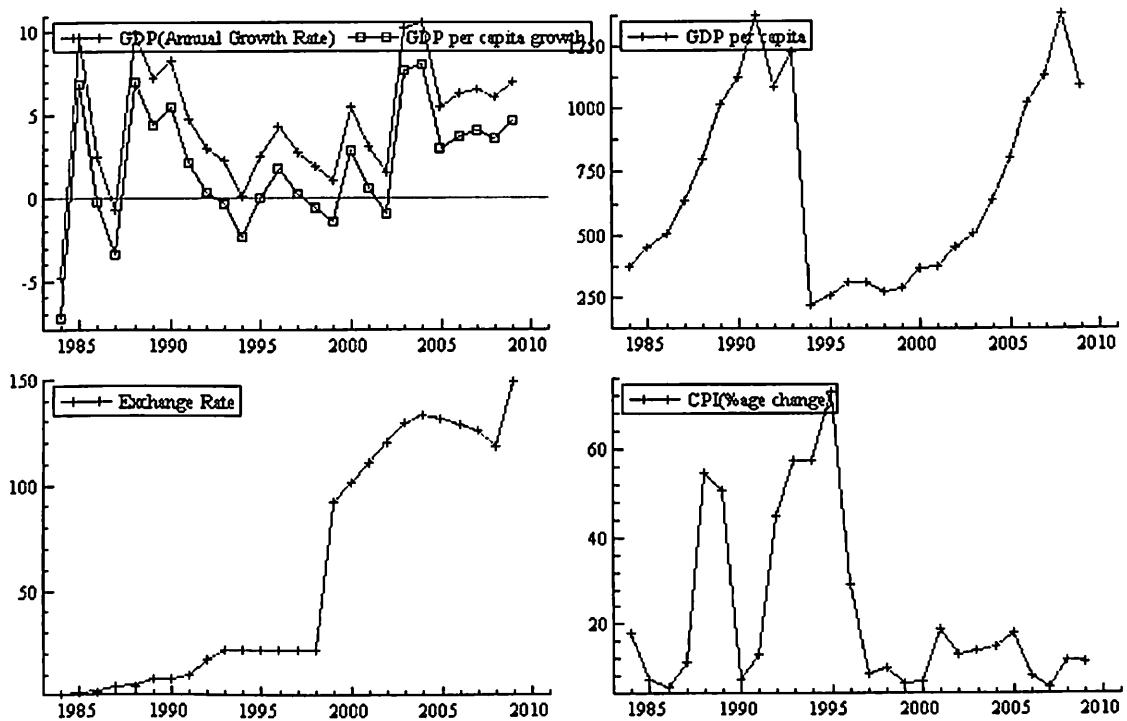


Figure 21: Trends in macroeconomic variables in Nigeria, 1984-2009

Source: Author; Based on World Bank Data

The dual exchange rate regime was introduced in 1995 as an attempt to redress the continued depreciation of the domestic currency. The essence was to achieve a stable and realistic value for the Naira. As a follow up action, the Central Bank of Nigeria, in 1996, intervened in the operations of the autonomous market to ensure that it was adequately funded. Between 1994 and 1998, real GDP grew steadily from 101.0 billion to 113.0 billion naira. The annual growth rates were 1.3 per cent in 1994, 2.2 per cent in 1995, 3.3 per cent in 1996, 3.8 per cent in 1997 and 2.4 per cent in 1998 (see Figure 21). Given the estimated population growth rate of 2.83 per cent, the GDP growth rate of 2.4 per cent in 1998 implied that the average Nigerian citizen was

worse off in terms of well-being than in 1997. In terms of per capita income, there was fluctuation in this index of welfare between 1994 and 1998 as Figure 21 depicts.

Perhaps, a contributing factor to this dismal picture was the contractionary monetary and fiscal policy measures adopted by government, due in part to IMF and World Bank initiatives for reduced public expenditure in the economy. In 1994, the value of output per head of the population was about 1,053 naira. It reduced to 1,047.0 naira in 1995, rising marginally to about 1,051.0 naira in 1996. The figures for 1997 and 1998 were 1,081.3 naira and 1,078.4 naira, respectively. During the period of guided deregulation, and despite efforts by government and the private sector to redress the situation, there was still high unemployment. The published unemployment rates were of 3.2 per cent in 1994, 3.8 per cent in 1996, 2.6 per cent in 1997 and 14 per cent in 1998. The general consensus among economists and various social commentators was, however, that the rates of unemployment were far higher than the true ones published. The Nigerian economy was not able to create enough employment opportunities for citizens who were able and willing to work. Moreover, an adequate environment was not created for self-employment.

The result was increased discomfort suffered by many Nigerians. The inflationary situation during this period was chequered. The rate of inflation rose from 57.0 per cent in 1994 to 72.8 per cent in 1995, but fell to 29 per cent in 1996. It reduced drastically to 8.5 percent in 1997, but rose marginally to 9.5 per cent in 1998 (see Figure 21). Prices were therefore generally unstable during the period of guided deregulation and after. The improvements

recorded in 1997 and 1998 might have been due to the demand management strategy of government, whereby demand was suppressed through the payment of poverty wages and salaries, and due to reduction in government spending generally. However, if the economic fortunes of Nigeria must improve, then the perennial problems of the exchange rates, inflation, unemployment, corruption and low capacity utilisation must be tackled.

For Nigeria, the period beginning from the later end of 1999 marked a turning point from a hitherto culture of fiscal indiscipline characterized by frivolous spending to a new dawn of prudent consumption and saving. This is evident from an unprecedented accumulation in the level of reserves from USD 4.98 billion in May 1999 to USD59.37 billion as at March 28, 2007 (CBN, 2007). These robust domestic economic performances according to Magnus (2007) were occasioned by macroeconomic fundamentals like internal reforms, complemented by favourable external conditions like the persistent and unprecedented rise in crude oil prices joined with drastic decline in external obligations like debt service.

Nigeria's economy has experienced strong growth in recent years. Real GDP growth averaged 7.8 percent from 2004 to 2007, and growth of 6.4 percent in 2007 exceeded the low-income sub-Saharan (LI-SSA) median (4.0 percent), and the LI median (6.0 percent), although it was lower than the rate in Kenya (7.0 percent). Oil accounts for nearly 40 percent of GDP, but from 2001 to 2006—except in 2003—real growth in other sectors outpaced growth in the oil sector. Sectors that have experienced particularly strong growth include telecommunications, which has been liberalized and privatized over the past decade, and wholesale and retail trade. Agriculture has also shown

some growth, although it remains far from fulfilling its potential. Agriculture is important in the Nigerian economy, not only because it employs a large share of the labor force (58.6 percent in 2005), but also because of its importance in the allocation of consumption. Subsistence farming and agricultural production of food and beverages dominate output, but the federal government and several state governments want to revive the prominence of commercial agriculture. The sector has grown in real terms, but its share in GDP has hovered at about one-third in the past few years as the price of oil in the world market has increased along with Nigeria's revenues from oil exports. This share of GDP for agriculture tracks well the expected value of 33.8 percent for a country with Nigeria's characteristics and the medians for low-income countries globally (28.1 percent) and in sub-Saharan Africa (35.6 percent) (USAID, 2008).

The services sector's share of output increased from 21.2 percent in 2002 to 26.3 percent in 2006, but remained well below the LI median (44.6 percent), and the LI-SSA median (44.1 percent). Reforms in the banking and insurance sectors as well as liberalization and privatization in telecommunications and transport have been helpful, as have reforms in the aviation and mobile phone industries. Wholesale and retail trading has also grown. In addition, tourism, Nigeria's movie industry ("Nollywood"), and the entertainment industry in general show potential for growth and employment generation. In summary, growth in non-oil sectors has been promising but will need to outpace oil sector growth for a sustained period to lessen the economy's dependence on oil.

Nigeria's per capita GDP is high relative to GDP in other LI-SSA countries. In purchasing power parity dollars, GDP per capita grew from \$1,597.90 in 2003 to \$2,034.60 in 2007—an average annual growth rate of 5.6 percent. It is now far higher than the LI-SSA's median per capita GDP (\$1,018.00), and Kenya's (\$1,359.00). Despite Nigeria's relatively high per capita GDP, poverty remains widespread and there are wide disparities in income.

Nigeria's labor force grew more productive by an average of 5.1 percent annually between 2003 and 2006, but annual growth dipped from 7.5 percent in 2004 to 3.3 percent in 2006—lower than Kenya's 3.6 percent in 2005 (most recent year available). Nigeria has significant scope for increasing labor force productivity by improving health and education, introducing new technologies, and eliminating protectionist trade policies. Nigeria may also be able to increase productivity and growth by improving the business-enabling environment and increasing fixed investment (expenditure on fixed assets such as buildings, equipment, and infrastructure) from both the private and public sectors.

Structure of the Nigerian Economy

Structurally, the Nigerian economy can be classified into three major sectors namely primary/agriculture and natural resources; secondary—processing and manufacturing; and tertiary/services sectors. The economy is characterized by structural dualism. The agricultural sector is an admixture of subsistence and modern farming, while the industrial sector comprises modern business enterprises which co-exist with a large number of micro-enterprises

employing less than 10 persons mainly located in the informal sector. The agricultural sector has not been able to fulfill its traditional role of feeding the population, meeting the raw material needs of industries, and providing substantial surplus for export. Indeed, the contribution of the sector to total GDP has fallen over the decades, from a very dominant position of 55.8 per cent of the GDP in 1960-70 to 28.4 percent in 1971-80, before rising to 32.3, 34.2 and 40.3 per cent during the decades 1981-90, 1991-2000 and 2001-2009, respectively (Table 5). The fall is not because a strong industrial sector is displacing agriculture but largely as a result of low productivity, owing to the dominance of peasant farmers and their reliance on rudimentary farm equipment and low technology. Another feature of the sector is under-capitalization which results in low yield and declining output, among others.

Table 5: Sectoral contributions to Nigeria's GDP

Activity Sector	1981-1990	1991-2000	2001-2009
1. Agriculture	32.3	34.2	40.3
2. Industry	41.0	38.6	28.4
3. Manufacturing	6.1	4.9	3.9
4. Building & Construction	2.3	1.8	1.8
5. Wholesale & Retail Trade	14.5	13.8	14.0
6. Services	9.8	11.5	15.5
TOTAL Value Added	100.0	100.0	100.0
Diversification Index	0.4	0.4	0.3

Source: Sanusi (2010)

The industrial sector comprises the manufacturing, mining (including crude petroleum and gas) and electricity generation. Prior to independence in

1960, the Nigerian economy was mainly agrarian. On attainment of independence, the Nigerian government embarked on the programme of transforming the country into an industrial economy. The Nigerian manufacturing sub-sector is made up of large, medium and small enterprises, as well as cottage and handcraft units. In spite of spirited efforts made to boost manufacturing output and various policy regimes, manufacturing has not made any significant contribution to the growth of the economy. Industry as a whole contributed only 11.3 percent of the GDP in 1960-70, growing significantly in the next two decades to high of 41.0 per cent in 1981-1990, owing largely to the crude petroleum and gas production during the decades. The contribution contracted to 38.6 percent in the 1990s and further to 29.4 per cent during 2001-2009. These numbers, in fact, belie the poor contribution of the manufacturing sub-sector to aggregate output in Nigeria compared with its peers in Asia and Latin America. Indeed, the contribution of the manufacturing component has on average been below 5.0 per cent in the last two decades. Even the relatively high contribution of oil sector to the industrial sector contribution is being driven largely by crude production and not by the associated 'core industrial 'components like refining and petrochemicals.

The contribution of wholesale and retail trade and services has more or less remained stable while that of building and contribution rose sharply from 5.3 per cent in the 1960s to 8.3 per cent in the 1970s, but fell consistently, thereafter, to 1.8 per cent during 2001-2009. During and some few years after SAP, the main manufactured exports were textiles, beer and stout, cocoa butter, plastic products, processed timber, tyres, bottled water, soap and

detergents as well as iron rods. However, some of these products have disappeared from the export list owing to poor enabling environment.

The components of the mining sub sector in Nigeria are crude petroleum, gas and solid minerals. Prior to the advent of petroleum minerals such as coal and tin were the main mineral exports. However, with the emergence of crude oil, the relative importance of solid minerals diminished. Indeed, since the 1970s, the largest mining activity has been crude oil production, which became dominant in terms of government revenue and export earnings. Lately the production of gas has gained increased attention, as the export potential of gas has reduced the dominance of crude oil.

Indeed, the Nigerian economy has not experienced remarkable transformation and restructuring. Equally important is the indication that since 1999, Nigeria has become a trading outpost for goods produced elsewhere with little domestic transformation of the output of primary sectors by the secondary sector. This is particularly so since the Nigerian agriculture is really peasantry and the high contributions of tertiary sector to output suggest that the sector is not really servicing the Nigerian economy but, indeed, the economies of her trading partners. Thus, the Nigerian economy is still dominated by the primary sector, followed rather closely by the tertiary sector with the contribution of the secondary sector remaining insignificant.

External Sector of Nigeria

In terms of external trade, four major trading partners for Nigeria are United Kingdom, European Union (EU), the United States of America and

Japan. Most of the exports to these countries include petroleum, agricultural products and other minerals.

The United States is the major importer of Nigeria's crude petroleum. More than 80 per cent of Nigeria's exports are destined for markets in Western Europe, North America, Japan and other industrialised countries. Nigeria's export to the UK - a traditional partner because of past colonial ties - has been chequered. According to Ekpo and Umoh (2012), the determination to find new markets and the will to export to brotherly African countries partly explain this situation. Also, U.K's import of Nigeria's crude has declined steadily over time.

Nigeria exports both raw materials and finished products to other African countries (excluding ECOWAS) and Eastern European countries. However, the magnitude of exports to these regions is quite insignificant.

Nigeria's imports from U.K., EEC, USA and Japan have increased steadily in value terms. During the oil boom, imports were possible because the economy had no 'problem' with foreign exchange. What is disturbing is that imports from these sources continue to be over 70 per cent despite the adjustment and stabilization programme. Furthermore, the direction of trade seems to confirm Nigeria's dependence on Western Europe, North America and Japan. Nigeria's exports go to the same sources where her imports come from. There is the need to open up new markets especially in the Far East, Pacific and the Caribbean as well as in promising African countries like South Africa.

On the ECOWAS sub-region, the volume of trade with Ghana, Cote d'Ivoire and Senegal has increased substantially in recent years. Trade with

Niger Republic is very large. It is important that the volume of trade between Nigeria and ECOWAS continue to increase. It is possible that most cross-border transactions are not properly recorded. Nonetheless, the charter of ECOWAS stipulates that member countries must enhance trade among themselves.

Nigeria's current account has shown remarkable variations over time (see Figure 22). During the period 1986-88 the current account maintained a negative trend, with the exception of 1986. However, the following four years, 1989-92 marked the current account surpluses, followed by current account deficits up to 1995. The worst current account deficit occurred in 1998 and since then it has consistently been in surpluses as depicted in Figure 4. The behavior of the Nigerian current account appears to have been sensitive to developments in the world oil market, even after the introduction of reforms in 1986. Among other factors, this sensitivity reflects the non-diversification of the economic base. While the current account does not appear to be a source of policy concern, a sudden negative terms of trade shocks could easily produce an external crisis as the financing of future current account deficits become constrained by the existing stock of external debt obligations.

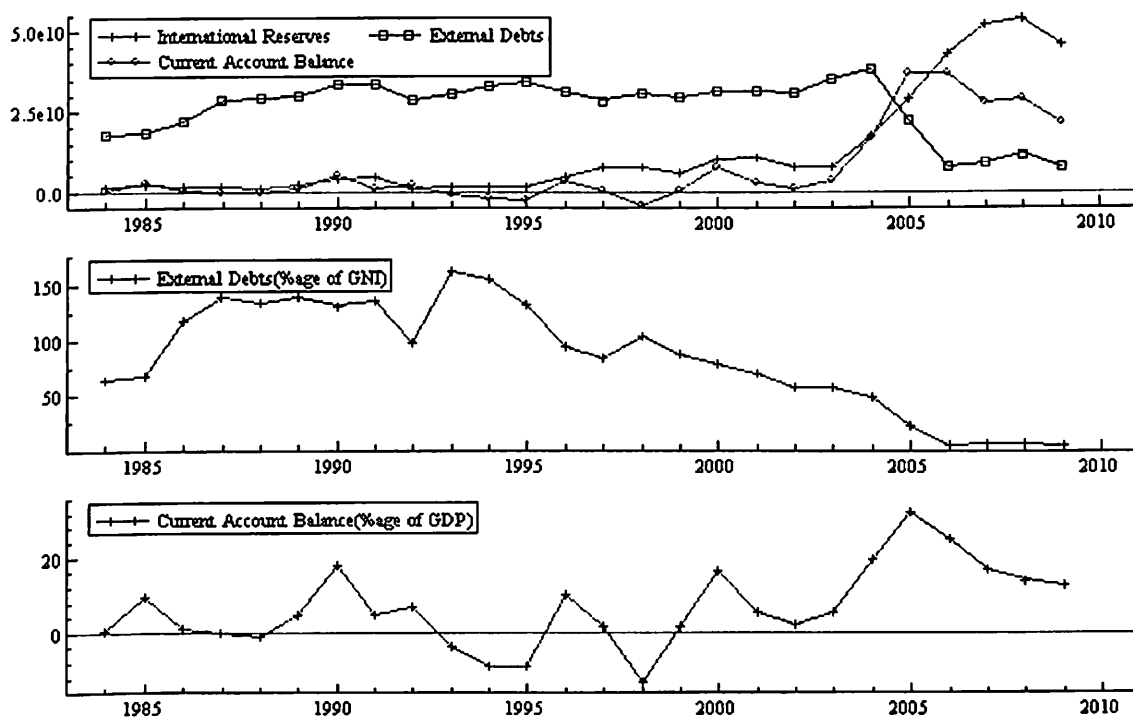


Figure 22: Trends in international reserves, external debts and current account balance in Nigeria, 1984-2009

Source: Author; Based on World Bank Data

Economy of the Gambia

The Gambia's economic development is very reliant on continued multilateral and bilateral aid and on prudent economic management by the government as espoused by the International Monetary Fund's fiscal help and advice. The Gambia is among the poorest countries of the world, ranking 155th out of 177 countries in the 2007/2008 UNDP Human Development Index rankings (HDI). According to the UNDP's Human Poverty Index (HPI-1) of 2004 poverty is was at 40.9 percent, with rural poverty slightly exceeding urban poverty rates, except in Banjul where the rate is much lower.

GDP per capita of The Gambia registered a peak growth of 23.3% in the Seventies. But this proved unsustainable and it consequently shrank by

8.30% in the Eighties and a further 5.20% in the Nineties (US State Department Report). For the period 2000 – 2009, there were three occasions where the growth in GDP per capita registered negative values. The years were 2002, 2005 and 2006. However, the year 2002 registered the worst per capita GDP growth of about -6.4% within the period (see Figure 23).

The government's strategy for 1999-2000 was aimed at consolidating the gains made in 1998 and in 1999, despite some slippages and adverse developments during that period. In 1998, GDP grew by 4.7%, compared to the program target of 3.8%. In 1999, GDP was projected to moderately rise by 4.2% and rise by 5% in 2000. However, it grew by 6.4% and 5.5% in 1999 and 2000 respectively which were above the projected values.

The fiscal program through 2000 aimed to reduce the overall deficit to 2.5% of GDP in 2000 from 4.5% in 1998, with a repayment of domestic debt equivalent to 5.1% of total outstanding government domestic debt. In its budget for 2000, the government planned to further reduce expenditure to 16.3% of GDP in 2000 from 18.1% in 1998, while at the same time bolstering domestic revenue to about 20% of GDP in 2000 from 18.8% in 1998. The 1999-2000 program further aimed at reducing the external account deficit to 10.8% of GDP in 1999 and to 10.5% in 2000 from 11.5% in 1998, while increasing gross external reserves to an equivalent of about 4 months of imports of goods and services during 1999-2000.

Monetary policy was to focus on containing average annual inflation at about 2.5% in 1999 and 2000, while maintaining an adequate level of gross official reserves. The exchange rate was to continue to float freely and the central bank was to limit its interventions to smoothing out seasonal

fluctuations and meeting its external reserves objective. The monetary authorities were to monitor closely the liquidity of the banking system and continue to rely on indirect instruments for monetary control.

On structural reforms, the government was to take steps to strengthen the legal and institutional framework, including efforts to quickly resolve the dispute concerning the Gambia Groundnut Corporation (GGC) property seized by the government and created confidence problem for private investors. It also adopted and was going to continue to approve the divestiture strategy and investment and procurement codes. It intended to further simplify the external tariff structure and improve the soundness of the banking system. The government's strategy on social policy was to focus on improving employment opportunities in key sectors such as agriculture and tourism and on providing better social services.

After almost two decades of continuous economic growth, the macroeconomic performance deteriorated in 2002–03, reflecting the impact of loose fiscal policy, accommodating monetary policy and a drought (see Figure 5). In the past six years, real GDP growth averaged nearly 6%, driven mainly by tourism-related services, communications, and construction. Affected by the global economic crisis, real GDP decelerated to 4.6% growth in 2009 as tourist arrivals and remittances declined. These falls were partly offset by increased agricultural production.

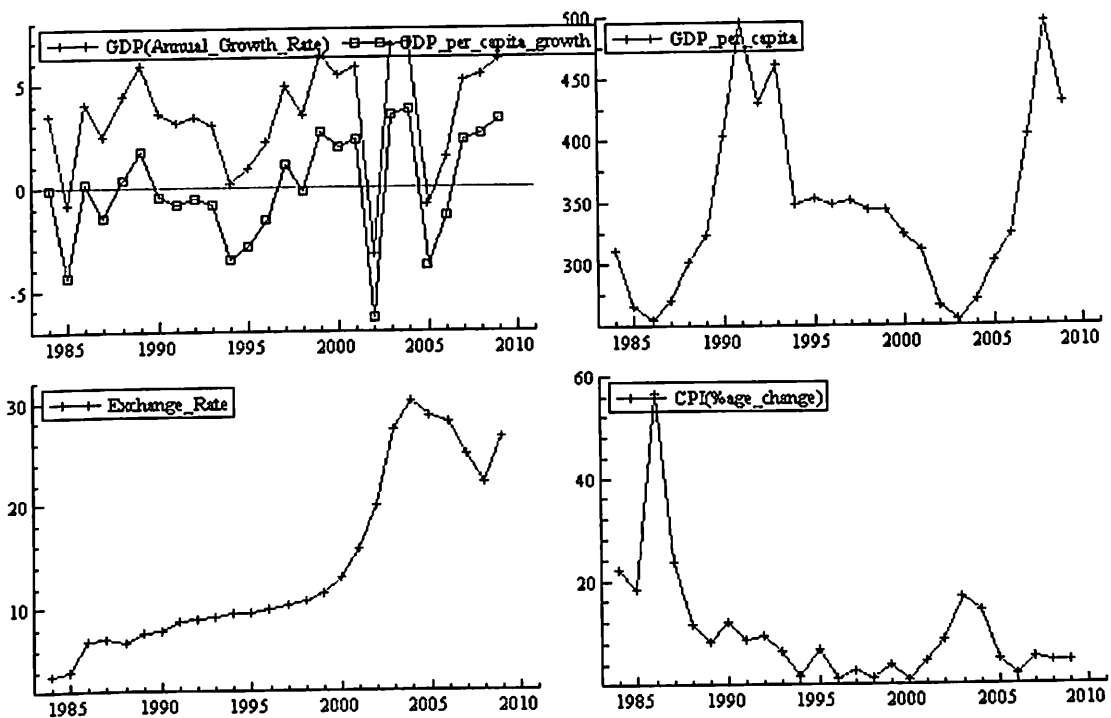


Figure 23: Trends in macroeconomic variables in The Gambia, 1984-2009

Source: Author; Based on World Bank Data

As Figure 23 clearly depicts, inflation rose from an average of less than 5 percent in 2001 to 17 percent in 2003, the highest level in nearly two decades. The dalasi depreciated by 55 percent in nominal effective terms between end-2001 and end-2003. The seeds for the poor performance were sown in 2001 when a combination of significant unbudgeted expenditures and a fall in tax revenues led to a large increase in government borrowing from the Central Bank of The Gambia (CBG) and a sharp rise in domestic debt. Real GDP declined by 3 percent in 2002 because of a drought, but recovered in 2003.

The 2002 IMF PovertyReduction and Growth Facility (PRGF) loan was cut off in 2002 following spending overruns and irregularities at the CBG. The Gambian government sought to re-establish a program with the Fund through a Staff-Monitored Program (SMP) as an interim step towards re-

establishing a PRGF. The IMF noted that fiscal and monetary policies had been tightened, thus, contributing to sharp decline in inflation, from double digits in 2003-2004 to 4.5 percent in 2005 and less than one percent in 2006. Nevertheless, the IMF expresses continued concerns about slippages in fiscal discipline, extra-budgetary expenditures, and inadequate auditing of both fiscal and monetary accounts. The Gambia's fiscal policy was also constrained by a large domestic debt and high real interest rates, such that a substantial primary surplus is required to cover interest payments. As at 2008 The Gambia had had a Staff Monitored Programme with the IMF, as part of a Medium Term Economic Framework Plan. The agency has reported some modest progress on fiscal balance and some improvements in financial management.

A tightening of fiscal and monetary policies from late-2003 restored macroeconomic stability and contributed to sustained growth. The basic primary fiscal balance moved from a deficit of over 1 percent of GDP in 2001 to an average surplus of nearly 9 percent of GDP during 2004–07. Yields on treasury bills rose from 15 percent at end-2001 to 31 percent at end-2003 before declining to 10–15 percent from mid-2005. Inflation fell to less than 1 percent at end-2006 before a spike in the prices of some imported food items pushed it to around 6 percent during most of 2007. It resumed its downward trend in 2008 (see Figure 23). The recent moderation in headline inflation is consistent with the deceleration in the monetary aggregates and the stability of the Dalasi. In the near-term, inflation is forecast to remain in single digit. However, there are risks to the outlook emanating mainly from cost-push factors such as rising food and energy prices. Real GDP expanded at a robust

average annual rate of 6.5 percent, led by the tourism, telecommunication, and construction sectors. Tourism infrastructure has been a major beneficiary of foreign direct investment (FDI).

"The Gambia Incorporated: Vision 2020", adopted in 1996, remains the Government's overall guiding development policy document. Gambia's longer term policy objectives are sketched in this ambitious Vision 2020 document which aims to turn Gambia into a diversified middle income economy with the private sector as "a serious partner in national development and the very engine of growth" by 2020.

External sector of The Gambia

The Gambian economy is a highly open type as measured by export and import ratios to GDP, however, as much as 80 percent of exports consist of re-exports. The external sector is heavily dependent on re-exports, tourism, and remittances from overseas. Import and export procedures are relatively simple and efficient compared with many other developing countries. The main domestically-originating exports are groundnuts and tourism. Tourism, which mostly takes the form of sun seekers, birdwatchers and African-Americans, makes up about 18% of the Gambia's GDP. The Gambia has recently run substantial trade and current-account deficits (see Figure 6) financed largely by official grants and loans, and increasingly foreign direct investment inflows. Foreign direct investment in 2003-2005 averaged more than 10 percent of GDP. The country's economy is mainly reliant mainly agricultural exports as a foreign currency earner. Entrepot (re-export) trade

from Banjul Ports makes up a significant portion of economic activity though the devaluation of the CFA Franc in 1994 reduced it somewhat.

Between 2003 and 2009, The Gambia's competitive advantage was eroded by ECOWAS tariff harmonization, increased relative efficiency of other regional ports, and real effective exchange rate appreciation. These factors impacted both formal and informal trade, with merchandise trade falling from over 70% of GDP in 2003 to under 50% in 2009.

The import bill rose to 31.5% of GDP in 2010 from 30.8% in 2009, reflecting higher oil prices and a weaker currency, while exports fell to 9.2% from 9.8% as re-exports, which account for more than half of all exports, slipped. Re-exports continued to decline as tariff harmonisation in the Economic Community of West African States (ECOWAS) and improving efficiency at other regional ports eroded Banjul's advantages as an entrepot. The current account deficit widened to 12.2% of GDP in 2010 from 10.1% in 2009 and was projected at 11.9% in 2011 and 11% in 2012.

Gambia has applied the ECOWAS common external tariff since 2006, with the mean tariff rate falling from 19% to 14% as a result. As tariffs are an important source of government revenue, the government appears cautious in pursuing further tariff reduction through the Economic Partnership Agreement (EPA) between ECOWAS and the EU. The country has preferential duty free access to the EU under the "Everything But Arms" (EBA) scheme for the 49 Least Developed Countries and to the United States under the African Growth and Opportunities Act (AGOA). So far, however, no exports have been recorded under the AGOA. This poor performance of the AGOA suggests that preferential tariffs alone are not enough to stimulate Gambian exports.

Participation in the ECOWAS Trade Liberalisation Scheme (ETLS), which provides various benefits to qualified exporters, also does not seem to have helped much. ECOWAS, the EU and other development partners have launched initiatives to improve the quality of export groundnuts to meet World Trade Organization (WTO) standards.

With a growing trade imbalance, stemming from higher oil prices and the collapse of groundnut exports, and declines in tourist arrivals and remittances, the current account deficit rose from 5% of GDP in 2003 to over 17% in 2009 according to the WTO. The capital and financial account remains in surplus, helped by an HIPC debt write-off in 2007.

At end 2009, The Gambia's foreign exchange reserves covered more than six months of imports. Gross official reserves, including Special Drawing Rights at the IMF, stood at USD 163.5 million, or 5.1 months of import cover at the end of 2010, down from USD 186 million, or 6.4 months at the end of 2009. The decrease reflects central bank spending on intervention in May and June 2010. The services surplus declined to 5.5% of GDP in 2010 from 6% in 2009, mainly owing to a fall in European tourist arrivals. Workers' remittances fell 17.3% and government transfers declined 15.4% in the first nine months of 2010. FDI fell 5.3% in the first nine months of 2010 after a sharp increase in the presence of foreign banks the previous year.

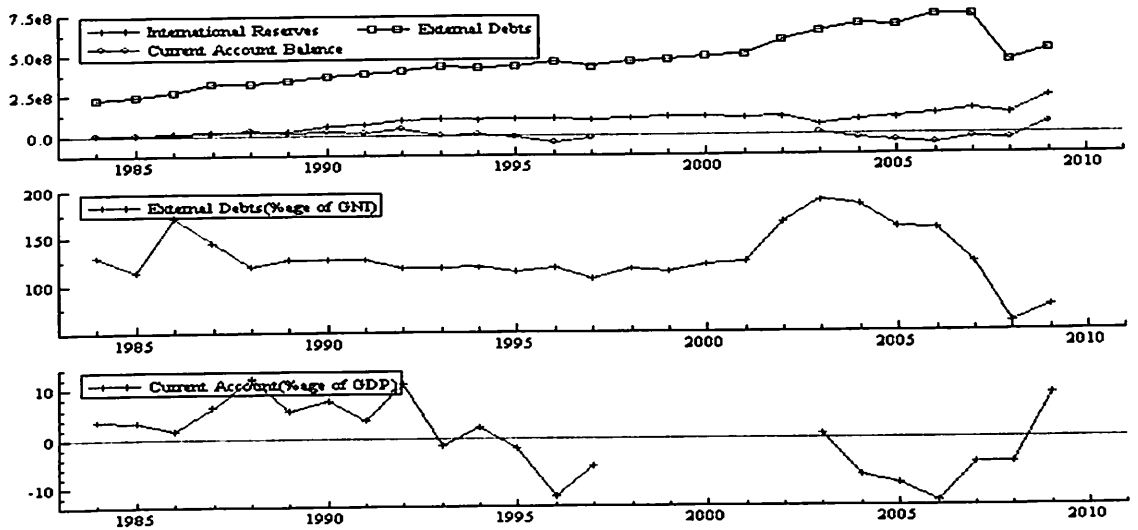


Figure 24: Trends in International reserves, external debts and current account balance in The Gambia, 1984-2009

Source: Author; Based on World Bank Data

Note: The breaks indicate that data were not available for those years.

Economy of Sierra Leone

Sierra Leone's economy is constrained by a narrow production (and export) base, highly dependent on only two sectors: agriculture and mining. These two sectors, as mentioned above, contributed in the 1990s nearly 61 per cent to GDP, and 97 percent to export earnings. They were the major sources of economic growth in the 1960s and early 1970s. By the mid-1970s however, the stimulus to growth provided by the mining sector came abruptly to an end with the termination of iron ore mining brought about by the depletion of economic deposits. At about the same time production of alluvial diamonds took an unabated downward trend. In agriculture, the mid-1970s also witnessed the start of a long period of stagnation and decline. The overall effect of the sharp deterioration in mining and agriculture resulted in rapid

contraction in national income, and highlighted the economic weaknesses associated with a narrow production base.

The civil conflict started in March 1991, six months after the Paris Conference. A combination of factors was responsible for the difficulties that plagued the economy and society in 1990. These factors can be categorized under three headings, they are: poor governance; inappropriate social and economic policies; and weak international prices for the country's main exports. Faced with the attendant circumstances brought about by several years of decline, the Government in 1989/90 embarked on a Structural Adjustment Programme (SAP) which was endorsed by the Bretton Woods Institutions and aimed at correcting the imbalances and distortions in the economy. The main objectives of the SAP included: (1) to achieve and maintain a stable macro-economic environment; (2) to redefine the role of the public sector while restoring the Government's capacity to provide basic services; and (3) to create an economic environment conducive to private sector development with a predictable transparent and fair regulatory framework.

The strategies adopted for realizing the above objectives included: (1) liberalization of trade and the exchange rate; (2) deregulation of prices; (3) strengthening of fiscal management and domestic resource mobilization; (4) elimination of subsidies(especially on petroleum products and the staple food, rice); (5) streamlining of the civil service, and (6) divestiture of state-owned enterprises. These objectives and strategies still constitute the basic framework of Government's economic reform policy. After being in place for ten years however, no realistic assessment of the SAP would be possible because of the

abnormal circumstances created by the civil conflict. Nevertheless, several developments associated with the SAP were recorded during the decade of the 1990s. On the positive side, improvements on several fronts were realized. These included: (1) a sharp reduction in the rate of inflation, from an average of 67.3 per cent in the 1980s to 43.1 per cent in the 1990s; (2) the budget deficit declined from an average of 12.4 per cent of GDP in the 1980s to 6.9 per cent in the 1990s; (3) petroleum products and rice became freely available; (4) the exchange rate was more in line with market forces, than it had been in the 1980s, and (5) fiscal management was improved in terms of planning, recording, monitoring and controlling of expenditures. On the negative side, trade liberalization opened a floodgate, which allowed the free importation of goods and services with few exceptions. Unrestricted imports led to job losses in some manufacturing enterprises, most of which came into existence during the import substitution regime of the 1960s.

Also, major job losses occurred in the civil service with the retrenchment of several thousand workers. It is hoped that the Poverty Reduction Strategy Paper approach to the adjustment process will to a large extent address these negative tendencies. This approach will also address the wider issue of poverty countrywide. The factors that have impeded socio-economic growth and development are basically structural in nature. Their roots can be traced to: Low level of human development and technology use, Low productivity of labour, especially in agriculture, Inadequate infrastructural facilities, Acute shortage of skilled manpower, High population growth rate, Low status of women, High dependence of output on agriculture

and mining, High dependence on the external sector, Small domestic market, and Civil conflict in the 1990s.

Macroeconomic conditions which began deteriorating in the 1970s, worsened in the 1980s. Real GDP growth averaged 3.5 percent in the 1970s but slowed down significantly to an average of 1.5 percent in the 1980s. The deteriorating performance could be attributed to domestic economic policy distortions and external shocks. The oil price shocks led to increased current account and fiscal deficits and higher inflation (Davies, 2007). The economic downturn and high inflation experienced during this period made it difficult for businesses to service their debts. According to Bank of Sierra Leone estimates, the economy of Sierra Leone continued to suffer massive deterioration in the 1990s, as it contracted during the decade at the rate of 4.6 per cent per annum. The years 1991/92 and 1997 witnessed the worst declines at -11.4 and -19.9 per cent respectively. The best or most positive years were 1993/94 and 1996, recording growth rates of 5.6 per cent and 5.0 per cent respectively, brought about largely by revival in food production. Per capita GDP which measured US\$363 in 1980 had declined to US\$190 in 1990. It shrunk further by about 47 per cent from 1990 to 1999. This decline in per capita income had serious poverty-related implications for the country.

The inefficiencies and distortions of the financial system, coupled with deteriorating macroeconomic conditions resulted in the adoption of macroeconomic and structural reforms in the 1990s. These reforms covered a broad spectrum of issues including interest rate liberalization, liberalization of the exchange rate, elimination of directed credit, adoption of indirect methods of monetary control, abolition of price controls and exchange restrictions,

institutional strengthening and review of the relevant legislations. However, the civil war that started in 1991 adversely affected the implementation of reform measures and culminated in deterioration of financial sector performance and growth in the economy. Growth in real GDP dropped significantly to an average of -4.5 percent per annum between 1990 and 2000 (Sierra Leone Poverty Reduction Strategy Paper, 2005).

The rehabilitation of basic agriculture and the boom of the informal sector have led Sierra Leone to high growth rates since 2002. Rates slowed down, however, to about 7% per annum from 2004 to 2007, and further flattened to a projected 5.5% in 2008 when, among several economic shortcomings, the production of rutile and kimberlite encountered problems that caused income shortfalls. From 2002 to 2008, GDP per capita increased from \$185 to \$335 in current prices, or from \$476 to \$728 in purchasing power parity (PPP) terms. The first postwar phase of renewed growth was largely due to the resuscitation of sectors and regions that had been almost or utterly destroyed by massive violence and the vast numbers of displaced persons. Large-scale resettlement and reconstruction, increases in land under cultivation, a rebounding private sector and the growth of donor-financed imports have propelled recovery.

During the postwar period as a whole, the increase in GDP was much more a matter of reconstruction- and rehabilitation-related growth than sustainable development and transformation-related growth. Performance in terms of development and transformation has been and still is weak. The dynamics of the economy remain limited, due to the low and erratic rate of

investment (13.4% of GDP in 2007) as well as the low extent of diversification.

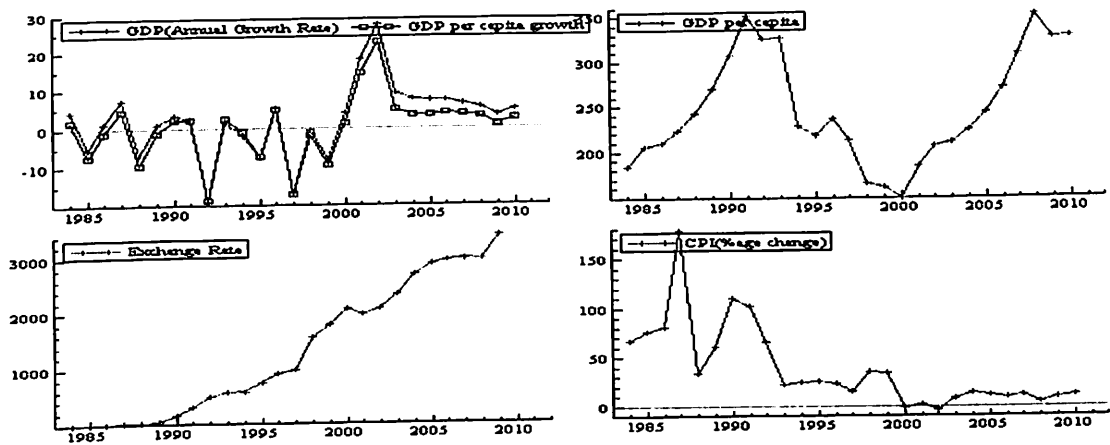


Figure 25: Trends in macroeconomic variables in Sierra Leone, 1984-2009

Source: Author; Based on World Bank Data

External Sector of Sierra Leone

The economy of Sierra Leone is significantly dependent on the external sector. Between 1994 and 1995, exports of goods and services constituted over 22 percent of GDP while the corresponding percentage for imports was as high as 27 per cent. Given these substantial proportions, the balance of payments out-turn have binding consequences on the development of the economy. It should however be noted that there is considerable scope to reduce the level of imports in the medium term. This can be done through import substitution in food which, between 1989 and 1998, averaged 38 per cent of total imports of goods and non-factor services. Import substitution in rice, cooking oil and vegetables can be achieved to a considerable degree by efficient management of the production potential in agriculture.

In external trade, except for 1991 and 1992, deficits were incurred in the trade balance for the remaining years. The export trade virtually collapsed

in the second half of the 1990s as the war intensified and, as a consequence, with the closure of bauxite and rutile mining in 1995. Total merchandise exports which averaged US\$146.6 million between 1990 and 1992, declined to US\$118.3 million in 1993. Between 1995 and 1997, average yearly merchandise exports stood at a mere US\$35million, most of it in diamonds. Analysis of the import bill indicates that payment for food was by far the dominant item, accounting for nearly 38 per cent of the total. This was followed by machinery and transport equipment (17.6 per cent); fuel (16.4 per cent), and manufactured goods (9.6 per cent). In 1997 the Security Council imposed a trade embargo on Sierra Leone as a reaction to the AFRC coup.

With the exception of 1991, the current account remained in deficit throughout the period 1990 to 2009 (see Figure 26). In 1991, a positive balance on merchandise trade helped to achieve a current account surplus amounting to 1.5 percent of GDP. For the remaining years, the deficit fluctuated from a low 0.7 per cent of GDP in 1992, to a high of 15.9 per cent in 1996. The average for the period was a deficit of 6.7 per cent of GDP. In 2000, the deficit rose to as high as 17.7 percent, the highest within the period, 1984 to 2009, before coming down to 6.7 percent in 2006. It increased again to 11.5 percent in 2008 before reducing to 9.9 percent in 2009. This state of affairs was attributable to exogenous factors such as substantial increases in the value of petroleum and food imports.

Foreign exchange income is still heavily dependent upon a single product, diamonds, which accounted for 59% of (regular) export earnings in 2007. Another 25% of export earnings were attributed to rutile and bauxite, which had been resuscitated from their wartime collapse only in 2006. Other

products such as oil, gas and agricultural crops still have to prove their potentials.

Sierra Leone is a member of the Economic Community of West African States (ECOWAS). With Liberia and Guinea, it formed the Mano River Union (MRU) customs union, primarily designed to implement development projects and promote regional economic integration. Cote d'Ivoire joined the MRU in May 2008. The MRU has been largely inactive because of domestic problems and internal and cross-border conflicts in all three countries. The future of the MRU depends on the ability of its members to deal with the fallout from these internal and regional problems, as well as adequately fund the union to carry out sub-regional activities. These regional groupings are potentially of great advantage to Sierra Leone in overcoming the inhibitions to sustained economic growth imposed by the smallness of the domestic market. In June 2010, the Monetary Fund (IMF) approved a 3-year successor arrangement under the Extended Credit Facility (ECF) for Sierra Leone. Sierra Leone continues to rely on significant amounts of foreign assistance, principally from multilateral donors. The largest bilateral donors are the United Kingdom and the European Union; others include the United States, Italy, and Germany.

Sierra Leone's economic policy has generally shifted from post-conflict stabilization to poverty-reduction efforts, including good governance and fighting corruption; job creation; and food security. In general, Sierra Leone remains highly vulnerable to global economic developments that influence its major export and import products. Moreover, in the foreseeable future, the overall economic performance of this still war-torn country remains

heavily dependent upon money inflows from international donors and investors.

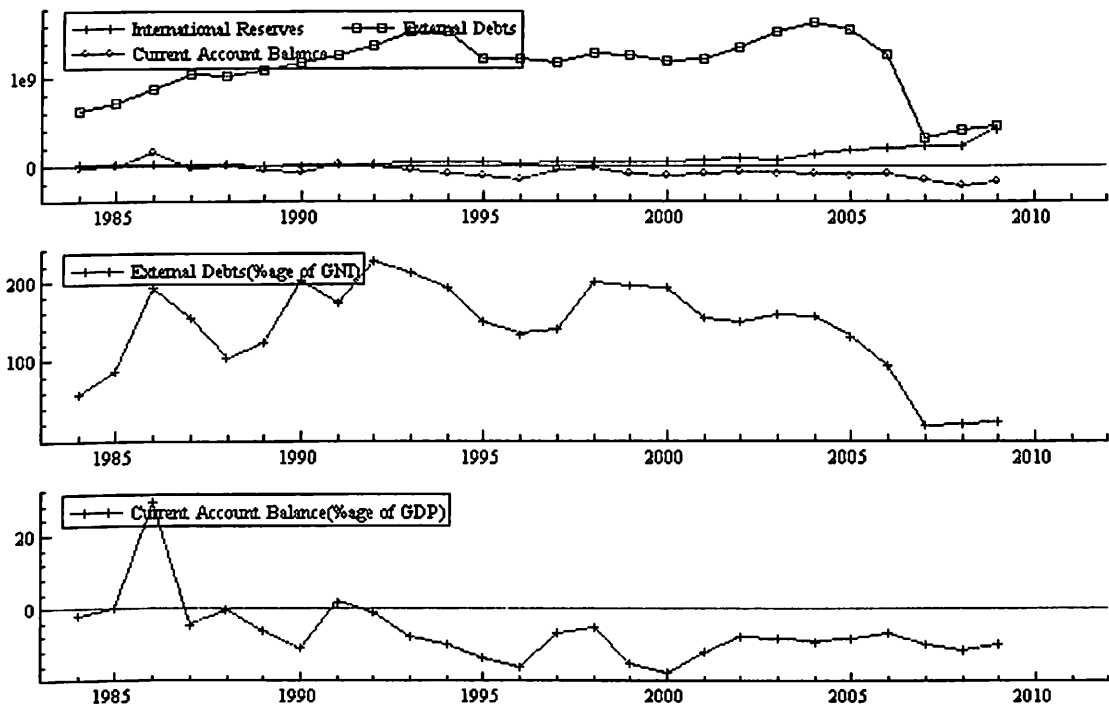


Figure 26: Trends in international reserves, external debts and current account balance in Sierra Leone, 1984-2009

Source: Author; Based on World Bank Data

Economy of Guinea

From 1985 to 2002, Guinea engaged in a process of economic liberalisation and transformation that drove real gross domestic product (GDP) growth to an average of 4% per year over the period (equal to a 0.8% increase in per capita income), while stabilising prices and the exchange rate. In 1990–2000 Guinea’s GDP grew at an average annual rate of 3.4% in real terms. GDP growth began a downward trend in 1997, dropping to its lowest level (1.1%) in 2000. The poor growth performance in 2000 mainly reflected deteriorating security conditions and unfavourable world price trends for the

country's two main exports, bauxite and alumina. The economy's heavy reliance on mining means that the fortunes of that sector largely determine macroeconomic and social outcomes.

Problems in the implementation of reforms between 2003 and 2006 resulted in a 0.6% fall in per capita income, and the economic slump subsequently worsened in 2007 as a result of the global crisis. In response to these difficulties, since 2007 Guinea has been conducting reforms under its second poverty reduction strategy (PRSP 2), which is supported by the International Monetary Fund's (IMF) Poverty Reduction and Growth Facility (PRGF) and by other technical and financial partners. The reforms bore fruit in 2008, despite the difficult international context, as growth accelerated from 1.8% in 2007 to 4.9% in 2008. From 2009, however, the economic situation was marked by the combined effects of the economic and financial crisis and the socio-political crisis, resulting in a 0.3% fall in GDP (see Figure 27).

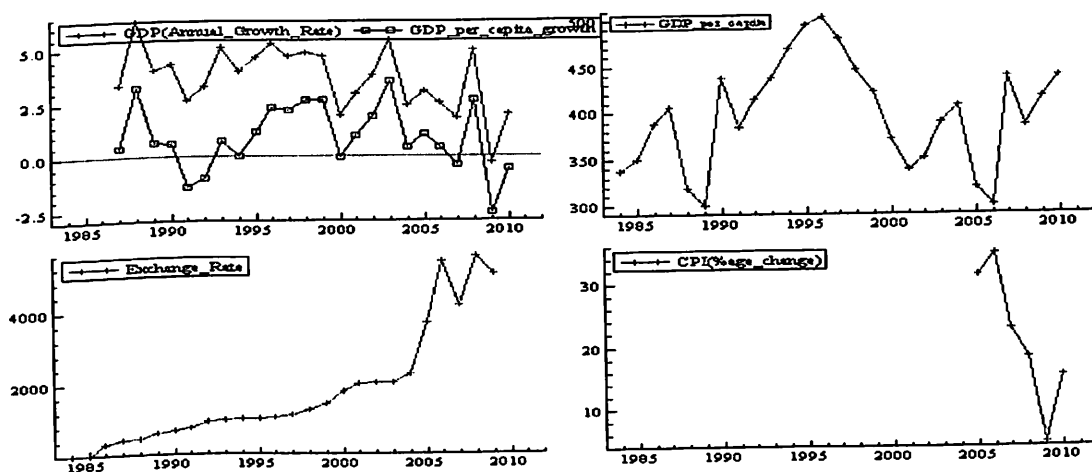


Figure 27: Trends in macroeconomic variables in Guinea, 1984-2009

Source: Author; Based on World Bank Data

Note: The breaks indicate that data were not available for those years.

The economic situation remains difficult, as reflected in the 2010 indicators. The rate of economic growth is 1.6%, too low to reduce poverty. The high rate of inflation (15.8%) continues to undermine the population's purchasing power. The poverty rate, which stood at 49% in 2002, reached 55% in 2010. Foreign exchange reserves have dwindled to only 1.9 months of imports. Domestic and foreign arrears have rocketed, making it difficult to improve the macroeconomic situation. Added to all this is a substantial reduction in official development assistance (ODA), both bilateral and multilateral, and increased prices for the main imported products, such as food and oil. If these trends are not reversed soon, it will be difficult for Guinea to reach the completion point of the Heavily Indebted Poor Countries (HIPC) Initiative; even though it had nearly attained this important milestone at the end of 2008 (African Economic Outlook 2011). The informal sector continues to be a major contributor to the economy. Exchange rate stability is an ongoing concern.

Guinea's reform efforts

The Guinean Government adopted policies in the 1990s to return commercial activity to the private sector, promote investment, reduce the role of the state in the economy, and improve the administrative and judicial framework after decades of socialism under President Sekou Toure. Despite the initial success of these programs to promote economic growth, changes in policy over the following decade up to President Conte's 2008 death made little headway in addressing the structural problems afflicting Guinea's private sector, although there was some growth.

The government revised the private investment code in 1998 to stimulate economic activity in the spirit of free enterprise. The code did not discriminate between foreigners and nationals and provided for repatriation of profits. While the code restricted development of Guinea's hydraulic resources to projects in which Guineans have majority shareholdings and management control, it did contain a clause permitting negotiations of more favorable conditions for investors in specific agreements. Foreign investments outside Conakry were entitled to more favorable benefits. A national investment commission was formed to review all investment proposals. The United States and Guinea signed an investment guarantee agreement offering political risk insurance to American investors through the Overseas Private Investment Corporation (OPIC). In addition, Guinea inaugurated an arbitration court system to allow for the quick resolution of commercial disputes.

Until June 2001, private operators managed the production, distribution, and fee-collection operations of water and electricity under performance-based contracts with the Government of Guinea. However, with both utilities plagued by inefficiency and corruption, foreign private investors in these operations departed the country in frustration.

In 2002, the International Monetary Fund (IMF) suspended Guinea's Poverty Reduction and Growth Facility (PRGF) because the government failed to meet key performance criteria. In reviews of the PRGF, the World Bank noted that Guinea had met its spending goals in targeted social priority sectors. However, spending in other areas, primarily defense, contributed to a significant fiscal deficit. The loss of IMF funds forced the government to

finance its debts through Central Bank advances. The pursuit of unsound economic policies resulted in hard-to-correct imbalances.

Under Prime Minister Diallo, the government began a rigorous reform agenda in December 2004 designed to return Guinea to a PRGF with the IMF. Although exchange rates temporarily improved, these reforms did not slow down inflation, which hit 27% in 2004, 30% in 2005 and, according to the Economist Intelligence Unit, 34.7% in 2006 and 23.4% in 2007 (see Figure 2(i)). In 2007, the IMF launched a new PRGF for Guinea to support a 3-year IMF program with the objective of reducing poverty and securing debt relief for the country under the Heavily Indebted Poor Countries (HIPC) initiative. As of late 2008, Guinea was on track to achieve debt reduction under the HIPC initiative. However, after the December 23, 2008 coup d'état, the status of the HIPC program was unclear. In 2009, both the World Bank and the IMF stopped their programming to Guinea.

Investment and economic growth slowed considerably in 2009 due to falling commodity prices, the global economic crisis, and CNDD economic mismanagement. After seizing power, CNDD President Moussa Dadis Camara declared that all commercial contracts negotiated under the former regime would be subject to immediate audit and review. Camara waged several contract campaigns in his first 6 months in power against large international mining companies including Rio Tinto, Rusal, and AngloGold Ashanti. From September 2009, the insecurity created by government hostility toward investment was compounded by violent political crackdowns and fracturing within the military. Many companies already operating in Guinea slowed exploration efforts considerably for fear that falling prices and government

intervention could precipitate massive investment losses. New investments also decreased significantly in 2009.

In the wake of Guinea's first democratic elections, international interest in Guinea is on the rise. Following the release of Guinea's new mining code in September 2011, mining companies are beginning to restart their projects, and investors are arriving with interest in Guinea's overall economic potential and opportunities in the minerals sector. The World Bank and IMF restarted operations in Guinea in June 2011. The World Bank committed \$140 million to development projects in 2011 and 2012, and the IMF initiated a Staff Managed Program designed as a bridge to the establishment of an Extended Credit Facility (ECF), a requirement for HIPC completion. As of October 2011, experts said Guinea might be able to begin the ECF by January 2012 and could qualify for debt relief under HIPC by July 2012. Although progress on economic reform and reengaging with international partners has been slow, as of November 2011 President Conde seemed to be following through with his promise to make Guinea's economic development his top priority.

External sector of Guinea

The Guinean export sector is fragile. It is concentrated in minerals that are particularly sensitive to fluctuations in world markets (especially the two main exports, bauxite and alumina). It is poorly diversified, particularly in agriculture and fisheries. And it lacks competitiveness, particularly in agriculture, relative to the rest of the sub-region. The lack of competitiveness stems from the prohibitive costs of inputs (particularly packaging and

transport), supply-side constraints on the ability to adapt to changing international demand, and the absence of an entrepreneurial export culture. And all these bottlenecks are linked to the weak business environment, the lack of productive investment, and the inadequate and high-cost infrastructure services.

The trade balance has remained in deficit since 1991. This can be explained in part by the decline in earnings from mineral exports due to the drop in prices and production levels for bauxite and alumina. These two minerals account for more than half the goods exported by Guinea. Exports grew in 1998, mainly because of an increase in gold exports resulting from recent investments in the gold sector. Imports are equivalent to roughly a quarter of GDP, with food and agricultural products (mostly rice, sugar, and flour) accounting for around 30% of the total (Economic Report on Africa 2002). The changing fortunes of mining are reflected in the fluctuating value of machinery and equipment imports in recent years and in the recent rise in imports of semi-finished goods destined primarily for the construction industry. The growth in total imports reflects an increase in the volume of intermediary goods and capital, closely linked to investments by the public sector, investments in the mining sector, and growing purchases of petroleum products.

Estimates of the current account deficit vary from one source to another, but the IMF, World Bank and Guinean institutions have observed a declining trend over the years. The IMF put the current account deficit at 6.3–7.2% of GDP between 1997 and 1999 and estimated it at 2.9% (including official transfers) in 2000. Official statistics put the current account deficit at

2.1% of GDP in 2000 and an estimated 1.2% in 2001 (Economic Report on Africa 2002). According to the World Bank records the current account deficits worsened from 4.5% of GDP in 2000 to 6.5% in 2002, 9.07% in 2007 and a whopping 31.8% of GDP in 2008 before reducing to 9.8% in 2009 (see Figure 28).

The European Union is the country's main trading partner, accounting for more than 50% of total trade. The United States has been an important client of Guinea since 1995 (mainly for bauxite). Trade with Asia is almost unidirectional, consisting mainly of imports from China and Japan (Economic Report on Africa 2002). Although some trade is developing with countries in the sub-region, particularly Côte d'Ivoire, Nigeria, and Senegal, it remains insignificant. Further growth in trade will depend on the development of lower-cost transport through the establishment of road, rail, seaport, and airport networks.

The Guinean government has undertaken sizable investments in support of its socioeconomic objectives, financed largely by concessionary credits from external partners. The development of basic infrastructure (roads, water, electricity, communications) and agriculture was accompanied by a substantial increase in debt. In 1995 the country's external debt amounted to \$2.9 billion, and in 1999 to \$3.4 billion (Economic Report on Africa 2002). Between 2000 and 2009, the external debts have ranged from about \$2.9 billion to \$3.2 billion. The highest within the period was registered in 2003 and the lowest in 2005 (see Figure 28).

Despite the concessionary nature of the loans and the debt rescheduling negotiated with the Paris Club of bilateral creditors, the country faced serious

difficulties in managing its debt. In recognition of the government's reform efforts, Guinea was declared eligible for the HIPC initiative in 1999 by the executive boards of the IMF and the World Bank. A debt rescheduling agreement reached in 1997 with the Paris Club had already cancelled 50% of Guinea's debt and authorized the country to convert up to 20% of outstanding arrears into local currency equity for investment in development projects. A similar agreement followed in 2001. The debt relief under the HIPC initiative has helped to finance the country's poverty reduction strategy.

In terms of trade, the government's new liberalization policy, laid out in the Economic and Financial Reforms Programme, aims to help reintegrate the country with the global trading system after a quarter century of socialism. In the long run the policy is expected to make the Guinean economy internationally competitive and to enable the country to accumulate external reserves to cope with the difficulties typical for countries relying on exports of one or two primary commodities. One important step towards these goals has been to enhance the flexibility and transparency of exchange operations. The government has done so by limiting the involvement of the Central Bank in the exchange market (by eliminating short-term fluctuations) and by encouraging transactions on the foreign currency auction market (Economic Report on Africa 2002).

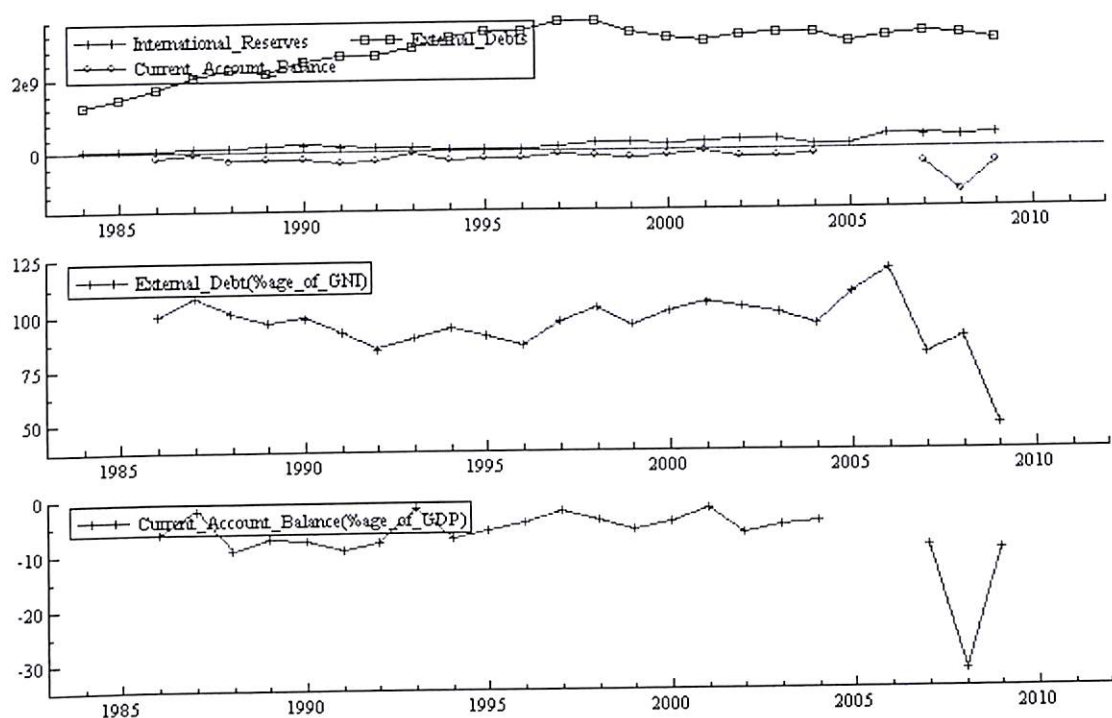


Figure 28: Trends in international reserves, external debts and current account balance in Guinea, 1984-2009

Source: Author; Based on World Bank Data

Note: The breaks indicate that data were not available for those years.

Summary

The economies of WAMZ are endowed with numerous natural resources that could be tapped to promote economic growth and development. Nigeria has the biggest economy, has a very significant amount of oil and gas deposits and provides the largest market in the sub-region because of her huge population and as such a very important member in the WAMZ. Agriculture sector is the major sector in the economies of WAMZ, both in terms of its contribution to GDP and to employment. But unfortunately, it is not very much developed to enable it play its major and critical role of adequately feeding the people and also providing raw material

for the industry. None of the five countries can claim to be self-sufficient in food production. They depend on food imports especially rice from outside Africa. Lack of capital has always been cited as the major problem which is very much debatable.

All the five countries in one way or the other have gone through and still going through reforms or programmes prescribed by the Bretton Wood institutions, IMF and World Bank and their affiliates. The results from these programmes can best be described as mixed.

As it is the characteristic of every developing country, achieving a sustainable macroeconomic stability and economic growth still remains a challenge for these five countries making up the WAMZ. The analyses of the individual economies have shown that the economic performance has been mixed. There have been periods of some progress being made and periods when the performance has been very poor and not encouraging. This state of affairs has been attributable to a number of factors, both internal and external. The internal factors include over dependence on export of primary products, poor management of scarce resources, lack of capital to invest, corruption, inefficiency, bad governance, and political instability. The external factors include unfavourable world economic order leading to unfavourable terms of trade, ever fluctuating world market prices of primary products and attachment of very stringent conditions to external aid. It is believed that with proper planning and management of scarce resources, efficient institutions, good governance and political stability, these countries could make giant strides in their developmental efforts.

CHAPTER FOUR

LITERATURE REVIEW

This chapter reviews some of the existing theoretical literature as well as empirical studies on international reserves holdings and also on economic growth. It begins by looking at the theory of international reserves and their determinants. The chapter also explains the Mrs. Machlup and the related Joneses hypothesis and examines some opposing views on the relationship between international reserves and economic growth. Some of the existing empirical studies done in the area of demand for international reserves and economic growth are also reviewed with the view to identifying some of the relevant and possible factors that may influence these two variables, demand for international reserves and economic growth.

International reserves and their determinants in theory

Traditional models of demand for international reserves

Traditionally, exchange rate policies and the choice of adjustment measures are crucial determinants of international reserve holdings. If central banks do not intervene in the market for foreign exchange, the balance of payments is by definition in equilibrium, and the exchange rate adjusts to shocks. A fixed exchange rate arrangement or a managed exchange rate, however, may lead to foreign exchange interventions, which imply a deficit or a surplus in the balance of payments. In the case of a deficit, countries sell reserves. This amounts to a net capital import by the central bank and requires offsetting changes elsewhere in the balance of payments, for example, an increase in the trade balance. Imports can be reduced by expenditure-reducing

policies. These are internal measures that basically reduce national income. For a given propensity to import, lower income reduces imports. Alternatively, expenditure-switching policies can be implemented. These are external measures like the imposition of tariffs and quotas intended to reduce imports or devaluation, which also affects exports. If the currency is permitted to depreciate, balance of payments equilibrium is automatically maintained.

According to the monetary approach to the balance of payments, i.e., with a fixed exchange rate, the loss of reserves and the balance of payments deficit implied by it, are caused by a disequilibrium in the money market, for example, an unexpected increase in the money supply. The foreign exchange intervention implies a reduction of the monetary base and thereby restores the equilibrium in the money market. The reserve losses will end, i.e., the deficit of the balance of payments will equally vanish, as soon as the money market has reached its equilibrium. Hence, there is no need for an active balance of payments policy. The central bank loses reserves – willingly or not.

The alternatives to foreign exchange intervention, expenditure-reducing and expenditure-switching policies are variants of the absorption approach to the balance of payments. One shortcoming of this Keynesian analysis is that it focuses on the current account and disregards the capital account. It erroneously assumes that the necessary adjustment has to be borne by the current account and that the capital account balance is exogenous.

The traditional theory of optimal international reserves compares the cost of holding reserves for foreign exchange interventions with the cost of these alternative adjustment policies, if the exchange rate is not permitted to adjust. The cost of adjustment is defined as the output or wealth foregone by

taking costly policy measures like expenditure-switching or expenditure-reducing. The theory of optimal international reserves was developed along two lines: a cost-benefit approach and a utility-maximising approach. According to the cost-benefit approach to determining the optimal level of reserves, central banks face a trade-off between the cost of holding reserves and the cost of adjustment policies that prevent the balance of payments to turn into deficit under a fixed exchange rate. Reserves can be used to temporarily mitigate these adjustment costs and allow for a smooth adjustment in the face of an external shock. However, in the case that the balance of payment is not temporary and the use of reserves only delays a necessary adjustment, the use of reserves might even exacerbate a crisis since the adjustment takes place under less attractive terms. Central banks demand reserves until their opportunity cost equals the marginal benefit.

The pioneering work of the cost-benefit approach is due to Heller (1966). His results are based on a Keynesian model with fixed prices and a fixed exchange rate regime. He assumes that there are no capital flows and that expenditure-reducing is the only adjustment policy to maintain the equilibrium of the balance of payments. Implicitly, he also assumes that the monetary base can only be adjusted through foreign exchange interventions (and that the demand for money and the monetary base cannot be manipulated by economic policy, i.e. (fiscal policy)). Whenever reserves reach their lower bound, the adjustment cost is incurred. According to Heller the marginal cost of adjustment is equal to the inverse of the marginal propensity to import. Under the assumption of a structural equilibrium in the balance of payments he obtains the following formula for the optimal level of reserves (R^*):

$$R^*_H = \left[\frac{\log(r^{opp} \cdot m)}{\log(1/2)} \right] \cdot \sigma \quad (4.1)$$

Hence, the optimal level of reserves increases with the variability of reserves under a fixed exchange rate (σ) and decreases with the opportunity cost of holding reserves (r^{opp}) and the marginal propensity to import (m).

Frenkel and Jovanovic (1981) refine the stochastic process of this model and focus on a stochastic inventory control model. By the minimization of total costs, they derive the following formula of the optimal level of international reserves:

$$R^*_{FJ} = A \cdot \sigma^{1/2} \cdot (r^{opp} \cdot m)^{-1/4} \quad (4.2)$$

where A is a fixed cost of adjustment that is incurred by expenditure-reducing or expenditure-switching policies. The exchange rate is assumed to be fixed. This model is known as the buffer stock model. Although the formula and the optimal level of reserves differ from Heller's results, the determinants of the optimal level of reserves and their expected effect coincide with those of Heller's model: The optimal level of reserves increases with the reserve variability under a fixed exchange rate (σ) and decreases with the opportunity cost (r^{opp}) and the marginal propensity to import (m). An adjustment of the exchange rate is ruled out.

Despite the fact that the buffer stock model was developed under assumptions that do not hold any longer – fixed exchange rate arrangements and no capital flows – it is still the workhorse in empirical studies (IMF 2003; see Bahmani-Oskooee & Brown 2002 for a comprehensive survey). Moreover, the theoretical contributions of the asset market approach have hardly been applied to the demand for reserves. Flood and Marion (2002) find that the

buffer stock model works about as well in the post-Bretton Woods period (1976-1997) as before. Nevertheless, it explains only a small portion of reserve changes and fails to explain cross-country variations.

A basic contribution to the utility-maximizing approach is Clark (1970) who assumes a social welfare function which increases with income and decreases with income variability. Both arguments are linked to the level of reserves: A higher level of reserves implies a higher opportunity cost and therefore a lower income. The larger the level of reserves, the smaller is the probability of reserve depletion. Accordingly, enforced adjustment policies which lead to income fluctuations are less frequent. Optimal reserves turn out to be an increasing function of shocks to the balance of payments and GDP per capita and a decreasing function of the opportunity cost and the marginal propensity to import. Since the cost-benefit approach and the utility-maximizing approach only differ in the modelling strategy but are essentially based on the same idea, the determinants of optimal reserves do not differ much.

Another work in the tradition of the cost-benefit approach is Ben-Bassat and Gottlieb (1992). They adapt the original model to the conditions of the post-Bretton Woods era and allow for capital flows and flexible exchange rates. They derive the demand for precautionary reserves for a borrowing country characterised by capital imports (surplus in the private capital account). These capital imports might be the result of the efficient distribution of world capital. Whereas the traditional approach stresses the adjustment cost in case of reserve depletion, Ben-Bassat and Gottlieb shift their focus on the cost of a sovereign default. After a period of external borrowing, the sovereign

entity might default on its debt obligations, a situation caused by the change of investors' sentiment and willingness to provide further capital. The probability of sovereign default is assumed to be a negative function of the ratio of reserves to imports (R/Im) and a positive function of the ratio of external debt to exports (D/Ex). The cost of reserve depletion then includes the negative output effect and the cost of the reduced or even lost access to the international capital market for the defaulting country (due to high risk premia). This also implies that future consumption smoothing by means of foreign borrowing is more difficult.

Unlike preceding models, the authors hypothesise that the cost of sovereign default is positively related to the openness of an economy since more open economies suffer more from a disruption of the flows of tradables and capital. Total expected cost (TC) is the sum of the expected cost of sovereign default and the expected opportunity cost of reserve holdings:

$$TC = p(R/Im, D/Ex, \dots) \cdot C + [1 - p(R, \dots)] \cdot r^{opp} \cdot R \quad (4.3)$$

where p is the probability of reserve depletion which equals the probability of sovereign default. C measures the cost of reserve depletion. Since the authors do not assume any functional form, an explicit solution for the optimal level of reserves cannot be derived.

However, the model identifies the following variables as determinants of the optimal level of reserves:

$$R^*_{BG} = R^*(m, Im, D/Ex, r^{opp}) \quad (4.4)$$

In comparison with the buffer stock model, external debt enters as a new determinant, the variability measure is no longer relevant and the expected sign of the openness variable changes - from negative to positive.

One might however question the plausibility of the assumption that reserves can prevent a sovereign default. There are two possible situations: Either the level of reserves exceeds the amount of public external debt or reserves do not cover external debt. In the first case, reserves can impede sovereign default. However, this raises the question why the country does not repay its external debt by the use of reserves. Thereby it could economize the opportunity cost since the interest rate paid on external debt is generally higher than that paid on reserves. In the second case, the level of reserves is too small to prevent a sovereign default. Hence, in this model reserves are costly and have limited benefits.

Crisis-related model

The models presented so far ignore the implications of increasing financial integration for developing and emerging economies. With respect to reserve holdings one can distinguish two opposing effects of financial integration.

First, private sector access to international capital markets facilitates private financing of current account deficits. Loans from the international capital market can serve as a substitute for reserves in order to smooth absorption in the presence of trade shocks. Hence, the adjustment to trade shocks ceased to be a topic of great concern.

Second, open capital markets increase the exposure to external financial disturbances and speculative flows. The sources of risk move from the current account to the capital account. Crises may stem from the capital account with no change in the current account. Financial markets often bring

about adjustment with no reaction of the current account being required. Therefore, the more recent literature views reserves as a precautionary cushion against the risks of capital account liberalization, namely sudden stops, reversals of capital flows and financial volatility (Aizenman & Lee, 2007; Jeanne & Rancière, 2006; Li & Rajan, 2005). This implies that open capital markets reduce the need for official reserve holdings in good times but increase the need for reserves in times of economic crisis. The function of precautionary reserves includes both crisis prevention and crisis management. The former refers to the role of reserves in reducing the probability of a crisis. A high level of reserves may signal the central bank's ability to stabilize the exchange rate. This might prevent the outset of a speculative run which leads to a self-fulfilling crisis. Crisis management refers to the role reserves may play in a crisis. Reserves can reduce and smoothen the adjustment of the exchange rate and of output. In the presence of current account crises, banking crises or exchange rate crises, the central bank can stabilize the exchange rate. However, there are also other ways of stabilizing the exchange rate, and stabilizing the exchange rate need not be optimal.

External factors might have contributed to the rising importance of autonomous crisis management on the national policy agenda. A financial crisis often leads to a forced partnership between the affected country and an international financial institution: the country resorts to assistance programmes provided by the IMF or the World Bank. After the experience of the loss of autonomous decision-making implied by the conditionality of the programmes a country might have an increased interest in preventing a similar situation in the future. However, empirical studies find that the participation in an IMF

programme is more likely, the more frequently it received IMF credit in the past. This, however, does not contradict the hypothesis that countries are less willing to depend on international financial assistance after they once received an assistance loan. The tendency for recidivism might be caused by factors like weak governance, a volatile external sector or dependence on foreign investment.

In sum, the evidence suggests that IMF programmes do not foster precautionary policies. The accumulation of international reserves might rather be a side-effect of the increasing international financial integration. Given increasing stocks of cross-border assets and liabilities and volatile capital flows, central banks might demand additional reserves in order to manage potential crises themselves.

A critique of presented models

All approaches outlined so far implicitly assume that different central banks behave identically as individual preferences do not enter the optimising calculus. In practice, however, the level of reserves increases with a country's risk aversion, which differs due to individual historical experience, culture and stage of development.

All these models determine an optimal level of reserves. However, critics argue that the level of reserves is not the outcome of a central bank's optimising strategy. The level of reserves is only the outcome of an optimising strategy if its determination is a policy objective of its own. The level of reserves, however, may not be an exogenous variable but depend on other

policies, particularly on monetary and exchange rate policies. Therefore, it might simply be a by-product of other policies.

According to the Tinbergen rule, the number of instruments should equal the number of policy objectives. Due to a lack of instruments, a central bank might deliberately deviate from the optimal level of reserves if other policy objectives – e.g. an inflation or exchange rate target – are prioritised. An example for such undesired reserve movements are changes in reserves which are necessary to support a fixed exchange rate but that result in an undesired level of reserves. Therefore, one might expect that under a flexible exchange rate system the observed level of reserves reflects its demand better than under a fixed exchange rate.

Another example illustrating that changes in reserves might be rather a by-product of other policies than an intentional movement is given by the monetary approach to the balance of payments. It argues that reserve changes are the result of a disequilibrium in the domestic money market. This approach is a fundamental critique of the theories that model a demand for reserves. These objections might be especially important in the short run. In the long run, however, a central bank has to consider the effect of its policies on the level of reserves. When reserves decrease continuously, a central bank has to adapt its policies at the latest when there are no reserves left or when it or the government fails to borrow reserves. If reserves increase all the time (Bundesbank since 1966), there is no natural limit anyway.

With respect to the cost of reserves, it has to be emphasised that the opportunity cost only captures a fraction of the total costs of reserve hoarding. Changes in international reserves are a form of public intervention in the

market mechanism, which creates distortions in the private sector. Since the accumulation of reserves implies that the central bank acquires foreign assets, it is a form of capital export. Consequently, if capital is not perfectly mobile, net capital imports are smaller than without public intervention and the central bank policy prevents an efficient allocation of world capital. Thus, this policy of reserve accumulation might raise domestic real interest rates above their equilibrium value and render efficient investment projects impossible. If net capital imports are smaller than without intervention, the balance of payments restriction requires that net imports of goods and services are also depressed. Hence, the distortion in the capital account translates into a distortion in the current account.

Since the acquisition of reserves leads to an increase of the monetary base, the central bank faces at least one of two forms of costs: Either it creates inflationary pressures or it has to sterilize the expansionary effects of reserve accumulation, e.g., through the sale of bonds. The interest paid on these bonds may increase with the extent of sterilisation. As a further cost, a misallocation of capital and a higher inflation rate may reduce the potential growth rate of the economy.

Finally, the accumulation of reserves also imposes long-run costs on the country that supplies the reserves. Whereas the capital export to this country reduces its real interest rate, in the long run it may struggle with costs due to higher inflation, overinvestment, public budget deficits and delayed adjustment of its real exchange rate.

These objections to the theoretical models indicate that there are additional cost variables and that the level of reserves may be affected by them. Unfortunately, they are difficult to measure.

The monetary approach to the exchange rate and to the balance of payments

The monetary approach is a special case of the general asset market approach. It assumes that domestic and foreign currency bonds are perfect substitutes. If the money demand function is stable, an increase of the domestic monetary base depreciates the domestic currency *ceteris paribus* (for given interest rate, level of income and constant foreign money supply and demand). This implies that the central bank can steer the exchange rate by monetary policy. There is no need for reserves. If there is a tendency towards nominal exchange rate depreciation, the central bank may decrease the monetary base by a domestic open market operation instead of selling reserves.

Another way to analyse changes of reserves is provided by the monetary approach to the balance of payments. It postulates that changes in international reserves are a monetary phenomenon resulting from changes in money supply and demand. A positive change in reserves is related to an excess demand for money; reserves decrease if there is an excess supply of money. The main features of the monetary approach to the balance of payments can be illustrated by an analysis of the balance sheet of the central bank. Its assets consisting of domestic credit (D) and international reserves (R) equal the monetary base (M). Hence, changes in these variables are determined by the following identity:

$$\Delta D + \Delta R = \Delta M \quad (4.5)$$

Changes in reserves are given by the equation:

$$\Delta R = \Delta M - \Delta D \quad (4.6)$$

This implies that reserves can be increased either by an increase of the monetary base (the central bank purchases foreign exchange and pays in domestic money) or by a decrease of domestic credit (the central bank substitutes foreign exchange for domestic bonds). Any active policy of reserve accumulation affects the domestic money and/or bonds market. The above equation from the central bank's balance sheet assumes that the change in money supply (ΔM) is balanced by an equal change in money demand such that the equilibrium of the money market is restored. If this is not the case, the money market will be cleared via a change of reserves (if the price level is assumed to be constant in the short run). One can think of two different mechanisms: Either the excess supply of money is used to buy foreign goods or foreign currency or the central bank itself sells reserves for domestic currency in order to prevent a depreciation of the nominal exchange rate. The same reasoning applies for situations in which the central bank maintains money supply constant while money demand has decreased. Independently of the underlying cause, any excess supply of money implies a reduction of reserves.

$$\Delta R = \Delta M^D - \Delta M^S \quad (4.7)$$

where M^D and M^S denote domestic money demand and domestic money supply, respectively.

To put it differently, any disequilibrium in the money market involves a change of reserves. This was already noted by Ricardo (1809, p.59): "The

temptation to export money in exchange for goods, or what is termed an unfavourable balance of trade, never arises but from a redundant currency.” Therefore, the monetary approach suggests that a loss of reserves is generally associated with domestic money supply expanding at a higher rate than the demand for money. Thus a change of foreign reserves is basically due to domestic factors. If monetary policy clears the money market, there is no change in reserves. Thus, in addition to real shocks the disequilibrium in the money market determines the level of reserves. The explanatory power of the monetary approach will be tested in the empirical analysis by the inclusion of a measure of money market disequilibrium.

International reserves hoarding: Mrs. Machlup versus the Joneses

In the current study, an idea advanced by Machlup (1966) is explored and assessed to determine the extent to which his idea is relevant for explaining the international reserve accumulation behavior of the economies of WAMZ. Fritz Machlup, after examining some measures of international reserves, argued that the observed holding patterns could not be explained by reasons offered “by either theorists or practitioners.” Instead, he suggested monetary authorities’ hoarding of international reserves can be driven by non-fundamental factors. Specifically, he used his wife’s need for dresses as a metaphor to exemplify the monetary authorities’ desire for more and more international reserves.

It is postulated that the international reserve accumulation process pertaining to the Mrs. Machlup’s Wardrobe metaphor may serve some relevant economic purposes. It is quite non-controversial to state that, on the

other things being equal basis, international reserves help absorb unexpected (external) shocks and smooth current and capital account imbalances. The crisis experience and the development after the crisis appear to be consistent with the notion of accumulating international reserves to forestall future speculative attacks. The question, of course, is how high the level of international reserves an economy has to hold?

On his wife's dress need, Machlup (1966, p. 26) suggests that it depends "on the Joneses with whom she wishes to keep up." That is, besides some fundamental considerations, the buildup of international reserves depends on the behavior of neighboring economies. Ignoring the question of why Mrs. Machlup has to keep up with the Joneses for a moment, the (implicit) rivalry among economies may give rise to competitive hoarding mechanism that pushes the holding of international reserves to a level that is difficult to be explained by only traditional considerations.

Besides the pure psychological desire to feel good and not to be perceived as inferior, there are a few reasons why economies would like to keep up with their peers. Remarks by Feldstein (1999) and Fischer (1999), for example, offer some insight on the keeping up with the Joneses motivation. After the crisis, these two noted economists observed that economies with a higher level of international reserves survived the East Asian financial crisis better than those with a lower level. Thus, a level of international reserves that is relatively higher than your neighbors may diffuse the speculative pressure on your own economy and divert it to the neighboring economies and, hence, reduce the chance of bearing the full cost of an attack. In other words, when a financial crisis is brewing in the region, if two economies have similar

economic fundamentals, the one with a higher level of international reserves is less likely to be attacked and more likely to survive the crisis.

Another reason for keeping up with the Joneses is that international reserves can have a positive impact on an economy's output prospects. If the level of international reserves is a barometer of financial health, an economy has an additional incentive to keeping up with the Joneses to position itself to compete for international capital and foreign direct investment, which tend to have a level of productivity proficiency higher than the domestic capital. For developing economies, the output effect of international reserves also arises from their ability to reduce costs of borrowing in the international capital market and provide needed liquidity when there is a reversal of capital flows. A relatively high level of international reserves will, thus, provide a catalyst for economic growth and enhance output prospects, which in turn will improve the market sentiment and, hence, reduce an economy's vulnerability to attack.

Determinants of economic growth - Theoretical perspectives

The starting point of conventional economic growth theorisation is the neoclassical model of Solow (1956) and Swan (1956). The basic assumptions of the model are: constant returns to scale, diminishing marginal productivity of capital, exogenously determined technical progress and substitutability between capital and labour. As a result, the model highlights the savings or investment ratio as important determinant of short-run economic growth. The Solow-Swan growth model predicts that in steady-state equilibrium the level of GDP per capita will be determined by the prevailing technology and the

exogenous rates of saving, population growth and technical progress. They conclude that different saving rates and population growth rates might affect different countries steady-state levels of per capita income. That is, other things being equal, countries that have higher saving rates tend to have higher levels of per capita income, and vice versa. Technological progress, though important in the long-run, is regarded as exogenous to the economic system and therefore it is not adequately examined by this model.

Turning to the issue of convergence/divergence, the model predicts convergence in growth rates on the basis that poor economies will grow faster compared to rich ones. If all economies were intrinsically the same, except for their starting capital intensities, then convergence would apply in an absolute sense; that is, poor places would tend to grow faster per capita than rich ones. However, if economies differ in various respects—including propensities to save and have children, willingness to work, access to technology, and government policies—then the convergence force applies only in a conditional sense. The growth rate tends to be high if the starting per capita GDP is low in relation to its long-run or steady state position; that is, if an economy begins far below its own target position. For example, a poor country that also has a low long-term position—possibly because its public policies are harmful or its saving rate is low—would not tend to grow rapidly. The convergence property derives in the neoclassical model from the diminishing returns to capital. Economies that have less capital per worker (relative to their long-run capital per worker) tend to have higher rates of return and higher growth rates. The convergence is conditional because the steady-state levels of capital and output per worker depend, in the neoclassical model, on the

propensity to save, the growth rate of population, and the position of the production function - characteristics that may vary across economies. Recent extensions of the model suggest the inclusion of additional sources of cross-country variation, especially government policies with respect to levels of consumption spending, protection of property rights, and distortions of domestic and international markets.

Triggered by Romer's (1986) and Lucas' (1988) seminal studies, work within the endogenous growth framework highlighted three significant sources of growth: new knowledge (Romer, 1990; Grossman & Helpman, 1991), innovation (Aghion & Howitt, 1992) and public infrastructure (Barro, 1990). As a result, and in contrast to the neoclassic counterpart, policies are deemed to play a substantial role in advancing growth on a long-run basis. Turning to the convergence/divergence debate, the endogenous growth models suggest that convergence would not occur at all (mainly due to the fact that there are increasing returns to scale).

One shortcoming of the early versions of endogenous growth theories is that they no longer predicted conditional convergence. Since this behavior is a strong empirical regularity in the data for countries and regions, it was important to extend the new theories to restore the convergence property. One such extension involves the diffusion of technology (see Barro and Sala-i-Martin [1995b]). Whereas the analysis of discovery relates to the rate of technological progress in leading-edge economies, the study of diffusion pertains to the manner in which follower economies share by imitation in these advances. Since imitation tends to be cheaper than innovation, the diffusion models predict a form of conditional convergence that resembles the

predictions of the neoclassical growth model. Therefore, this framework combines the long-run growth of the endogenous growth theories (from the discovery of ideas in the leading-edge economies) with the convergence behavior of the neoclassical growth model (from the gradual imitation by followers).

Endogenous growth theories that include the discovery of new ideas and methods of production are important for providing possible explanations for long-term growth. Yet the recent cross-country empirical work on growth has received more inspiration from the older, neoclassical model, as extended to include government policies, human capital, and the diffusion of technology. Theories of basic technological change seem most important for understanding why the world as a whole can continue to grow indefinitely in per capita terms. But these theories have less to do with the determination of relative rates of growth across countries, the key element studied in cross-country statistical analyses.

International reserves and economic growth

In this section, two opposing views by Cruz and Kriesler (2010) and Polterovich and Popov (2003) on international reserves accumulation and its effects on economic growth are presented and discussed.

According to Cruz and Kriesler (2010), the accumulation of international implies taking out of circulation resources that could be used to influence domestic economic activity. They represent a potential source of economic growth that could be used to stimulate aggregate demand, particularly through investment to increase productive capacity in developing

economies. The resulting increased levels of domestic activity would spill over into increased global activity and trade. The accumulation of idle currency reserves carries a large opportunity cost that has been largely ignored. In support of their views, they dwell on the relationship between aggregate demand and economic growth. They cite Kalecki ([1960] 1993, [1966] 1993) who noted that whereas the fundamental factor constraining growth in developed economies is the level of effective demand, in developing economies the main constraint is a lack of productive capacity. For both types of economy, the build-up of excess foreign reserves represents lost opportunities in terms of reduced growth and employment.

In this context, the recommended policy is clear: the path of sustained growth (and growing employment) can be regained by stimulating one or more components of aggregate demand. Needless to say, more vigorous policies are needed when the economy has suffered an economic collapse or is in recession. Knowing that insufficient aggregate demand is the main cause of low growth does not imply that all countries should stimulate the same components of aggregate demand or that demand should be increased for its own sake. The decision regarding which component of aggregate demand should be stimulated will depend, among other factors, on whether the economy is developed or semi-developed. In other words, the decision of where aggregate demand needs to be boosted has to be taken on the basis of the particular structural characteristics of the economy under consideration and what will contribute most to growth in the short-term without restricting it in the long term.

According to them, the fundamental problem in developed economies is rooted in inadequate levels of aggregate domestic demand. The existence of idle productive capacity reduces investment spending, which may undermine long-term growth. For capitalism, investment is a double-edged sword. In the short run it increases effective demand, which is important in reducing today's unemployment, but at the same time it increases capacity and productivity, which may increase tomorrow's unemployment. Thus, for developed economies the policy recommendation to boost growth and increase the degree of capacity utilisation (reducing unemployment) will emphasise consumption. Investment becomes important mainly when considering international competitiveness. There is, however, evidence that unemployment in developed economies (mainly Europe) during the 1970s to the 1990s was the result of capital shortages. Hence, policies to expand capital accumulation should not be dismissed.

The problem of low growth in developing economies is of a different nature: it results mainly from a shortage of capital equipment. In this case, stimulating effective demand through the expansion of capacity productivity will be essential for both short- and long-term growth. In developing economies, the effect of investment is unambiguously positive; by increasing capacity it enables increased employment and growth.

In fact, an UNCTAD development report notes that investment not only 'generates income and expands productive capacity, . . .it also carries strong complementarities with other elements in the growth process, such as technological progress, skills acquisitions and institutional deepening' (UNCTAD, 2003, p. 61; see also Kenny & Williams, 2001). Evidence from

the most recently industrialised economies—China and the first and second tiers of Asian Tigers—confirms that capital accumulation is fundamental for the take-off of any developing economy (see Bosworth & Collins, 2003, 2007; Krugman, 1994; Madsen, 2002; Young, 1994, 1995). According to UNCTAD (2003, p. vi), ‘the minimum level [of investment spending] needed for a satisfactory growth performance will be influenced by country-specific factors, but a 20 per cent share of fixed investment in GDP has been suggested as a target threshold in poor countries, rising towards 25 per cent as countries climb the income ladder.’

For capitalist economies, a recovery of aggregate demand must originate in those of its components of spending that are autonomous with respect to current income. It is unlikely that capitalists, let alone workers, will increase consumption when their current incomes are contracting. Private investment is also unlikely to increase if firms have unused capacity and are having difficulties servicing their debts. In these circumstances, any stimulus to aggregate demand must originate from outside the private sector, for example, by increased public spending or through tax cuts, that is through fiscal policy. There is, moreover, a large literature showing that public investment is beneficial for short- and long-term growth and that it complements, rather than crowds out, private investment (see, for example, Aschauer, 1989; Bose et al., 2007; Erden & Halcombe, 2006; Herrera, 2007; Munnell, 1992; Nazmi & Ramírez, 1997; Noriega & Fontanela, 2007; Otto & Voss, 1994; Rodrik & Subramanian, 2004). The take-off, in other words, must be made through public investment.

Surpluses in the current account are a method of exporting one country's unemployment and aggregate demand shortfalls (Halevi & Kriesler, 1998). If some countries maintain such surpluses, their increased domestic employment from the trade surplus will be offset by employment losses in other countries whose trade balances will be in deficit, since these latter countries will need to lower domestic growth rates to improve their trade balances. Excess international reserves represent a loss to all countries. As is well known, the main determinant of a country's level of exports is the level of world activity. By lowering the growth rates of deficit countries, the accumulation of excess international reserves reduces the level of global economic activity below what it would have been in the absence of those reserve accumulations. In other words, the build-up of excess international reserves reinforces stagnationist tendencies that result from the current international monetary system (Halevi & Kriesler, 2007).

In conclusion, Cruz and Kriesler (2010) propose that international reserves be used to boost growth. They do not however, suggest the running down of all reserves, leaving the economy illiquid and therefore highly exposed to domestic or external shocks. They claim, there are legitimate precautionary reasons for holding reserves. Their proposal is to use excess international reserves, that is, the amount in excess of what is necessary to protect the economy from balance-of-payments problems. This again brings to the fore the debatable issue of optimal and excess reserves. What level of reserves will be deemed necessary to protect the economy from balance-of-payments problems will be difficult to determine as there has not been any scientifically proven level of reserves.

Polterovich and Popov (2003) on the other hand argue that whereas it is widely recognized that devaluation can increase output in the short run, bringing actual output above the potential level, it is generally assumed that in the long term growth rates of output do not depend on the exchange rate. On the contrary, the exchange rate itself in the long run is considered as an endogenous variable determined by the growth rates of prices and outputs in two countries. Nevertheless, there is a strong empirical evidence that the accumulation of foreign exchange reserves (FER) leads to lower exchange rate, which in turn stimulates export-led growth. Countries with rapidly growing FER/GDP ratios, other things being equal, exhibit higher investment/GDP ratios, higher trade GDP/ratios, higher capital productivity and higher rates of economic growth.

The FER build up should be financed - either through a government budget surplus or via money printing, or through the accumulation of debt. In either case, there is a net loss in the current consumption because a part of potentially available resources is not used. Besides, accumulation leads to a gap between the money supply and the goods sold at the domestic market. This gap may result in inflation or should be financed by additional regular taxes, expenditure cuts, or debts that should be finally paid. So if FER accumulation not only stimulates economic growth, but results in the increase of total welfare, it should be considered as a puzzle: by limiting consumption today it becomes possible to increase the integral discounted consumption. The analogy may be with the Keynesian policy of fiscal expansion that takes the country out of the recession. In words of Joan Robinson, when the government of a country in a recession hires the unemployed to do any kind of

work, even totally senseless (digging the pits and filling them with soil again), the actual GDP approaches the potential GDP. In a similar way, it appears that under certain conditions (externalities associated with international trade and/or various kinds of traps in which developing countries often find themselves due to market failures) the authorities/central bank can boost economic growth by underpricing their exchange rates via FER accumulation. The important difference with the standard Keynesian effect, of course, is that here we are talking about long-term growth rates of GDP, not about the deviation of actual from potential income.

Demand for international reserves --- A survey of the empirical studies

The dramatic increase in foreign reserves, in recent years, has reignited researchers' interest in determining how countries determine their optimal level of reserves and specifically what economic factors are included in this process. Research on foreign reserves was particularly active during the 1960s, 1970s, and 1980s. During those decades, researchers were focused primarily on identifying the effects that the Bretton Woods system of fixed exchange rate, and its collapse, had on foreign reserves. An interest in whether developed and developing countries differed in their demand for reserves simultaneously arose (Flood & Marion, 2002). However, according to Flood and Marion (2002), attention was eventually directed away from reserve holdings by the widespread assumption that international reserves would be stable-and probably low-in an era of increased exchange-rate flexibility and very high capital mobility.

The increasing growth of foreign reserves, contrary to what was predicted, has forced researchers to revisit this issue and explain why the evidence seems to contradict the theory. Most of the current research stems from the theories developed in the 1970s and 1980s, so there has not been much new light shed on the subject.

Empirical investigation of the theory of demand for international reserves has been extensively conducted for over four decades. There is a plethora of published papers dealing with the issues. One can count at least eight review articles relevant to this study. They include Clower and Lipsey (1968), Niehans (1970), Salant (1970), Grubel (1971), Williamson (1973), Cohen (1975), Bahmani-Oskooee (1985b) and the most recent one being Bahmani-Oskooee and Brown (2002).

Empirical studies of the demand for international reserves have sought answers to a number of questions concerning international reserves. These questions include the following: Could the demand for international reserves be specified as a function of some quantitative variables from which an inference could be made about the rate of growth of international reserves? Has the demand for international reserves remained stable over time? How adequate are international reserves? Does the monetary approach help explain the demand for international reserves? Is the mercantilist motive the major reason for the upsurge in international reserves holdings? Different equations and testing procedures have been applied in order to address these questions. In all these, the central issue of most of the empirical studies has been to identify the determining factors of demand for international reserves.

According to Bahmani-Oskooee and Brown (2002), the empirical literature can be divided in two distinct periods. The pre-1973 literature when most countries participated in the Bretton-Woods Agreement of fixed exchange rates from the end of the Second World War to March 1973. Research that analysed reserve demand during this period compared various historical ratios such as reserves/imports. The second apparent time frame was from 1973 through to the present which coincided with the newly instituted floating-rate monetary system and its characteristic gyrating exchange rates. Of course, the managed float has been in place now for a quarter of a century. Inquiries that analysed reserve demand in this period rejected the ratio comparisons in favour of the more scientific econometric methods that postulated an explicit reserve demand equation and attempted to statistically identify the significant determinants of official reserve holdings. Moreover, such investigations compared reserve demand equations estimated for the pre-floating rate period with those estimated for the floating rate period.

The post-1973 period, as already indicated, witnessed the movement of the international monetary system from a pegged-rate system to a managed floating rate regime. Theory predicts that floating exchange rates would eliminate the *n*th country or reserve currency problem. Haberler (1977) speculated that a nation's reserve demand should decrease after exchange rates are allowed to fluctuate in response to changes in trade. As a result, the research focus shifted to investigating whether the move to flexible exchange rates would have reduced the demand for international reserves. In addition, the studies looked at the stability of the reserve demand function, particularly in light of the oil price shocks after 1973, whether the increasing price of gold

and the deviation from its official price witnessed during the 1970s had an impact on the demand for international reserves, and finally, the speed of adjustment of reserve demand to its desired level. It is these latter studies that issues of non-stationarity of the data were incorporated through the utilisation of error correction models [Elbadawi (1990); Ford & Huang (1994); Badinger (2004)].

In the following, the different explanatory variables in the reserve demand function analysed from the various econometric studies are examined. We first group the determinants of international reserves into three categories: traditional macro variables, financial variables, and institutional variables to examine how contributions of the determinants have evolved over time. The group of traditional macro variables consists of the propensity to import, volatility of real export receipts, international reserve volatility, the opportunity cost of holding international reserves, real *per capita* GDP, and population. These variables have been commonly considered as determinants since the 1960s. The second group of explanatory variables includes money supply, external debts, and capital flows. The third group of explanatory variables is institutional variables. It has been argued that institutional characteristics like corruption, political stability, and capital controls affect the hoarding of international reserves. Aizenman and Marion (2003, 2004) and Alfaro *et al.* (2004), for example, show that holdings of international reserves are influenced by political uncertainty and corruption.

Traditional macro-variables:

Economies of scale, economic openness and payments variability

An open economy is an economy which engages in trade of goods and services with the international community at large. Increased exposure in the international markets could affect the domestic currency, asset pricing, and even the stock market (Salvatore, 2001). Wanting to offset the effect an external imbalance could have on the domestic economy is a powerful motive to hold foreign currency reserves. For example, the Asian Financial Crisis of 1997 started in Indonesia, South Korea and Thailand. Hong Kong, Malaysia, Laos, the Philippines, and China were also affected by the crisis due to their economic ties to these countries. Another incentive to hold reserves is that countries with larger reserve holdings have fared better during financial and currency crises. There are several measures of economic openness. The most widely used measure in the literature is the average propensity to import, first introduced by Frenkel (1974). This measure is often controversial. Frenkel predicted a positive relationship for the variables, while other researchers like Heller (1966) predicted a negative relationship.

Since the middle of the 1960's, regression has become the popular technique used in the empirical estimation of the demand for international reserves. The major advantage of the regression technique over the ratio approach is that regression allows for the inclusion of more explanatory variables in the analysis and for more sophisticated specification of relationships with the dependent variables. The primary selection by most researchers is a measure of the variability of payments. Variability was usually measured by an instability index. Kenen and Yudin (1965) used this approach

as did Couchene and Youssef (1967), Clark(1970b), Kelly (1970) and Flanders (1971). Most of these results indicate that payments variability does explain reserve demand behaviour.

The main difficulty with using a payments variability measure is that instability in payments imbalances and actual reserve holdings by monetary authorities are determined simultaneously. In fact, expenditure-switching and/or reducing policies adopted by the authorities are influenced by the actual level of reserves outstanding. Referring to this simultaneity problem, Thorn (1967) criticized Kenen and Yudin and theorized that studies based on desired reserves would explain reserve demand better than those based on realized reserves. Thorn employed two regressors, the ratio of desired reserves/imports (R^*/M) and actual imports (M), with a country's demand for reserves as the dependent variable. However, Yudin and Kenen (1967) rejected Thorn's approach by exposing the tautological nature of his regression equation.

Using cross-sectional data from 55 countries over the period 1963-1967, Frenkel (1974a) finds a statistically significant positive relation between propensity to import (m) and reserve demand. He believed this positive relation between reserves and propensity to import (m) reflects an economy's openness. Then using pooled annual data from 55 countries over the period 1963-1967, he found all variables to be positively related to reserve demand. Both the cross-section and pooled estimates demonstrated that there are economies of scale in reserve holding. Using Chow's tests, Frenkel also found that for the 1963-1967 period, the cross section regression coefficients were stable over time. Later that year Frenkel (1974b), incorporated pooled data over the 1963-1976 period, analysed 22 developed countries (DCs) and 33 less

developed countries (LDCs) separately using the same reserve demand equation. In all cases, Frenkel found positive elasticities with regard to all three variables.

Heller and Khan (1978) found that there are no significant economies of scale for either LDCs or DCs and most of the world economies behave according to the Keynesian fixed price model while the variability measure is meaningful for all countries. Using nominal data, Frenkel (1980a) found mixed results on import propensity, an important variability gauge and economies of scale to prevail for all countries. Frenkel and Jovanovic (1981) found economies of scale for developed countries. Saidi (1981) discovered square-root rule and notable instability for Canada. Frenkel (1983) used real instead of nominal data and found that no scale economies for any country, but that openness and the variability quantity remain intact. Edwards (1983) showed that LDCs exhibit little, if any, economies of scale in reserve holding. He found propensity to import to demonstrate openness for any LDC, and discovered no evidence of variability being significant.

Lizondo and Mathieson (1987), updated Heller and Khan (1978) with revised data and found that DCs have no economies of scale in reserve holding. Lizondo and Mathieson (1987) revised and extended Frenkel (1983) and confirmed that there are no economies of scale for LDCs or DCs, that countries not characterized as 'priceless' and that payment instability remained important. Bahmani-Oskooee (1987b), Bahmani-Oskooee and Malaxi (1987, 1988) and Bahmani-Oskooee and Niroomand (1988) consistently found that both LDCs and DCs experienced economies of scale in a fixed-price Keynesian world where payment variability is significant in the

reserve demand equation. Landell-Mills (1989) also found that countries exist in a Keynesian environment.

Elbadawi (1990) using an error correction model (ECM) discovered that the Sudan economy adjusts according to a flexible-price environment that is mildly sensitive to payment instability and demonstrated no economies of scale in reserve holding. Remittances from exporting labour services also increased central bank reserves, according to Elbadawi. Barbados is revealed to experience diseconomies of scale in an open economy by Coppin (1994) who also included an opportunity cost variable rather than a measure of payments variability in the conventional reserve equation. Following Heller and Kahn (1978), Islam *et al.* (1994) showed that Costa Rica, El Salvador and Panama all demonstrated diseconomies of scale in reserve holding. Costa Rican and Panamanian reserves were sensitive to trade instability, while Panama adjusted in a Keynesian world. Not surprisingly, Huang (1995) with cointegration equations and quarterly data, 1980-1994, found that China had a closed economy and that variability plays no role in this command economy. Huang showed that China had negative diseconomies of scale (associated with scale variable, M) when it comes to reserve holding and he believed this to be logical because in-payments from exports are greater than out-payments from imports ('contra-flows').

Lane and Burke (2001) studied the determinants of cross-country variation in the level of international reserves over the period 1981-1995. Confirming intuition, trade openness is easily the most important variable. Abdourahmane *et al.* (2004), estimated long run relationship between foreign reserves holdings and their determinants--- real GDP per capita, openness to

trade (ratio of imports and exports to GDP), current account deficit to GDP, nominal short-term interest rate differential and exchange rate volatility. The study reveals that foreign exchange reserves are positively related to economic size and current account vulnerability and negatively correlated with exchange rate flexibility and the opportunity costs of holding reserves. Using pooled data for 137 countries over the period 1980-2000, Choi and Baek (2004) found the economy size measured by real GDP per capita and trade openness measured as the ratio of exports plus imports to GDP to be positively related to international reserve holdings.

Khan and Ahmed (2005) estimated the long run cointegration relationship between reserves variable and other determinants such as balance of payments variability, money market rate, the average propensity to import, the level of imports and workers remittances using quarterly data over the period 1982:1-2003:2. The study finds that there exists a stable long run reserve demand function in case of Pakistan. The estimated cointegration relationship shows that all variables except remittances are significant. The variations in balance of payments and imports have positive relationship while money market rate has a negative impact on international reserves.

Using a cointegration and a vector error correction approach in a study of Korea, Jo (2007), found that GDP has a significantly positive relationship with foreign reserve stock implying that, from long-term point of view, as international transactions increase with economic size, reserve levels have increased with GDP levels. The variability measures of the balance of payments have positive long term relationship with reserves, confirming that reserve holding increase with the volatility of international transactions. The

exchange rate volatility shows positive long-run relationship with reserves while the openness measure shows a long run negative relationship with reserves.

Recent studies like Flood and Marion (2001) and Aizenman and Marion (2002) have concentrated on the role of the volatility of exports as a measure of international transactions' volatility. Romero (2005) uses both exports and imports scaled over GDP as a measure of economic openness. The former were more significant than the latter.

Edison (2003) estimated the demand for international reserves for one hundred and twenty two emerging market economies during 1980-1996. He used real GDP per capita and population as proxies for scale variable and export volatility as a proxy for variability measure. The results from multiple regression indicated that the demand for international reserves were positively related to the size of the economy and trade openness. However, the variability measure, even though correctly signed, was not significant. Using quarterly data for the period 1985Q1-1997Q4, Bandinger (2004) found strong economies of scale in holding reserves in Austria and concluded that the transactions motive represented the foreign exchange demand by the private sector. Shegal and Chandan (2010) in their study of India found out that higher economic growth provides a sense of confidence that encourages for lesser reserves demand.

The opportunity cost measure

Another theoretically sound variable introduced by Heller (1966) which has been widely tested is the opportunity cost of holding reserves. To

find an adequate measure for the opportunity cost of holding reserves is one of the most difficult problems in the empirical analysis of international reserves behavior. Various researchers have tried various proxies. Opportunity cost was measured in a number of different ways including a long-term interest rate, per capita income, international indebtedness, by Kenen and Yudin (1965), Heller (1966), Couchene and Youssef (1967), Kelly (1970) and Clark (1970). Flanders (1971) implemented a nation's growth rate. Most of these studies were not successful in finding a significant opportunity cost measure. For instance, Kelly (1970) used income per capita as a proxy and found an unexpected positive sign in the regression equation. Iyoha (1976) applied a domestic discount rate as a proxy for the opportunity cost of holding reserves. He also found a significant positive sign on the estimated coefficient. Any theoretically sound alternative cost measure would be expected to have a significant negative elasticity although Williamson (1973) claimed there was an across the board 'lack of success' empirically identifying opportunity cost in earlier research articles. Iyoha (1976) attempted to refine earlier reserve demand models and also looked specifically at the demand for international reserves by LDCs. One of Iyoha's main contributions is that his work was the first cross-sectional study to identify a significant relation between an interest rate (opportunity cost) and reserve demand.

Hipple (1979: 612) argued that the relevant interest rate is an external rate of interest because LDC reserves are held in US dollar-denominated deposits outside the country. Consequently, all LDCs receive the same US rate of interest and this interest rate does not vary from LDC to LDC. Hence, this would not be identified by a cross-sectional study.

Trailing Heller (1966) and Kenen and Yudin (1965) and formulating a stochastic framework, Frenkel and Jovanovic (1981), tried to identify the influence on reserves, exerted by the opportunity cost measure along with an instability index, alternative costs of holding reserves are measured as the domestic government bond rate, discount rate or call money rate of Japan. Frenkel and Jovanovic posited that DC reserve demand rose with the square-root of variability and fell with the fourth-root of the interest rate.

Edward (1985) argued that the reason for the poor empirical support for the validity of the opportunity cost of holding reserves as a determinant in the reserve demand function is that the variable has been measured incorrectly. He argued that since international reserves are usually held in the form of short-term interest bearing assets, the appropriate opportunity cost of holding them is a net cost, given by gross income forgone by holding reserves minus the return obtained from holding them. The gross forgone income was approximated by the interest rate at which a particular country could borrow in the international capital market and the return obtained on reserve holdings was approximated by the London Interbank Offered Rate (LIBOR). Consequently, in the estimations of the reserve demand function the spread charged over LIBOR has been used as a proxy for the net opportunity cost of holding reserves.

Edwards (1985) assumed that the net opportunity cost of holding international reserves is captured by employing the difference between the domestic marginal product of capital and the interest return on reserve held as deposits. Edwards (1985) estimated his model inclusive of the net opportunity cost measure for each year, 1976-1980, using cross-sectional data form 17

LDCs. Under both the 2SLS method and jointly generalized least squares (JGLS) method, he found that the net opportunity cost measure has a significant negative effect on the demand for international reserves, in all five years. Further, the absolute value of this elasticity coefficient was very large, which indicates that central bank authorities would decrease their holdings by a large amount if the net opportunity cost of holding reserves increases (Edwards, 1985: 291).

In a 1989 study, that updates and extends Edwards (1985), Landell-Mills (1989) also found significant evidence that countries economize on reserve holdings as the net opportunity cost of reserves increases. Landell-Mills used quarterly data and employed pooled data from 24 countries, during a period of managed floating, 1978-1982. She divided the 24 countries into three groups: non-reserve centre industrial countries; LDCs without debt-service problems; and LDCs with debt problems. In an OLS regression, including all three country groups over the small period 1978-1982, she found that the opportunity cost measure had a significant negative effect on the demand for international reserves. Landell-Mills' generalized least squares (GLS) estimates of opportunity cost are significant and correctly signed as well. For the same period and again including same countries (debt LDCs, non-debt LDCs and non-reserve DCs), Landell-Mills adjusted the OLS regression for country specific dummies which gave better fit and increased R^2 to 0.90, while preserving the significance and sign of independent variables. For a third regression of a longer period, 1978-1986, the LDCs that developed debt problems after 1982 had to be dropped from the sample. The remaining 12 non-reserve DCs and non-debt LDCs had correct sign and significant

independent variables. Albeit for very short time periods, in all these regressions, Landell-Mills (1989) showed that the net opportunity cost variable had a significant negative effect on reserve demand.

Borrowing Frenkel and Jovanovic's model, Ben-Bassat and Gottlieb (1992a), estimated the coefficients on payment variability and net opportunity cost using annual data for Israel over the 1968-1988 period. Their net opportunity cost is the real return on capital minus the real return on an average of US dollar reserves and Deutschemark reserves held. These authors demonstrated that opportunity cost is negatively related to reserves as far as Israel is concerned. Abdourahmane et. al (2004), in their study of Tunisia, also found out that opportunity cost has a negative relationship with international reserve holdings. However, Choi and Baek (2004) did not find opportunity cost variable to be significant.

Financial variables:

Money supply /monetary disequilibrium, external debts, capital flows

Domestic money supply is also an intuitively appealing variable displayed in the empirical literature, which of course, is the global monetarist approach outlined by Johnson (1965). The use of money in explaining the hoarding of international reserves can be dated back to the 1950s. More recently, de Beaufort Wijnholds and Kapteyn (2001) argue that money stock in an economy is a proxy for potential capital flight by domestic residents and, therefore, can be a measure of the intensity of the "internal drain." Studies that incorporated this variable into the demand for reserves equation were very limited in the pre-1973 period. According to Bahmani-Oskooee and Brown

(2002) only two reports looked for a statistical relationship between reserves and money supply, perhaps because monetarism had not fully been reborn until the 1970s. In more recent times, many studies have sought to find out the role of monetary disequilibrium in international reserves holdings. In other words, they have sought to find out the validity of the monetary approach to the balance of payment by incorporating monetary disequilibrium variable in the analysis of the short run demand for international reserves.

Using data for 23 fixed exchange rate developing countries, a two-step testing procedure was conducted by Edwards(1984). In the first step, a demand for money equation was estimated for these countries using least squares on pooled cross-section and time-series for the period 1965-72. In the second step, the fitted values from this demand for money equation were used as a proxy for the money market disequilibrium. These values were then used in the estimation of the demand for reserves-cum-monetary disequilibrium equation. The results from the multivariate log-linear equation showed that the positive coefficient of money market disequilibrium (0.299) is significant at 10 percent level, suggesting that in these countries money market disequilibrium have had an important role in determining the movement of reserves through time, and therefore that domestic credit cannot be considered to be completely exogenous. These results indicate that the exclusion of monetary considerations from the dynamic analysis of international reserves will yield biased coefficients.

Besides the conventional issues associated with the demand for reserves, Elbadawi (1990) also studied the relevance of monetary theory to the reserve relationship. The findings supported an important short-run influence

of the monetary policy on reserve relationships. The policy implication is that, on the face of declining foreign exchange reserves, the Sudanese monetary authorities, among other things, must attempt to reduce the excess of money supply over money demand. Ford and Huang (1994) examined the demand for international reserves in China during 1952-1991. They concluded that domestic monetary disequilibrium significantly affected reserve demand and the monetary authority was responsive to correct deviation from desired levels of reserves from the preceding period.

Using a vector error correction approach, Badinger (2004) estimates Austria's demand for international reserves over the period 1985:1-1997:4 and tests for short-run effects of the disequilibrium on the national monetary market. The results show that the monetary disequilibrium enters significantly with a lag of one quarter and shows the expected negative sign. Excess demand for (supply of) money leads to an increase (decrease) in reserves with an elasticity of 0.98. The size of the coefficient is plausible if one considers that reserves form only part of the monetary base. Thus, for reserve changes to eliminate the disequilibrium completely, one would expect a coefficient well above one. The smaller coefficient is plausible if the central bank took measures to (partly) clear the money market by changing both the interest rate and domestic credit, and did not leave it entirely to the market forces (induced reserve flows) to restore the equilibrium.

Khan (2008) formulates and examines the monetary approach to the balance of payments by incorporating the currency substitution version of money demand function for Pakistan over the period 1962-2005 using FM-OLS and Johansen-Juselius cointegration techniques. The results suggest that

real output, real exchange rate and domestic credit play an important role in the determination of foreign reserves in Pakistan in long-run as well in short-run. Moreover, the monetary authorities sterilize foreign exchange reserves by 12% in long-run and 34% in short-run. The results support the evidence of long-run causality running from foreign reserves to domestic credit. One important policy implication from the empirical analysis is that the validity of the monetary approach to the balance of payments and the effectiveness of monetary policy depend on the nature of the money demand function. As the specification of money demand function undergoes a change, the evidence for monetary approach also alters.

Mishra and Sharma (2011) investigate India's demand for international reserve by focusing on the role of national monetary disequilibrium and to present new benchmarks for assessing the adequacy of international reserves. The results reveal that the central bank is holding substantial excess reserves and the related opportunity cost (1.5% of GDP) appears to be quite considerable. More importantly, validating the monetary approach to balance of payment, their results show that national monetary disequilibrium does play a crucial role in short-run reserve movements. An excess of money demand (supply) induces an inflow (outflow) of international reserves with an elasticity of 0.56 which also implies that Reserve Bank of India responds to correct the domestic money market disequilibrium; and did not just leave it completely on the mercy of reserve inflows.

The implications of external debts and capital flows on the holding of international reserves have received considerable attention after the Asian

financial crisis. Shegal and Chandan (2010) found out that capital flows and volatility in the external sector push up for more reserves piling in India.

Using data from more than 100 economies for the period of 1975 to 2005, Cheung and Ito (2009) conduct an extensive empirical analysis of the determinants of international reserve holdings. Four groups of determinants, namely, traditional macro variables, financial variables, institutional variables, and dummy variables that control for individual economies' characteristics are considered. They find that the relationship between international reserves and their determinants is different between developed and developing economies and is not stable over time. The estimation results indicate that, the explanatory ability of financial variables, especially those related to external financing, has been increasing over time.

Other determinants

There are a number of other factors that have been incorporated in the demand for international reserves especially in the post-1973 period. Some of these variables are incorporated in order to achieve various research objectives or to test the validity of some theories associated with the demand for international reserves. Other variables such as exchange rate flexibility, gold price, IMF Quotas among others have also been identified in the empirical studies. The following will examine some of these issues in the empirical literature.

Exchange rate flexibility, gold price, IMF quotas

Abdourahmane et.al (2004) reveal that foreign exchange reserves are negatively correlated with exchange rate flexibility. Jo (2007), found the exchange rate volatility to have a positive long-run relationship with reserves. Chakravarty (2011) analyzes the optimal reserve holding for India during an era of flexible exchange rate and high capital mobility using the buffer stock model of Frenkel and Jovanovic(1981). The evidence derived from the ARDL approach of Pesaran, Shin and Smith (1996) support the fact that the scale variable, opportunity cost variable and the volatility variable all have significant effects on the reserve demand. The evidence also shows that exchange rate flexibility does not have any significant impact on the reserve demand.

Using a panel of 136 countries for the period 1973-2003, Bastourre et. al.(2009) find that countries with flexible exchange rate regimes have higher ratios of reserves to GDP. The policy implications of their findings suggest a relationship between foreign reserves, financial flows globalization, and exchange rate regimes. Traditionally, it was thought that exchange rate flexibility was a substitute for reserve accumulation. They claim, however, that they have seen from their results that when countries are in an intermediate stage of development and face increasing capital flows exposure, reserve accumulation can be considered an important tool to obtain a successful integration. In this scenario, flexibility could be viewed as a complement of reserves.

Bahmani-Oskooee (1985a) formulated a simultaneous model of the demand for and supply of international reserves. The endogenous variables are

reserve quantities and the price of gold. Bahmani-Oskooee (1985a, p. 494) states that 'a higher gold price will make countries feel wealthier and consequently, their demand for liquidity will be less'. On the supply side, as is known, a high price of gold stimulates production in the private sector. A higher market price of gold, in relation to the government's fixed price of gold, would encourage central banks to sell their gold for foreign exchange. Makin (1977, p. 10) concurred and made the point that central banks' gold holdings also are effectively monetized because they serve as collateral when a central bank borrows foreign exchange. Hence, a higher price of gold will induce an increase in the official quantity of reserves supplied (Bahmani-Oskooee, 1985a, p. 497).

The rise in reserves by emerging market economies may also reflect their concerns about the size of their IMF quotas, which set limits on the amount of credit that countries could draw from the IMF, and the conditionality associated with borrowing from the IMF. Joyce and Razo-Garcia (2010) offer a model of the choice by central banks between quotas and reserves to demonstrate that emerging markets will choose to hold relatively more reserves than advanced economies. They then investigate the impact of IMF quotas on reserve holdings for a panel of countries during the period of 1980–2006. In addition to finding evidence of precautionary and mercantilist motives for holding reserves in emerging markets, they also find that reserves in these countries have been inversely related to their IMF quotas.

Precautionary versus Mercantilist motives

Huang and Shen (1999), in their study of Taiwan, found that the precautionary motive was not an important determinant of reserve demand in Taiwan. This according to them, was possibly due to the fact that Taiwan has accumulated a large stock of foreign exchange during the past two decades --- relative to its trade flows and, therefore, the risk of an external payment problems would be very low.

Aizenman and Lee (2005) compare the importance of precautionary and mercantilist motives in the hoarding of international reserves by developing countries. Overall, empirical results support precautionary motives; in particular, a more liberal capital account regime increases international reserves.

The precautionary motive for holding reserves has been tested using quarterly data for Korea during 1994-2003 by Aizenman, Rhee, and Lee (2007). Their results suggest that the Korean holding of international reserves is consistent with the precautionary motive since variables such as short-term external debt and foreign portfolio holdings are found to be significant in affecting reserve demand after the 1997-98 East Asian financial crisis. Cifarelli and Paladino (2007) also estimated the reserve demand based on the buffer stock model using the Johansen cointegration approach for ten emerging economies in Asia and Latin America. They attributed the high demand for international reserves in these countries to the “fear of floating” as well as the mercantilist motive.

Prabheesha et.al (2009) empirically investigates the importance of precautionary and mercantilist approaches to international reserves in the

Indian context using monthly data from 1993:06 to 2007:03. The ARDL approach to cointegration is used to estimate the long-run relationship between reserves and its determinants, namely imports, treasury bill rate, exchange rate flexibility, volatility of foreign institutional investment and the deviation of real exchange rate from its trend. In order to generate the volatility series of exchange rate and foreign institutional investment, Prabheesha et.al (2009) have applied univariate Generalized Autoregressive Heteroscedastic (GARCH) model developed by Bollerslev (1986). The deviation of exchange rate from its trend is calculated using Hodrick- Prescott (1997) or HP filter method.

The empirical results show that the impact of the volatility of foreign institutional investment which captures the precautionary motive, and that of undervalued real exchange rate which is associated with the mercantilist view on reserves are statistically significant in the long run. They conclude that both the precautionary and mercantilist motives explain reserve accumulation in India over the study period. Shegal and Chandan (2010) also, analyze the demand function of India's reserves holdings with a large number of variables utilizing cointegration and VECM approach. The analysis evidently explains that the main purpose of reserves holding is precautionary.

By reviewing relevant data on Korea, Jo (2011) examines the interaction between international reserve hoarding and mercantilist motives, in the context of Korea's policy of maintaining export competitiveness through exchange rate management. The cointegration and error correction estimations reveal a negative relationship between the real effective exchange rate and international reserves over both the short term and long term, which provides

econometric evidence that Korea has stockpiled reserves amid heightened concerns regarding export competitiveness. In the short-run, financial openness reflecting the precautionary motive was found to have contributed to the reserve build-up. The variance decomposition test results confirm that the mercantilist motive has been the main driver of the build-up of Korean reserves. Despite these analytical results, Jo (2011) advises that one should not ignore the fact that Asian countries exert some degree of precautionary demand, which acts as a buffer against rapid financial outflows.

Mrs. Machlup Wardrobe and the related Joneses Argument

A number of studies have recently tested empirically the validity of this age old theory propounded by Fritz Machlup in 1966. The studies include Cheung and Qian (2009), Cheung and Sengupta (2011) and Bird and Alex Mandilaras (2010).

A canonical empirical international reserve demand equation is used by Cheung and Qian (2009) to investigate the presence of the Joneses effect in a group of East Asian economies. Both linear and panel-based regression results are suggestive of the presence of the Joneses effect, especially in the post-1997 crisis period. Individual economy estimation results, however, show that the Joneses effect is not uniform across economies.

Cheung and Qian (2009) put in a few caveats. First, the stylized model is used to highlight the Joneses effect. It does not, however, imply that other motivations for holding international reserves are not important. For instance, the increasing capital mobility and growing financial account liberalization around the world will boost the demand for international reserves to smooth

outpayment imbalances. However, their exercise demonstrates that one seemingly non-economic reason, the so-called Mrs. Machlup's wardrobe hypothesis, may help account for the part of international reserve accumulation that is not explained by standard macroeconomic variables.

Cheung and Sengupta (2011) also, investigate the factors determining the reserve accumulation in Latin American (LATAM) economies between 1980 and 2007. In doing so, they assess the relevance of 'Mrs. Machlup's Wardrobe' hypothesis of demand for international reserves, advocated by Fritz Machlup in the 1960s, and re-introduced by Cheung and Qian (2009). The empirical findings of their analysis are in general, supportive of the presence of a significantly positive Joneses effect. The competitive hoarding behavior as implied by the empirical Joneses effect is robust to the presence of economic determinants that are commonly considered in the extant literature, control variables that account for region specific and crisis effects, alternative definitions of the Joneses variables, as well as different means to normalize cross-country international reserves. Thus, the 'peer group' effect on international reserve accumulation is not unique to the East Asian economies explored in Cheung and Qian (2009). According to them, in some sense, the Joneses effect revealed in the analysis is stronger than the one in Cheung and Qian (2009) study.

Cheung and Sengupta (2011) assert that the empirical Joneses effect points to some interesting policy issues. For instance, it is believed, in general, that holding international reserves incurs a net economic cost. In that case, the competitive hoarding behavior implied by the observed Joneses effect is likely to inflate the cost of holding international reserves for the Emerging Market

Economies (EMEs). This is because the competitive behavior pushes the demand for international reserves above levels justified by standard economic fundamentals. While the behavior may be a rational one from an individual economy's point of view, it may not necessarily be an optimal scenario for all economies as a group. If the economies could instead co-ordinate their international reserve accumulation policies and alleviate or even eradicate the (motivations underlying the) competitive behavior, then they could maintain an optimal level of international reserves to smooth out trade and capital account variations instead of competing with their peers. Such a co-operation strategy could bring down individual economies' costs of holding international reserves.

Bird and Mandilaras(2010) also find significant support for the 'Mrs. Machlup's Wardrobe Theory' of international reserves, which purports that irrespective of the amount of reserves countries have accumulated, they continue to add to their stock. Time exerts a significant positive impact on reserve accumulation. Perhaps, it indicates that monetary authorities perceived the period covered by the study as one of increasing financial turbulence and potential vulnerability, irrespective of whether crises actually occurred.

Using monthly data for the period 2000:m1–2006:m12 for eleven Asian economies, namely, China, India, Hong Kong, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Taiwan and Thailand, Pontines and Yongqiang (2011) provide significant empirical support to the Mrs. Machlup theory of international reserves for the case of Asian countries. The Wilcoxon test statistic ranges from 1.84 (for the case of Japan vis-à-vis the other ten Asian economies) to 9.52 (for the case of Korea vis-à-vis the other four crisis-

affected Asian economies). For all cases encompassing the three alternative definitions of the Joneses or 'peer' countries, the null of independence was rejected in favor of the alternative of dependence. This result holds regardless of whether the tests are based on asymptotic and bootstrapped critical values. This suggests that the decision to accumulate international reserves is not independent of the decision of the relevant Joneses or 'peer' countries. This means that official reserve accumulation behavior in Asia is driven by a non-fundamental desire to keep up with neighboring or 'peer' countries.

Demand for international reserves--- non-linear approach

Many of the studies in the area of demand for international reserves have not paid attention to the possibility of a threshold effect in the demand for international reserves. As such there is a paucity of empirical literature as far as threshold in the demand for international reserves is concerned.

Among the very few studies is Choi and Baek (2004) who use a new classification of exchange rate arrangements developed by Reinhart and Rogoff (2004) to test whether reserve holdings decrease with increasing exchange rate flexibility. Using pooled data for 137 countries over the period 1980-2000, the study regresses international reserves variable on other variables such as per capita GDP, trade openness (measured as the ratio of exports plus imports to GDP), financial openness (defined as the ratio of gross private capital flows to GDP), interest rate, export volatility and a dummy for exchange rate regime. The study finds that the degree of exchange rate flexibility has an inverted-U relationship with the country's reserve holdings. Exchange rate regimes with intermediate flexibility need more reserves than

polar regimes (hard pegs and freely floating). Also, reserve holdings are smaller under hard pegs than under freely floating, implying that current large stockpiles of reserves in East Asian countries can be significantly reduced if they adopt a single currency. Regarding the other determinants of the demand for reserves, country size, real openness and financial openness all raise reserve holdings while the opportunity cost and export volatility are not significant variables.

Finally, per capita GDP and reserve holdings, also, have an inverted-U relationship, reflecting that their correlation would be negative for industrial countries, but positive for developing countries. Bastourre et. al. (2009) also confirmed an inverted U-shaped relationship between reserves and development level.

Delatte and Fouquau (2011) also adopted a non-linear approach to examine the dynamics of international reserve holdings by emerging economies. They found evidence for the presence of non-linear behaviour in the demand for international reserves, a result that is new to the literature. After testing five candidates for the threshold variable, they identified that the deterioration of the U.S.'s external position is the most relevant to explain the increase in the accumulation of foreign exchange reserves observed recently. Finally, their results support the mercantilist view and do not support the importance of precautionary concerns at the end of the sample period.

Ahmad and Pentecost (2009) model the long-run relationship between exchange rates and international reserves in a sample of African countries over the period of 1980:01 - 2004:04. The empirical methodology uses threshold cointegration technique that considers the possibility of a non-linearity. The

results have indicated that a long-run dynamics exist between the series. Cointegration occurs when the divergence between the two is above the threshold point estimate. The threshold point estimate varies from country to country, reflecting the country's exchange rate regimes. The floating regimes seem to have higher threshold than the peg regimes and the exchange rates adjust more than the reserves.

A survey of empirical literature on economic growth

A wide range of studies has investigated the factors underlying economic growth. Using differing conceptual and methodological viewpoints, these studies have placed emphasis on a different set of explanatory parameters and offered various insights to the sources of economic growth. A variety of studies have addressed the issue of economic growth, mostly using either cross-country or panel data approach. While most of these studies utilise the standard neo-classical growth model or its extended version that includes human capital, more recent studies focus on endogenous growth models.

The broad consensus highlighted in these studies is that a country's growth over a long period is basically determined by three factors, namely: (1) the efficient utilisation of the existing stock of resources, (2) the accumulation of productive resources such as human capital, and (3) technological progress. However, these broad categories can be further broken down into various determinants of economic growth. The influences considered here include human capital, investment, geography, government policies, revolutions and coups, inflation, financial systems and technological progress.

Investment and human capital

Investment is the most fundamental determinant of economic growth identified by both neoclassical and endogenous growth models. However, in the neoclassical model investment has impact on the transitional period, while the endogenous growth models argue for more permanent effects. The importance attached to investment by these theories has led to an enormous amount of empirical studies examining the relationship between investment and economic growth (for instance, Kormendi & Meguire, 1985; De Long & Summers, 1991; Levine & Renelt, 1992; Mankiw et. al, 1992; Auerbach et al, 1994; Barro & Sala-i- Martin, 1995; Sala-i-Martin, 1997; Easterly & Levine, 1997; Bond et al, 2001; Podrecca & Carmeci, 2001). Nevertheless, findings are not conclusive.

Human capital is the main source of growth in several endogenous growth models as well as one of the key extensions of the neoclassical growth model. Since the term 'human capital' refers principally to workers' acquisition of skills and know-how through education and training, the majority of studies have measured the quality of human capital using proxies related to education (e.g. school-enrolment rates, tests of mathematics and scientific skills, etc.) and health. A large number of studies has found evidence suggesting that educated population is key determinant of economic growth (Barro, 1991; Mankiw et al, 1992; Barro & Sala-i-Marin, 1995; Brunetti et al, 1998, Hanushek & Kimko, 2000). However, there have been other scholars who have questioned these findings and, consequently, the importance of human capital as substantial determinant of economic growth (e.g. Levine

&Renelt, 1992; Benhabib & Spiegel, 1994; Topel, 1999; Krueger & Lindahl, 2001; Pritchett, 2001).

Barro (1991) studied 98 countries in the period 1960-1985 and concluded that the growth rate of real per capita GDP is positively related to initial human capital (proxied by 1960 school-enrollment rates). In 1995, he further concluded that for a country to grow adequately, human capital in the form of education and health is an important element. Sach and Warner (1997) also noted that a rapid increase in human capital development would result in rapid transitional growth. Gallup et al. (1998) further note that a well-developed labour force, in terms of better education and health, is likely to be able to produce more from a given resource base, than less-skilled workers. Romer (1990) states that quality development of labour force generates new products or ideas that underlie technological progress. He also notes that those countries with a large and well developed labour force experience a more rapid rate of introduction of new goods and thereby tend to grow faster.

Gallup et al. (1998) draw their variables from Barro and Lee (1993), and find a strong relationship between initial levels of health and economic growth, using life expectancy at birth as their basic measure of overall health of the population. They conclude that improved health is associated with faster economic growth. However, after using the average total years of education of the adult population as their main measure of education, they are unable to find a statistically significant relationship between initial levels of education and subsequent economic growth in their sample of countries. According to Levine and Zervos (1993), countries that have more students enrolled in secondary schools grow faster than countries with lower secondary school

enrollment rates. Brunetti et al. (1998) noted that education, measured by secondary school enrollment, is positively related to growth. Sala-i-Martin (1997) also supports the view that various measures of education are positively related to growth. Levine and Renelt (1992) concur.

Becker et al. (1990) state that higher rates of investment in human and physical capital lead to higher per capita growth. This is because well developed human capital will lead to an improvement in productivity, and an increase in the growth rate and investment ratio. Furthermore, studies have also found that if human capital is not accounted for in the model, then the quantitative implications of different saving and population growth rates are biased upward (Knight, Loayza & Villanueva 1993). Human capital development is positively correlated with savings and population growth.

Geography

The important role of geography on economic growth has been long recognized, though, over the last years there has been an increased interest in these factors since they have been properly formalised and entered into models (Gallup et al, 1998). Researchers have used numerous variables as proxies for geography including absolute values of latitude, distances from the equator, proportion of land within 100km of the coast, average temperatures and average rainfall, soil quality and disease ecology (Hall and Jones, 1999, Rodrik et al., 2002, Easterly and Levine, 2003).

Gallup et al.(1998), Sachs and Warner (1997), and Hall and Jones (1999) are a few of the cross-country growth studies that take geography into account. They generally conclude that countries located in the tropics tend to

grow more slowly than countries in more temperate climates. Developing countries that largely depend on the agricultural sector as their main source of export earnings are often adversely affected by the tropical climates, which hinder growth. Gallup et al.(1998) state that two possible reasons for this negative relationship could be as follows: (1) the presence of parasitic diseases in tropical countries; and (2) the tropics have more fragile soils and more natural disasters, all of which hinder agricultural growth. The writers further note that a geographical obstacle facing many countries is access to major shipping lines and important export/import markets.

There have also been a number of empirical studies such as Sachs and Warner, 1997, Bloom and Sachs, 1998; Masters and McMillan, 2001; Armstrong and Read, 2004, affirming that natural resources, climate, topography and 'landlockedness' have a direct impact on economic growth affecting (agricultural) productivity, economic structure, transport costs and competitiveness. However, others (e.g. Rodrik et al, 2002; Easterly and Levine, 2003) found no effect of geography on growth after controlling for institutions.

Economic/Government policies and macroeconomic conditions

Economic policies and macroeconomic conditions have, also, attracted much attention as determinants of economic performance (Kormendi and Meguire, 1985; Grier and Tullock, 1989; Barro, 1991, 1997; Fischer, 1993; Easterly and Rebelo, 1993; Barro and Sala-i-Martin, 1995) since they can set the framework within which economic growth takes place. Economic policies can influence several aspects of an economy through investment in human

capital and infrastructure, improvement of political and legal institutions and so on (although there is disagreement in terms of which policies are more conducive to growth). Macroeconomic conditions are regarded as necessary but not sufficient conditions for economic growth (Fischer, 1993). In general, a stable macroeconomic environment may favour growth, especially, through reduction of uncertainty, whereas macroeconomic instability may have a negative impact on growth through its effects on productivity and investment (e.g higher risk). Several macroeconomic factors with impact on growth have been identified in the literature, but considerable attention has been placed on inflation, fiscal policy, budget deficits and tax burdens.

Government policies also play a very crucial role in determining where an economy will go in the long run. Hall and Jones (1999) believe that differences in levels of economic success across countries are driven mainly by the institutions and government policies (or infrastructure) that frame the economic environment.

Gallup et al. (1998) explore the relationship between three basic government policies - openness to the global economy, government saving and the composition of government expenditures - and the growth of per capita income. They conclude that open economies are generally in a better position to import new technologies and new ideas from the rest of the world. In addition, they are likely to have a greater division of labour and production processes that are more consistent with their comparative advantages, which enable them to grow faster.

The central government savings rate is an important policy indicator. The authors measure this variable as a proportion of GDP, and average it over

their study period. They note that higher government saving is likely to support aggregate economic growth through two ways: (1) countries which have higher government saving rates also tend to have greater overall savings and investment, and therefore grow faster; and (2) higher government saving indicates sound overall macroeconomic management, which lowers risks for investors and increases investment. They conclude that prudent government fiscal policies appear to be associated with faster overall economic growth. The third policy examined by them is the composition of government spending, particularly, the extent of government spending on health and education. They find a positive relationship between government spending on health and education (measured as a share of GDP) and growth of per capita income.

Inflation

Inflation can adversely affect growth in the steady state through its effect on both the rate and efficiency of investment. Increased inflation will lead to increase in the cost of capital thus causing a decrease in the rate of investment which in turn reduces capital accumulation and growth (De Gregorio, 1992; Ghura 1997). Other studies that find inflation to have a significant impact on economic growth include Azam et al. (2002), Ghura and Hadjimichael (1996), Gutierrez (2005) and Ojo and Oshikoya (1995). Policy makers typically believe that inflation has important adverse effects on long-run economic performance (Clark, 1993). The reason for this, as noted by Fischer and Modigliani (1978) is that firms and workers devote productive resources to deal with inflation.

Fischer (1993) presents cross-sectional and panel regressions showing that growth is negatively associated with inflation. Levine and Renelt (1992) state that high growth countries are also lower inflation countries. While most authors find growth and inflation to be inversely related, with the implication that inflation is quite costly, there are exceptions: in his comments on Fischer's (1991) estimates, Sala-i-Martin (1991) reports an insignificant link between growth and inflation.

According to Cozier and Selody (1992), their results based on data from 22 countries belonging to the Organisation for Economic Cooperation & Development (OECD), suggest that inflation has a negative effect on economic output which is economically large and statistically significant. Other studies that found a negative relationship between inflation and economic growth include Dewan, Hussein and Morling (1999); Jarrett and Selody (1982); Clark (1982); Grimes (1990); Buck and Fitzroy (1988) and Barro (1995).

Furthermore, numerous empirical studies have found that inflation-growth interaction is non-linear and concave. In particular, Fischer (1993) was the first who investigated this non-linear relationship. He used cross-sectional data covering 93 countries. The author used the growth accounting framework in order to detect the channels through inflation impacts on growth. As a result, he found that inflation influences growth by decreasing productivity growth and investment. Moreover, the author showed that the effect of inflation is non-linear with breaks at 15 and 40 percent. Bruno and Easterly (1995) studied inflation-growth relationship for 26 countries over the 1961-

1992 period. They found a negative relationship between inflation and growth when level of inflation exceeds some threshold.

Khan and Senhadji (2001) investigated the inflation-growth interaction for both developing and developed countries applying the technique of conditional least squares. They used the panel data set on 140 countries (both industrial and developing) over the period 1960-1998. The authors employed the method of non-linear least squares to deal with non-linearity and non-differentiability of the inflation threshold level in growth regression. As a result, they obtained estimates of the threshold levels of 1-3% for developed and 11-12% for developing countries, which turned out to be very precise.

Financial system

The financial system is also known to affect the level of economic growth in a country. Recent extensions of the endogenous growth models to incorporate effects of financial deepening and intermediation on growth have emphasized the important role that financial intermediation plays in improving the efficiency of investment and thus stimulating economic growth. A survey of studies on economic growth, using the ratio of money to GDP as a financial indicator concluded that financial intermediation has beneficial effects on growth (King and Levine, 1993). Other studies that find the financial system to have an effect on growth include Teame (2004), Ghura and Hadjimichael, (1996) and Levine et al. (2000).

According to Levine and Zervos (1993), research suggests that economies with more developed and more efficient financial systems will be able to more effectively allocate savings to the best investments, which in turn

leads to increased productivity, potentially higher savings rates, and faster growth. The authors use the ratio of liquid liabilities to GDP to examine the relationship between financial policy and growth. Their results show that countries with larger per capita growth rates tend to have larger financial systems.

Openness

Openness to trade has been used extensively in the economic growth literature as a major determinant of growth performance. There are sound theoretical reasons for believing that there is a strong and positive link between openness and growth. Openness affects economic growth through several channels such as exploitation of comparative advantage, technology transfer and diffusion of knowledge, increasing scale economies and exposure to competition. Openness is usually measured by the ratio of exports to GDP. There is a substantial and growing empirical literature investigating the relationship between openness and growth. On the one hand, a large part of the literature has found that economies that are more open to trade and capital flows have higher GDP per capita and grew faster (Dollar, 1992, Sachs and Warner, 1995, Edwards, 1998, Dollar and Kraay, 2000). On the other hand, several scholars have criticized the robustness of these findings especially on methodological and measurement grounds (for example, Levine and Renelt, 1992; Rodriguez and Rodrik, 1999; Vamvakidis, 2002).

Political factors/instability

Research on the issues of political factors and economic growth has proliferated making clear that the political environment plays an important role in economic growth (Kormendi & Meguire, 1985; Scully, 1988; Grier & Tullock, 1989; Lensink et al, 1999; Lensink, 2001). At the most basic form, political instability would increase uncertainty, discouraging investment and eventually hindering economic growth. The degree of democracy is also associated with economic growth, though the relation is much more complex, since democracy may both retard and enhance economic growth depending on the various channels that it passes through (Alesina & Rodrik, 1994).

Political instability discourages investment in physical capital and cause skilled workers to emigrate to better economic opportunities, while both domestic saving and imported capital will drastically reduce because of a higher capital loss risk. It is generally believed that countries that experience more revolutions and coups grow more slowly than more stable countries. This view is strongly supported by Levine and Zervos (1993). However, Brunetti and Weder (1998) note that Thailand, characterised as a country with high political uncertainty still has a strong institutional framework and the number of coups it has experienced did not affect the functioning of the country's entrepreneurial class.

Gallup et al. (1998) find a strong negative relationship between political instability and economic growth. Their measure of political instability is based on the number of assassinations per million people per year and the number of coups per year. They conclude that political instability is a statistically significant deterrent to economic growth. The studies by

Kormendi and Meguire, 1985; Barro 1991; Fosu 1992; Easterly & Levine 1997; and Collier (2007), have all shown that political instability has an adverse impact on growth. Gyimah-Brempong and Muñoz De Camacho(1998); Gyimah-Brempong and Traynor(1999) in their study of Latin America and Africa respectively also confirmed that political instability is detrimental to growth.

Technological progress, innovation, R&D activities

Technological progress is another important factor which determines growth. According to Romer (1990) and other studies, the world economy grows because of technological progress, through the invention of new ideas. However, it should be noted that a country should be effective at taking advantage of technologies invented elsewhere. Hence, technology transfer and diffusion, are both essential contributory elements to the growth of a country. Foreign direct investment (FDI) has recently played a crucial role of internationalising economic activity and it is a primary source of technology transfer and economic growth. This major role is stressed in several models of endogenous growth theory. The empirical literature examining the impact of FDI on growth has provided more-or-less consistent findings affirming a significant positive link between the two (e.g. Borensztein et al, 1998; Hermes & Lensink, 2000; Lensink & Morrissey, 2006).

Innovation and R&D activities can play a major role in economic progress, increasing productivity and growth. This role has been stressed by various endogenous growth models and the strong relation between

innovation/R&D and economic growth has been empirically affirmed by many studies including (Fagerberg, 1987; Lichtenberg, 1992; Ulku, 2004).

Institutional framework

Another important source of growth highlighted in the literature is the institutional framework. Although the important role institutions play in shaping economic performance has been acknowledged long time ago (Lewis, 1955, Ayres, 1962), it is not until recently that such factors have been examined empirically in a more consistent way (Knack & Keefer, 1995; Mauro, 1995; Hall & Jones, 1999; Rodrik, 1999; Acemoglu et al, 2002).

Rodrik (2000) highlights five key institutions (property rights, regulatory institutions, institutions for macroeconomic stabilization, institutions for social insurance and institutions of conflict management), which not only exert direct influence on economic growth, but also affect other determinants of growth such as the physical and human capital, investment, technical changes and the economic growth processes. The most frequently used measures of the quality of institutions in the empirical literature include government repudiation of contracts, risk of expropriation, corruption, property rights, the rule of law and bureaucratic quality (Knack & Keefer, 1995).

Socio-Cultural/ Demographic factors

Recently, there has been a growing interest in how various social-cultural factors may affect growth (Granato et al, 1996; Huntington, 1996; Temple & Johnson, 1998; Landes, 2000; Inglehart & Baker, 2000; Zak

&Knack, 2001; Barro & McCleary, 2003). Trust is an important variable that belongs to this category. Trusting economies are expected to have stronger incentives to innovate, to accumulate physical capital and to exhibit richer human resources, all of which are conducive to economic growth (Knack & Keefer, 1997). Ethnic diversity, in turn, may have a negative impact on growth by reducing trust, increasing polarization and promoting the adoption of policies that have neutral or even negative effects in terms of growth (Easterly & Levine, 1997).

Several other social-cultural factors have been examined in the literature, such as ethnic composition and fragmentation, language, religion, beliefs, attitudes and social/ethnic conflicts, but their relation to economic growth seems to be indirect and unclear. For instance cultural diversity may have a negative impact on growth due to emergence of social uncertainty or even of social conflicts, or a positive effect since it may give rise to a pluralistic environment where cooperation can flourish.

The relationship between demographic trends and economic growth has attracted a lot of interest particularly over the last years, yet many demographic aspects remain today unexplored. Of those examined, population growth, population density, migration and age distribution, seem to play the major role in economic growth (Kormendi & Meguire, 1985; Brander & Dowrick, 1994; Kelley & Schmidt, 1995; Barro, 1997; Bloom & Williamson, 1998; Kelley & Schimdt, 2001). High population growth, for example, could have a negative impact on economic growth influencing the dependency ratio, investment and saving behaviour and quality of human capital. The composition of the population has also important implications for growth. A

large working-age population is deemed to be conducive to growth, whereas population with many young and elderly dependents is seen as impediment. Migration would affect growth potential of both the sending and receiving countries. Findings again are not conclusive since there have been studies reporting no (strong) correlation between economic growth and demographic trends (e.g. Grier & Tullock, 1989; Pritchett, 2001).

International reserves-economic growth nexus

None of the above studies on economic growth considers international reserves as a determinant of economic growth. However, there are very few studies that have looked at the effect of international reserves on economic growth. These studies include Polterovich and Popov (2003), Fukuda and Kon(2010) and Elhiraika and Ndikumana (2007) whose study did not directly look at the effect of international reserves on economic growth but on some variables which affect economic growth.

Elhiraika and Ndikumana (2007) use a panel data from 21 African countries to examine the causes and economic implications of reserve accumulation with a focus on the impact on the exchange rate, inflation, and public and private investment. They assert that while the level of reserves remains adequate on average, some countries have accumulated excessive reserves especially in recent years. Empirical analysis shows that the recent reserve accumulation cannot be justified by portfolio choice motives (in terms of returns to assets) or stabilization objectives. At the same time it has resulted in exchange rate appreciation while it has yielded little benefits in terms of public and private investment. The evidence suggests that African countries,

especially those endowed in natural resources, need to adopt a more pro-growth approach to reserve management.

Fukuda and Kon (2010) also, explores the possible long-run impacts of accumulation in foreign exchange reserves on macroeconomic variables in developing countries. They provide empirical support for their theoretical analysis using panel data from the Penn World Table. The cross-country evidence shows that an increase in foreign exchange reserves raises external debt outstanding and shortens debt maturity. The results also imply that increased foreign exchange reserves may lead to a decline in consumption, but can also enhance investment and economic growth. According to them the positive impact on economic growth, however, disappears when the impact is controlled through investment.

Summary

Based on a review of theoretical models, this chapter identifies possible determinants of the level of international reserves and economic growth. It then proposes an enhanced model that incorporates arguments that are discussed in the more recent literature in the field of international reserves. This is not to say that it is expected that central banks behave as predicted by these models. The purpose of this review is to identify possible determinants of the demand for international reserves and economic growth. If the theoretical models do not represent actual central bank behaviour or the behaviour of the economies well, possible determinants will simply turn out to be insignificant in the empirical analysis.

The empirical literature reviewed has revealed various variables or factors that may affect reserve holdings and also economic growth of any country. The review of the empirical literature on the demand for international reserves has revealed a number of possible factors that may influence reserve holdings. While some of the studies reveal the precautionary motive as the main driver of international reserve holdings others reveal the mercantilist motive as the major driver. There are some others which have shown the two motives as driving the demand for international reserves. A number of the studies have also tested the validity of the monetary approach to balance of payments, the Mrs. Machlup Wardrobe and the related Joneses argument and found them to be valid.

The review of the growth literature also reveals a number of variables. However, none of the studies reviewed apart from Polterovich and Popov (2003), Fukuda and Kon(2010) and to some extent Elhiraika and Ndikumana (2007) finds out the relationship between international reserves and economic growth. International reserves variable does not show in any of the growth equations estimated by these studies at all not to talk about the possibility of a threshold effect in the international reserves-economic growth nexus. This current study therefore helps expand the frontier of knowledge by finding out the effect of international reserves hoarding on economic growth and also the possibility of a threshold effect in the international reserves–growth nexus.

CHAPTER FIVE

METHODOLOGY

This chapter is divided into two main parts. The first part covers the specification of the model used whereas the second part looks at the econometric procedure adopted for estimating the models. There are subsections under the econometric procedure, which include issues relating to Univariate GARCH model, the Hodrick-Prescott Filter method, Time Series and Panel Data Unit Root (Stationarity) and Cointegration Tests and Testing for the Threshold Effects, following in that order. The remaining subsections present issues relating to the Dynamic Panel Data Estimation and Data Description and Sources.

Model specification

International reserves model

Traditionally, studies on the demand for international reserves used the inventory model or the buffer stock model (Heller 1966, Frenkel & Jovanovic 1981, Bahmani-Oskooee 1985). Several recent studies have also attempted to identify the determinants for the large reserve hoarding in East Asia using a buffer stock model (Aizenman & Marion 2004; Aizenman & Lee 2006; Aizenman et al, 2007). The buffer stock approach suggests that central banks rationally choose a level of reserves by comparing the opportunity cost of holding reserves with the macroeconomic adjustment cost in a case of reserves shortage. Under the conventional model, reserves holding mainly depend on economic size, trade openness, balance of payment volatility and opportunity cost. Thus, the equation often estimated is:

$$IR_t = \delta_1 + \delta_2 GDP_t + \delta_3 OPEN_t + \delta_4 BOP_t + \delta_5 OPCOST_t \quad (5.1)$$

where IR is international reserves; GDP is the Gross Domestic Products; OPEN is the trade openness; BOP is the balance of payment volatility; OPCOST is the opportunity cost.

While equation (5.1) is the benchmark specification of reserve holdings based on a buffer stock model, some researchers have considered additional variables. For example, Flood and Marion (2001) and Disyatat and Mathieson (2001) found that the volatility of the effective exchange rate is an important determinant. The choice of exchange rate regime should affect international reserve holdings. Greater exchange rate flexibility should reduce the demand for reserves since central banks no longer need a large reserve stockpile to maintain a peg or enhance the peg's credibility. The coefficient of exchange rate volatility should therefore be negative.

Following the IMF (2003), which used a standard buffer stock model based on Aizenman and Marion (2003), and with some additional variables, the empirical model for international reserves holdings is specified as

$$\ln Fr_{it} = \beta_0 + \beta_1 \ln Y_{it} + \beta_2 \ln Op_{it} + \beta_3 \ln Ev_{it} + \beta_4 \ln FOp_{it} + \beta_5 \ln TOp_{it} + \beta_6 \ln Gp_{it} \quad (5.2)$$

where Fr is the international reserves; Y is the Gross Domestic Products; Op is a measure of opportunity cost; Ev is exchange rate flexibility; FOp is financial openness; TOp is openness to trade; Gp is price of gold.

The right-hand side variables of equations (5.2) are chosen as potential determinants of reserves on the basis of previous empirical studies. The discussions on how these variables may affect the demand for international reserves are as follows:

Scaling factors

The scaling variable measures the size of international transactions and can be represented by GDP, GDP per capita, or population size. International transactions increase with economic size, and therefore reserves are expected to increase with real GDP per capita and population. Aizenman and Marion (2004) suggest that reserve holdings should increase with the size of international transactions. Thus we expect $\beta_1 > 0$ in Eq (5.2).

Opportunity cost of holding reserves

The opportunity cost variable plays an important role in theoretical models. The standard measure of the opportunity cost in empirical studies is the differential between the country's own-interest rate and the interest rate on comparable US treasuries. Most empirical studies, however, do not find a significant negative effect for the opportunity cost (Flood & Marion, 2002; IMF, 2003; Aizenman & Marion, 2004). As Aizenman and Marion (2004) point out, the opportunity cost variable may not be properly measured since the composition of reserves is not adequately reflected, and until the early 1990s, most emerging markets did not have market determined domestic interest rates. In addition, the standard measure does not take into account the cost of acquiring international currencies for building up reserves, which importantly depends on the country-risk premium and access to international capital markets. We expect $\beta_2 < 0$ in Eq (5.2).

Exchange rate flexibility

Conventional wisdom holds that greater flexibility in the exchange rate should reduce the demand for reserves since central banks then do not need a large reserve stockpile to maintain a peg or to enhance the peg's credibility (Disyatat, 2001; Flood & Marion, 2002; Aizenman & Marion, 2004). Also, more flexible exchange rate regimes can better accommodate shocks to the economy, and hence need smaller liquidity buffers (for example, Heller & Khan, 1978).

However, the need for reserves may increase with exchange rate flexibility to temper exchange rate movements if capital flows are volatile. Also, central banks, in an attempt to dampen the appreciation of their currencies, may accumulate reserves (Dooley et al, 2004). Thus β_2 could be positive or negative.

Financial and trade openness

With increased financial integration and open capital accounts, the scope of international reserve management has expanded over time and includes not just moderating volatility in the exchange rate and facilitating the export and import of goods and services, but now also encompasses a wide variety of cross-border asset transactions. Due to this trend, sovereign liquidity management has gained in importance and is increasingly perceived as a key element in reducing the vulnerability to international financial shocks. To capture changes in the financial openness of an economy, empirical studies use *de jure* financial integration measures based on policies to promote capital account liberalization or *de facto* measures based on actual capital flows.

Prasad et al (2003) and Lane and Milesi-Ferretti (2006) suggest *de facto* measures of financial integration.

Reserves should also be built up with the vulnerability of both real and financial external shocks such as terms-of-trade shocks and the currency and financial crises. To the extent that a country is more open in the real side as well as in the financial side, it is more vulnerable to such shocks. Thus real and financial-side openness both should be positively correlated with reserve holdings, that is, $\beta_4 > 0$ and $\beta_5 > 0$.

Price of gold

The closing of the so-called "gold window" by the Nixon administration in 1971 reflected a shortage of gold which has persisted for most of the following years. Two kinds of measures might have resolved the shortage; either the private demand for gold might have been reduced by lowering the commodity price level or the supply of gold could have been increased by raising the monetary price of gold. Since the scope for the first course was small, this led some economists to suggest the latter course--increasing the gold price in order to reduce not only the shortage of gold, but also the shortage of international reserves as a whole (see Bahmani-Oskooee, 1985). We therefore, incorporate into our model the gold price, which allows us to look at the proposal for which provisions were made in the International Monetary Fund (IMF) articles-which suggest that one possible method of dealing with the shortage of liquidity is gold revaluation. A higher price of gold will make countries feel wealthy and consequently their demand for

liquidity will be less. Consequently, a negative relation between the reserve holding behavior of a country and gold price would be expected; i.e, $\beta_6 < 0$.

The current study also attempts to quantify the relative importance of alternative views explaining international reserves accumulation. The precautionary approach links reserves accumulation directly to exposure to sudden stops, capital flight, and volatility, viewing precautionary demand for international reserves as self-insurance against costly output contractions induced by sudden stops and capital flight whereas the mercantilist approach views reserves accumulation as a residual of an industrial policy, a policy that may impose negative externalities on other trading partners. In this case, international reserves accumulation is triggered by concerns about export competitiveness. Under this strategy, reserves accumulation may facilitate export growth by preventing or slowing appreciation. Considering the above issues and taking into account current discussions concerning international reserves holdings, we specify a second empirical model for international reserves as

$$\ln Fr_{it} = \sigma_0 + \sigma_1 \ln IMF_{it} + \sigma_2 Egr_{it} + \sigma_3 \ln Ed_{it} + \sigma_4 \ln Cv_{it} + \sigma_5 \ln ExUS_t \quad (5.3)$$

where *IMF* is IMF relative quota; *Egr* is export growth; *Ed* is deviation of real exchange rate from its trend series; *Cv* is capital flow volatility; *ExUS* is the external position of the United States. Subscripts *i* and *t* represent country and time period respectively.

IMF relative quota

A number of reasons has been assigned to the rise in international reserves holdings. A related line of reasoning has focused on the response of emerging markets, particularly in Asia, to the financial crises of the 1990s and the early years of the following decade. According to Joyce and Razo-Garcia (2010), it has been claimed in some circles that these countries were unhappy about the policy prescriptions attached to the IMF's programs to the countries which borrowed from it. They subsequently sought to "self-insure" themselves against external shocks so that they would not need to turn to the IMF in the event of another crisis (Bird & Rajan, 2003; Mendoza, 2004).

The impact of the IMF on the demand for international reserves, however, may reflect other factors than concern over its lending conditions. A country's ability to draw from the IMF is constrained by its quota. Traditionally a country could draw no more than 100% of its quota in one year and 300% cumulatively. Emerging markets claim that their allotted quotas do not reflect their economic size and potential need for financing. Moreover, the total quota has not been increased for a very long time until 2009, and has lagged behind the growth in international transactions (Joyce & Razo-Garcia, 2010). Consequently, they may have chosen to hold more reserves to make up the anticipated shortfall in the event of a crisis and to evade conditions which they would regard as burdensome (Joyce & Razo-Garcia, 2010). Therefore, there may be an inverse relationship between the size of a country's IMF quota and its holdings of foreign exchange reserves. Thus we expect $\sigma_1 < 0$ in Eq(4.3).

Export growth

The mercantilist view focuses on hoarding international reserves in order to prevent or mitigate appreciation, with the ultimate goal of increasing export growth (Aizenman & Lee, 2005). Hence, we expect that reserves hoarding provoked by mercantilist concerns should be associated with higher export growth rate. Thus $\sigma_2 > 0$.

Real exchange rate deviation

The deviation of real exchange rate from its trend series is incorporated to capture the mercantilist argument of undervalued exchange rate policies. The variable, Ed , which captures the mercantilist argument for undervalued exchange rate system, is expected to have a positive relationship with international reserves holdings. A positive coefficient indicates an undervalued real exchange rate of domestic to foreign currency (Prabheesh, Malathy & Madhumati, 2009). Therefore, a high Ed would lead to high international reserves. Thus $\sigma_3 > 0$.

Capital flow volatility

The present study also incorporates the precautionary motive of reserve holdings to volatile capital flows. Financial integration of the developing countries has increased exposure to volatile capital flows or hot money, which are subject to sudden stop and reversal (Calvo, 1998; Edwards, 2004). Capital flow volatility is expected to have a positive relationship with international reserves holding because high volatility in capital flows induces the central bank to hold high reserves as precaution. Thus $\sigma_4 > 0$.

External position of the United States

The inclusion of this variable in the model stems from the central role played by the dollar in the current international monetary system. Following Delatte and Fouquau (2009) we explicitly test whether the deterioration of the U.S.'s external position leads to increased reserves holdings in the West African Monetary Zone. Indeed, the trade deficit results in devaluation pressures on the dollar. The larger the current account deficit, the higher the pressures on the dollar. All things equal, the central banks in emerging economies have to accumulate more reserves to mitigate appreciation of their currencies. The current account balance (as a proportion of GDP) or national savings (as a proportion of GDP) can be used to capture the external position of the United States. Indeed, other things equal, a decrease in national savings implies a deterioration of current accounts (see Krugman & Obstfeld, 2008). The external position of the United States deteriorates when the current account balance deteriorates and national savings decreases. In this study, the current account balance (as a proportion of GDP) has been used to capture the external position of the United States. Thus we expect $\sigma_5 < 0$ in Eq(5.3).

Static and dynamic panel models

The static and dynamic panel models for international reserves are expressed respectively as

$$Fr_{it} = \eta + \omega\chi_{it} + \mu_i + \varphi_{it} \quad (5.4)$$

$$Fr_{it} = \eta + \gamma Fr_{i,t-1} + \omega\chi_{it} + \mu_i + \varphi_{it} \quad (5.5)$$

where μ_i represents the unobserved country specific effects, φ_{it} is the error term, Fr_{it} is international reserves, subscripts i and t represent country and time period respectively, χ_{it} is a vector of explanatory variables capturing Gross Domestic Products, interest rate differential which is a measure of opportunity cost, exchange rate volatility, trade and financial openness, export growth, IMF relative quotas, real exchange rate deviation, external position of the United States, monetary disequilibrium and the Joneses effect.

In our study of the demand for reserves, we have to determine whether the dependent variable follows a static or dynamic process. There are several arguments why a dynamic behaviour is more plausible.

As a first approach, one might consider the nature of this variable. The level of reserves is a stock variable that would be constant over time if the central bank were totally passive (under a freely floating exchange rate system). The initial stock of reserves is not zero, but there is an existing level which is inherited from the previous period. When a central bank determines the level of reserves, it always starts from this level and has to define the desired changes. Therefore, the determination of the level of reserves is a natural candidate for a dynamic specification that includes the lagged level of reserves as one of its determinants.

Analytically, the inclusion of the lagged dependent variable can be motivated by a partial adjustment or habit-persistence model. A central bank might only partially adjust the level of reserves to its desired level when the adjustment is costly and when an optimising behaviour is assumed, trading off the costs of making the adjustment and the costs of not having the desired level of reserves. In addition, the lagged dependent variable might be

interpreted as a measure of inertia or historical persistence. A central bank that evaluates the past level of reserves as adequate will be inclined to stick to this level, even if the determinants of reserve holdings call for a reduction.

Bordo and Eichengreen (2001) show that inertia is at least present for gold holdings of central banks. Persistence of reserves might also be the result of a central bank considering the link between reserves and the confidence which is attributed to its paper money. Economic agents still associate the reliability of paper money, namely its price stability, with the level of reserves. If a central bank reduced abruptly but appropriately the level of reserves – for example in response to the move to a less managed exchange rate system – economic agents might question the reliability of national money, expect higher inflation, substitute national paper money for other sources of wealth, thereby destabilize the national money market and finally self-fulfil their expectations. Therefore, if fundamentals call for a reduction of reserves, central banks might sell reserves only smoothly such that the public is not unsettled.

Domestic monetary disequilibrium

One of the exogenous variables is the domestic monetary disequilibrium. The justification for not using this variable in the set of endogenous variables is that the monetary approach to balance of payments assumes a short run effect of the domestic monetary disequilibrium on reserves. We are therefore, not including this variable in the cointegration equation. Instead, we are looking for its short run role by incorporating it in the error correction equation as exogenous variable. The domestic monetary

disequilibrium is defined as the difference between the actual money supply and the equilibrium demand for money that is

$$M - M^* = M - f(Y, I, P) \quad (5.6)$$

where M and M^* denote actual money supply and the estimated domestic demand for money while Y , I , and P represents GDP, interest rate, and inflation rate respectively.

The Joneses effect

Since there is no foolproof method of defining the Joneses, we follow the convention of Cheung and Qian (2009). For any one economy, the Joneses constitute all the other economies in our sample, which together act as a proxy for all other economies in the WAMZ. We define the Joneses variable for economy i , as follows:

$$J_{it} = \sum_{i \neq k} Y_{kt} \quad (5.7)$$

where Y_{kt} is the reserves to GDP ratio of economy k at time t . The lagged Joneses variable is used in the model to reflect the lack of contemporaneous data on other economies' international reserves. In spirit of the 'Mrs. Machlup's Wardrobe' hypothesis, if reserve accumulation of other economies in the region went up in the previous year, then reserves held by the economy in question will go up in the current year.

To confirm the existence of the Joneses effect, we also used the Wilcoxon test. The test is carried out using a paired data comparison. The null hypothesis of this test is that the two variables come from the same distribution with the same location, equivalent to the independence hypothesis, whereas, the alternative hypothesis is that the two variables come from two

distributions of identical shape but different location, which is equivalent to the dependence hypothesis. An affirmation of the alternative hypothesis is interpreted as that the monetary authorities in the countries examined exhibit the Mrs. Machlup's wardrobe behavior.

International reserves accumulation and economic growth

One of the objectives of the study is to investigate the linkages between movements in foreign exchange reserves (accumulation or depletion) and economic growth. Following Mankiw et al. (1992), Knight et. al (1993), Ghura and Hadjmichael (1996), Hoeffler (2002) and Abdullahi and Suardi (2007), the growth model used in this study is an augmented neoclassical Solow-Swan model. Consider a Cobb-Douglas production function of the form:

$$Y_t = K_t^\alpha H_t^\beta (A_t L_t)^{1-\alpha-\beta} \quad (5.8)$$

where Y_t is real output, K is the stock of physical capital, H is the stock of human capital, L is labour, A is a labour-augmenting factor and t is the time sub-script. It is assumed that there are constant returns to scale and diminishing returns to each factor input (*i.e.* $\alpha + \beta < 1$).

Labour and labour augmenting technology are assumed to grow at the exogenous rate of n and g respectively given the following functions:

$$L_t = L_0 e^{nt}; \text{ and} \quad (5.9)$$

$$A_t = A_0 e^{(g^t + X\psi)} \quad (5.10)$$

In this formulation, X is a vector of policy and other factors that can affect the level of technology and efficiency in the economy while ψ is a vector of coefficients related to these policy and other variables. The accumulation

equations for both physical and human capital are given by the following functions:

$$\dot{K}_t = s_k Y_t - \delta K ; \text{ and} \quad (5.11)$$

$$\dot{H}_t = s_h Y_t - \delta H \quad (5.12)$$

For simplicity it is assumed that both types of capital depreciate at the same rate δ , where s_k and s_h are the fractions of income invested in physical and human capital respectively. Using the definitions; $y = Y/AL$, $k = K/AL$ and $h = H/AL$ Equations 5.8, 5.11 and 5.12 can be rewritten as

$$y_t = k_t^\alpha h_t^\beta , \quad (5.8')$$

$$\dot{k}_t = s_k y_t - (n + g + \delta) k_t , \quad (5.11')$$

$$\dot{h}_t = s_h y_t - (n + g + \delta) h_t , \quad (5.12')$$

Since in the steady state $\dot{k} = 0$ and $\dot{h} = 0$, then Equations 5.11' and 5.12' can be solved for k^* and h^* to obtain the following expressions:

$$k^* = \left(\frac{s_k^{1-\beta} s_h^\beta}{n + g + \delta} \right)^{\frac{1}{1-\alpha-\beta}} ; \text{ and} \quad (5.13)$$

$$h^* = \left(\frac{s_k^\alpha s_h^{1-\alpha}}{n + g + \delta} \right)^{\frac{1}{1-\alpha-\beta}} \quad (5.14)$$

Substituting Equations 5.13 and 5.14 into Equation 5.8' and suppose $\lambda = (\alpha + \beta)$ yields

$$y^* = \left(\frac{s_k^\alpha s_h^\beta}{(n + g + \delta)^\lambda} \right)^{\frac{1}{1-\lambda}} \quad (5.15)$$

On taking natural logarithms of Equation 5.15 gives the following steady state output per effective labour expression:

$$Iny^* = -\left(\frac{\lambda}{1-\lambda}\right)In(n+g+\delta) + \left(\frac{\alpha}{1-\lambda}\right)Ins_k + \left(\frac{\beta}{1-\lambda}\right)Ins_h$$

(5.16)

By taking natural logarithm of $y = Y/AL$ and substituting for A from Equation 5.13 yields the empirical form of Equation 5.19:

$$In\left(\frac{Y}{L}\right) = InA_0 + gt + X\psi - \left(\frac{\lambda}{1-\lambda}\right)In(n+g+\delta) + \left(\frac{\alpha}{1-\lambda}\right)Ins_k + \left(\frac{\beta}{1-\lambda}\right)Ins_h$$

(5.17)

Note the model predicts that the sum of elasticities with respect to s_k and s_h is equal to the elasticity with respect to $(n+g+\delta)$. Following Mankiw, Romer and Weil (1992), the transition of actual output y , to its steady state level is approximated by the expression;

$$\frac{dIny}{dt} = \phi(Iny^* - Iny) \tag{5.18}$$

where $\phi = (n+g+\delta)(1-\lambda)$ is the speed of convergence and the other variables are as previously defined. On integrating Equation 5.18 gives;

$$Iny = (1 - e^{-\phi t})Iny^* + e^{-\phi t}Iny_0 \tag{5.19}$$

where y_0 is output per effective labour at time t_0 . When we subtract Iny_0 from both sides of Equation 5.19 and substitute for Iny^* from Equation 5.17, gives

$$Iny - Iny_0 = (1 - e^{-\phi t}) \left[-\left(\frac{\lambda}{1-\lambda}\right)In(n+g+\delta) + \left(\frac{\alpha}{1-\lambda}\right)Ins_k + \left(\frac{\beta}{1-\lambda}\right)Ins_h \right] + X\psi + gt + InA_0 - Iny_0$$

(5.20)

The dynamic panel data model equivalent to Equation 5.20 is expressed as

$$y_{it} - y_{i,t-1} = \eta + \gamma y_{i,t-1} + \omega \chi_{it} + \mu_i + \varphi_{it} \tag{5.21}$$

Equation 5.21 can also be written as

$$y_{it} = \eta + \gamma^* y_{i,t-1} + \omega \chi_{it} + \mu_i + \varphi_{it} \quad (5.21a)$$

where $\gamma^* = (1 + \gamma)$, μ_i represents the unobserved country specific effects, φ_{it} is the error term, $y_{it} - y_{i,t-1}$ is the growth rate of real GDP per worker, $y_{i,t-1}$ is the level of GDP per worker, χ_{it} is a vector of explanatory variables capturing $\ln s_{k,i}$, $\ln s_{h,i}$, $\ln(n_i + g_i + \delta_i)$ and a set of ancillary variables comprising international reserves, remittances, financial development, trade openness, technological environment, and political indicators.

Taking into consideration the above exposition, the empirical economic growth model is specified as

$$\ln Y_{it} = \gamma_0 + \gamma_1 \ln Fr_{it} + \gamma_2 \ln CPR_{it} + \gamma_3 \ln Lab_{it} + \gamma_4 \ln Rmt_{it} + \gamma_5 \ln M2Y_{it} + \gamma_6 \ln FDI_{it} + \gamma_7 \ln TOP_{it} + \gamma_8 \ln GCF_{it} + \delta_{it} \quad (5.22)$$

where CPR is civil liberties and political rights, Lab is labour force, Rmt is remittances, M2Y is financial development, and FDI is foreign direct investment capturing technological environment.

The effect of international reserves on economic growth may come from two possible channels namely the export channel and investment channel. Accumulation of international reserves brings about undervaluation of the domestic currency. This undervaluation of the currency stimulates the increase in exports. This increase in exports raises accumulated knowledge due to learning from external trade and therefore economic productivity as well. The rate of growth rises and this outweighs the potential gain from spending reserves for current needs.

The undervaluation lowers foreign currency prices of domestic real assets and thus attracts foreign direct investment. Besides, continuing foreign exchange reserves build up (especially in periods of trade deterioration) gives a powerful signal to investors that the government is in full control of the situation and can afford costs for the sake of pursuing a consistent policy. Even if foreign exchange reserves accumulation outweighs the FDI flow, FDI externalities may be strong enough to accelerate growth (Polterovich & Popov (2003)). Also, the availability of reserves makes it possible to import capital goods, thus facilitating increased domestic private investment which may impact positively on economic growth. Also, there may be an increase in investment due to the inflow of foreign capital attracted by higher profitability in the tradable sector and due to the decline in government budget deficit resulting from increased revenues attributable to price increases in the tradable sector. It is therefore expected that an increase in international reserves should increase economic growth in accordance with Polsterovich and Popov (2003) postulation. Thus $\gamma_1 > 0$.

The discussions on the effect of political freedom on growth indicate that the net effect of more political freedoms on growth is theoretically ambiguous. According to Barro (1996), one cannot conclude from the available evidence that more or less democracy is a critical element for economic growth but there is some indication of a nonlinear relation in which more democracy raises growth when political freedoms are weak but depresses growth when a moderate amount of freedom is already established.

Human capital is the main source of growth in several endogenous growth models as well as one of the key extensions of the neoclassical growth

model. Nelson and Phelps (1966) suggest that a large sized labour force makes it easier for a country to absorb new products or ideas that have been discovered elsewhere. Romer (1990) states that quality development of labour force generates new products or ideas that underlie technological progress. He also notes that those countries with a large and well developed labour force experience a more rapid rate of introduction of new goods and thereby tend to grow faster. A large number of studies has found evidence suggesting that educated population is key determinant of economic growth (Barro, 1991; Mankiw et al, 1992; Barro and Sala-i-Marin, 1995; Brunetti et al, 1998, Hanushek & Kimko, 2000). However, there have been other scholars who have questioned these findings and, consequently, the importance of human capital as substantial determinant of economic growth (e.g. Levine & Renelt, 1992; Benhabib & Spiegel, 1994; Topel, 1999; Krueger & Lindahl, 2001; Pritchett, 2001).

Generally, the economic literature suggests that remittance flows contribute to investment growth, the alleviation of poverty, an improved standard of living, and economic growth and development. According to the World Bank (2006) remittances are more effective in both raising investment and enhancing growth in countries with higher levels of human capital, strong institutions, and good policy environments. However, as noted by Burnside and Dollar (2002) stated that the impact of these flows on the rate of growth of the recipient economy depends on whether that particular money transfer is invested or consumed. If it is invested, it is likely to positively affect growth, whereas if it is consumed it may have a negative or no impact. Incentives to invest remittances and any returns on investment and its subsequent

productivity, depends on the policy environment that exists. A good policy environment will increase the returns on investment and raise the opportunity cost on consumption, while on the contrary, a bad policy environment will reduce the returns on investment and lower the opportunity cost of consumption. Thus γ_4 could be positive or negative.

Recent extensions of the endogenous growth models to incorporate effects of financial deepening and intermediation on growth have emphasized the important role that financial intermediation plays in improving the efficiency of investment and thus stimulating economic growth. A survey of studies on economic growth, using the ratio of money to GDP as a financial indicator concluded that financial intermediation has beneficial effects on growth (King & Levine, 1993). Thus γ_5 is expected to be positive.

Foreign direct investment (FDI) has recently played a crucial role of internationalising economic activity and it is a primary source of technology transfer and economic growth. This major role is stressed in several models of endogenous growth theory. The empirical literature examining the impact of FDI on growth has provided more-or-less consistent findings affirming a significant positive link between the two (e.g. Borensztein et al, 1998; Hermes & Lensink, 2000; Lensink & Morrissey, 2006). Thus γ_6 is expected to be positive.

Openness to trade has been used extensively in the economic growth literature as a major determinant of growth performance. There are sound theoretical reasons for believing that there is a strong and positive link between openness and growth. On the one hand, a large part of the literature has found that economies that are more open to trade and capital flows have

higher GDP per capita and grew faster (Dollar, 1992, Sachs & Warner, 1995, Edwards, 1998, Dollar & Kraay, 2001). Thus γ_7 is expected to be positive.

Investment is the most fundamental determinant of economic growth identified by both neoclassical and endogenous growth models. The importance attached to investment by these theories has led to an enormous amount of empirical studies examining the relationship between investment and economic growth (see for instance, Kormendi & Meguire, 1985; De Long & Summers, 1991; Levine & Renelt, 1992; Mankiw et. al, 1992; Auerbach et al, 1994; Barro & Sala-i-Martin, 1995; Sala-i-Martin, 1997; Easterly & Levine, 1997; Bond et al, 2001; Podrecca & Carmeci, 2001). Nevertheless, findings are not conclusive.

Econometric procedure

This study uses a combination of time-series and panel data econometric techniques. Adopting both methods ensures that the inherent disadvantage(s) of one technique is (are) corrected by the other. First, we present the methodology used for constructing the variables such as exchange rate volatility, capital flow volatility and real exchange rate deviation (*Ed*).

Univariate GARCH (1, 1) model

In order to generate the volatility series of exchange rate and capital flow, we have applied univariate Generalized Autoregressive Heteroscedastic (GARCH) model developed by Bollerslev (1986). The main advantages of GARCH model as compared to traditional volatility estimation method such as rolling standard deviation etc are that it helps to model the volatility clustering

features of the data and incorporates heteroscedasticity into the estimation procedure (Bollerslev, 1986). The GARCH (p, q) model specification can be written as

$$Y_t = \mu + \varepsilon_t$$

$$\varepsilon_t / \Omega_{t-1} : N(0, h_t) \quad (5.23)$$

$$h_t = \omega + \sum_{i=1}^p \alpha_i \varepsilon_{t-i}^2 + \sum_{j=1}^q \beta_j h_{t-j}$$

$$\omega > 0; \alpha_1, \dots, \alpha_p \geq 0; \beta_1, \dots, \beta_q \geq 0 \quad (5.24)$$

Equation (5.23) is the conditional mean equation, where μ is the mean of Y_t . ε_t is the error term conditional on the information set Ω_{t-1} and is normally distributed with zero mean and variance h_t . Equation (5.24) is the variance equation which shows that the one period ahead forecast variance, h_t , is based on past information and therefore it is called conditional variance. The conditional variance depends on three factors: the mean ω ; the news about the volatility from previous periods ε_{t-1}^2 ; and forecast variance from previous period h_{t-j} . The size and significance of α_t indicates the presence of the ARCH process or volatility clustering in the series. Similarly the size and significance of β_j indicate the effect of GARCH. In the case of GARCH(1, 1) model, if $\alpha_1 + \beta_1 = 1$, then it indicates the persistence of a forecast of the conditional variance over all finite horizons and an infinite variance for the unconditional distribution of ε_t (Engle & Bollerslev, 1986). In order to derive the volatility of exchange rate and capital flow, we follow GARCH (1, 1) model, where h_t depends on only one lag of ε_{t-1}^2 and h_{t-1} .

Hodrick-Prescott (HP) filter method for exchange rate deviation(*ED*)

The deviation of exchange rate from its trend is calculated using Hodrick- Prescott (1997) or HP filter method. In the literature, the variable which is used to capture the effect of undervalued exchange rate system is the deviation of Real Effective Exchange rate (REER) from its trend (Aizenman and Lee, 2006). Since it is argued that the central banks of these five countries have not been targeting REER, REER is not considered for constructing undervalued exchange rate. Instead, we generate a real exchange rate series of the various currencies against the US dollar, since the large foreign exchange transactions of the domestic currencies take place in US dollars.

In order to derive the deviation of real exchange rate from its trend values, we use the HP filter procedure. The HP Filter is a smoothing method which is used to obtain a smooth estimate of the long-term trend component of a series. It has an advantage over simple de-trending procedure based on linear trend, that it is a time varying method and allows the trend to follow a stochastic process. HP computes the smoothed series y^T of y by minimizing the variance of y around y^T , subject to a penalty that constrains the second difference of y^T . The HP filter chooses y^T to minimize

$$\sum_{i=1}^n (y_i - y_i^T)^2 + \lambda \sum_{i=2}^{n-1} (\Delta y_{i+1}^T - \Delta y_i^T)^2 \quad (5.25)$$

where, λ is the smoothing weight on y^T growth and n is the sample size. In order to derive the series of Ed , the deviation of real exchange rate from its trend, we take the difference between real exchange rate and the smoothed real exchange rate derived from HP filter.

Time series unit-root and cointegration tests

Our first strategy is to test for the stationarity of the series since time-series data have been used. Granger and Newbold (1974) and Stock and Watson (1988) have shown that running regression on non-stationary data using OLS estimation method produces spurious results. It is therefore, necessary to test for the stationary status of the variables in order to avoid any spurious regression results. In this study the augmented Dickey-Fuller test has been used. A VAR based cointegration test developed by Johansen has been utilized to test for the existence of a long run equilibrium relationship among the variables.

Finding the threshold effects

In the first instance, the LOWESS techniques were used to determine the possibility of threshold effects in the demand for international reserves as well as the economic growth-international reserves nexus. LOWESS carries out a locally weighted regression of y-variable on x-variable, displays the graph, and optionally saves the smoothed variable.

LOWESS stands for locally weighted scatterplot smoothing and is one of many non-parametric regression techniques, but arguably the most flexible. LOWESS is a bivariate smoother meant to represent the notion of locally weighted regression—a curve- or function-fitting technique that provides a generally smooth curve, the value of which at a particular location along the x-axis is determined only by the points in that vicinity. The method consequently makes no assumptions about the form of the relationship, and allows the form to be discovered using the data itself.

LOWESS is essentially used to visually assess the relationship between two variables and is especially useful for large datasets, where trends can be hard to visualize. This method, originally proposed by Cleveland (1979) and further developed by Cleveland and Devlin (1988), specifically denotes a method that is also known as locally weighted polynomial regression. At each point in the data set a low-degree polynomial is fitted to a subset of the data, with explanatory variable values near the point whose response is being estimated. The polynomial is fitted using weighted least squares, giving more weight to points near the point whose response is being estimated and less weight to points further away. The value of the regression function for the point is then obtained by evaluating the local polynomial using the explanatory variable values for that data point. The LOWESS fit is complete after regression function values have been computed for each of the n -data points. Many of the details of this method, such as the degree of the polynomial model and the weights, are flexible.

The subsets of data used for each weighted least squares fit in LOWESS are determined by a nearest neighbors algorithm. A user-specified input to the procedure called the "bandwidth" or "smoothing parameter" determines how much of the data is used to fit each local polynomial. The smoothing parameter, α , is a number between $(\lambda + 1)/n$ and 1, with λ denoting the degree of the local polynomial. The value of α is the proportion of data used in each fit. The subset of data used in each weighted least squares fit comprises the $n\alpha$ points (rounded to the next largest integer) whose explanatory variables values are closest to the point at which the response is being estimated.

The α is called the smoothing parameter because it controls the flexibility of the LOWESS regression function. Large values of α produce the smoothest functions that wiggle the least in response to fluctuations in the data. The smaller α is, the closer the regression function will conform to the data. Using too small a value of the smoothing parameter is not desirable, however, since the regression function will eventually start to capture the random error in the data. Useful values of the smoothing parameter typically lie in the range 0.25 to 0.5 for most LOWESS applications.

Secondly, quadratic functional forms were formulated and estimated in order to confirm the existence of threshold effects in the demand for international reserves and in the economic growth-international reserves nexus.

Panel data tests

Panel data unit root and cointegration tests are based on pooling the information in the individual units in the panel. The main reason for using panel tests is that the power of individual tests to reject the null hypothesis of a unit root or no cointegration can be low.

Panel unit root tests

There are two types of panel unit root processes. When the persistence parameters are common across cross-section then this type of processes is called a common unit root process. Levin, Lin and Chu (2002) employ this assumption. When the persistent parameters freely move across cross-section then this type of unit root process is called an individual unit root process. The

Im, Pesaran and Shin (IPS), Fisher-ADF and Fisher-PP tests are based on this form.

The Augmented Dickey-Fuller (ADF) unit root test (Dickey and Fuller 1981) is based on the model

$$\Delta y_{it} = \mu_i + \rho_i y_{i,t-1} + \sum_{j=1}^{k_i-1} \gamma_{ij} \Delta y_{i,t-j} + \varepsilon_{it}, \quad \varepsilon_{it} \sim IID(0, \sigma_i^2) \quad (5.26)$$

$$i = 1, \dots, N, \quad t = 1, \dots, T.$$

The null hypothesis of a unit root is $H_{0i} : \rho_i = 0$ and the alternative hypothesis of stationarity is $H_{1i} : \rho_i < 0$ for all i . The panel unit root tests of Levin, Lin and Chu (2002) and Im, Pesaran and Shin (2003) are both panel versions of the ADF test. The Levin, Lin and Chu (LLC) test is based on a pooled panel estimator, assuming all $\rho_i = \rho$. The Im, Pesaran and Shin (IPS) test relaxes the assumption that all $\rho_i = \rho$. Their test uses separate ADF unit root tests for each of the N units and is based on the mean of the ADF statistics. Both tests require that T is the same for each unit, i.e., the panel is balanced. A simple alternative is the Fisher test suggested by Maddala and Wu (1999). Let p_i denote the p -values from the individual ADF tests. The Fisher statistic is given by

$$\Lambda_1 = -2 \sum_{i=1}^N \ln p_i \quad (5.27)$$

The test is an exact non-parametric test. The Λ_1 statistic has a χ^2 distribution with $2N$ degrees of freedom under the null hypothesis. In a simulation study, Maddala and Wu show that the Fisher test has better size and power properties than the LLC and IPS tests.

The Fisher test depends on the assumption of independence of the p-values. If the independence assumption is violated, an asymptotic test can be constructed using the statistic

$$\Lambda_2 = \frac{\sqrt{N}(\pi - 2)}{2} \quad (5.28)$$

$$\text{where } \pi = -\frac{2}{N} \sum_{i=1}^N \ln p_i \quad (5.29)$$

The asymptotic distribution of the Λ_2 statistic is standard normal. The rejection region is one-sided and the test rejects for large values of Λ_2 .

Panel cointegration tests

Westerlund (2007) developed four panel cointegration tests. The underlying idea is to test for the absence of cointegration by determining whether the individual panel members are error correcting. Consider the following error-correction model:

$$Dy_{it} = \alpha_i + \beta_{i1}Dy_{it-1} + \beta_{i2}Dy_{it-2} + \dots + \beta_{ip}Dy_{it-p} + \delta_{i0}Dx_{it} + \delta_{i1}Dx_{it-1} + \dots + \delta_{ip}Dx_{it-p} + \beta_i(y_{it-1} - \delta_i x_{it-1}) + u_{it} \quad (5.30)$$

β_i provides an estimate of the speed of error-correction towards the long run equilibrium $y_{it} = -(\delta_i / \beta_i)x_{it}$ for that series i . The Ga and Gt test statistics test $H_0: \beta_i = 0$ for all i versus $H_1: \beta_i < 0$ for at least one i . These statistics start from a weighted average of the individually estimated β_i 's and their t-ratio's, respectively. The Pa and Pt test statistics pool information over all the cross-sectional units to test $H_0: \beta_i = 0$ for all i versus $H_1: \beta_i < 0$ for all i . Rejection of H_0 should therefore be taken as rejection of cointegration for the panel as a whole.

The tests are very flexible and allow for an almost completely heterogeneous specification of both the long- and short-run parts of the error-correction model, where the latter can be determined from the data. The series are allowed to be of unequal length. If the cross-sectional units are suspected of being correlated, robust critical values can be obtained through bootstrapping.

Panel data estimation

The standard model to analyse panel data is the unobserved effects model. Observations are pooled over time and units of observation, with or without individual-specific effects. These effects can be fixed (fixed effects model) or random (random effects model). Analytically it can be written as

$$Z_{it} = \beta' x_{it} + \mu_i + \pi_{it} \quad (5.31)$$

where Z_{it} is the level of reserves/level of real GDP and x represents a set of variables that potentially affect the level of international reserves/level of real GDP. β is a vector of slope parameters, μ represents the country specific effect and π is the error term. i denotes a specific country and t stands for time. In total, we observe N countries over T time periods.

Fixed versus random effects

The choice between a fixed or random effects formulation can be justified by considerations on the data-generating process as well as by statistical tests. When the sample is open, i.e. when the N cross-section units are drawn randomly from a large population, random effects are natural candidates. When, on the other hand, the sample contains all units of interest

and is not a sample drawn from a larger population, fixed effects are appropriate.

Statistically, consistent estimation of the random effects model requires that the observed explanatory variables not be correlated with the unobserved effect ($Cov(x_{it}, \mu_i) = 0$). The fixed effects model, in contrast, allows for arbitrary correlation between the observed explanatory variables and the unobserved effect. If the assumption of zero correlation is violated, the random effects estimator is inconsistent, whereas the fixed effects estimator is consistent independently of the correlation between explanatory variables and unobserved effect. These properties are utilized by the Hausman test, which is based on the difference between the random and fixed effects estimates. A statistically significant difference is interpreted as evidence against the random effects specification.

For our specific analysis of a sample of countries, all mentioned considerations point to the fixed effects formulation. The sample is closed in the sense that it contains almost the whole population, namely all countries constituting the WAMZ. Moreover, it is likely that the individual effects are correlated with the observed explanatory variables.

The choice between fixed and random effects also determines the nature of inferences that can be made. In the random effects model, inferences can be made unconditionally about a larger population from which the data in the sample are (thought to be) just a random draw. Inferences of fixed effects models are limited to the behaviour of the set of observations included in the model and cannot be applied to “similar” units.

Static versus dynamic specification

Apart from the determination of an appropriate set of explanatory variables, one has to make an assumption concerning the properties of the dependent variable. Either it is static or it follows a dynamic adjustment process. From a theoretical perspective, models often relate to a stationary or static world in which the equilibrium value of a variable is exclusively determined by its determinants and in particular independent of its own realization in the previous period. However, most empirical economic relationships are characterized by a dynamic adjustment process where the equilibrium value is not reached immediately. In these cases, the current value of a variable depends on its past value, the current value may deviate from its optimal or desired value and the analysis of the time path to its equilibrium value is important.

The neglect of dynamics is not without cost. An incorrect specification of the process governing the dependent variable may also affect the estimated coefficients of its explanatory variables. In terms of empirical modelling, a static model is represented by equation (5.31) whereas a dynamic one includes the lagged dependent variable as a right-hand-side variable:

$$Z_{it} = \alpha Z_{i,t-1} + \beta' \chi_{it} + \mu_i + \varphi_{it} \quad (5.32)$$

where α is the coefficient of the lagged dependent variable.

This demonstrates that the neglect of dynamics is a special case of an omitted variable problem. The standard result of the literature on omitted variables states that the coefficients of the included explanatory variables are biased if the neglected variable is correlated with the included ones. In the case of neglected dynamics, the omitted variable contains all past values of the

explanatory variables. Therefore, consistent estimation is only viable if the explanatory variables are uncorrelated over time.

An alternative illustration of this problem can be obtained from an examination of the relation between explanatory variables and the error term. Estimation of fixed effects models by pooled OLS relies on the assumption that the explanatory variables are exogenous, i.e. uncorrelated with the error term. If the lagged dependent variable is neglected, it becomes part of the error term. By repeated substitution, the error term can be expressed as:

$$\pi_{it} = \alpha' Z_{i0} + \beta' \sum_{j=1}^{t-1} \alpha^j x_{i,t-j} + \frac{\alpha - \alpha^t}{1 - \alpha} \mu_i + \sum_{j=0}^{t-1} \alpha^j \varphi_{i,t-j} \quad (5.33)$$

It is noteworthy that this error term contains all past values of the explanatory variables x_i . In consequence, if the explanatory variables are correlated over time, then the error term is as well correlated with the current explanatory variables in equation (5.32) and there is an endogeneity problem. This leads to a bias in the estimation.

For a fixed time dimension T and a cross section dimension N that goes to infinity, the omission of dynamics may result in a substantial bias. The static fixed effects estimator is downward biased if the coefficients (β and α) are positive. It is the larger, the slower the dependent variable adjusts and the lower the serial correlation of the explanatory variables.

Hence, it is important to determine whether the dependent variable of a panel data study is generated by a static or dynamic data generating process. A first technique to detect dynamics simply consists in the estimation of a dynamic relationship (equation (5.32)) and the verification if α is significantly different from zero. Alternatively, one might estimate a static model like

(5.31) and test for serial correlation of the error term. The presence of serially correlated errors might be an evidence for the presence of dynamics.

Regardless of these considerations, the standard approach of the literature on the determinants of international reserves uses static models. We therefore, follow the standard approach by estimating a static model for international reserves demand whereas in the case of the economic growth both static and dynamic models are estimated.

Dynamic panel data estimation

The economic growth model can be expressed in a general form as

$$Z_{it} = \alpha Z_{i,t-1} + \beta' \chi_{it} + \mu_i + \varphi_{it} \quad (5.34)$$

Given the presence of the lagged dependent variable in Equation (5.34) and the possible correlation that exists between the lagged dependent variable and the unobserved country specific effects, the ordinary least squares (OLS) estimator and the fixed effects estimator are biased and inconsistent (Hsiao, 1986). In order to solve the problems of inconsistent and biased estimates, Arellano and Bond (1991) proposed a generalised method of moments (GMM) estimator based on first difference. Under this method in order to eliminate the country specific effects, first difference is taken in Equation (4.34) to obtain

$$Z_{it} - Z_{i,t-1} = \alpha(Z_{i,t-1} - Z_{i,t-2}) + \beta'(\chi_{it} - \chi_{i,t-1}) + \eta_i + (\varphi_{it} - \varphi_{i,t-1}) \quad (5.35)$$

Estimating Equation (5.35) using OLS, yields biased and inconsistent estimates for α because $Z_{i,t-1}$ and $\varphi_{i,t-1}$ are correlated by definition even if $T \Rightarrow \infty$. This therefore necessitates the use of an instrumental variable. Thus after differencing, the only valid instruments are series lagged two periods or more, assuming the residuals are not serially correlated. By further assuming

that the explanatory variables are weakly exogenous (that is, the explanatory variables are uncorrelated with future realizations of the error term), the following moment conditions employed by the GMM estimator (DIFF-GMM) can be stated:

$$\begin{aligned} E\{(\varphi_{it} - \varphi_{i,t-1})Z_{i,t-s}\} &= 0, \text{ where } s \geq 2 : t = 3, \dots, T; \\ E\{(\varphi_{it} - \varphi_{i,t-1})X_{i,t-s}\} &= 0, \text{ where } s \geq 2 : t = 3, \dots, T; \end{aligned} \quad (5.36)$$

The GMM estimator will thus be consistent in the absence of second-order serial correlation in the residuals, while the presence of the problem of weak instrument in this estimator is solved by employing the Blundell and Bond (1998) system GMM (SYS-GMM) estimator. This estimator is obtained from jointly estimating Equation (5.34) in levels and in first differences.

Data type, description and sources

The study uses time series as well as panel data for the five members of the West African Monetary Zone namely Ghana, Nigeria, Gambia, Guinea and Sierra Leone for the period 1984 to 2009. Quarterly data were collected for each of the five countries and used to estimate individual country parameters as well as the panel cointegration and the dynamic panel data estimation and analysis.

Following IMF(2003), income variable (Y) is measured by real GDP in constant 2000 US dollars, financial openness(FOp) by the ratio of external debt to GDP, openness to trade(TOp) calculated as ratio of imports plus exports to GDP, exchange rate volatility (Ev) and capital flow volatility(Cv) constructed by GARCH(1, 1) model. Opportunity cost of holding reserves (Id) by the difference between domestic and foreign interest rates. International

reserves (Fr), in US dollars, are measured by real reserves minus gold; Inflation is proxied by the respective consumer price indices (CPI). IMF relative quota is captured by using special drawing rights (SDRs). The deviation of the real exchange rate from its trend (Ed) is constructed using the Hodrick-Prescott Filter method. The real exchange rate is constructed using following formula:

*Real Exchange rate of the respective domestic currencies in terms of US Dollar = Nominal exchange rate * (US price level/Domestic price level)*

The variables $Ins_{k,i}$ and $Ins_{h,i}$, are proxied by the ratio of investment to GDP and total labour force respectively. Technological environment is captured by the contribution of FDI, in percentage, to capital formation. Financial development is measured by the ratio of broad money to GDP. Gross capital formation in constant 2000 US dollars is used as a measure of investment. Remittances refer to migrants' remittances in US dollars. All variables were transformed into natural logarithms before estimation. Thus, allowing us to interpret the coefficient estimates as elasticities.

Data were obtained from the World Bank's World Development Indicators (WDI) and from IMF's International Financial Statistics (IFS). Data on remittances, foreign direct investment and labour force were obtained from United Nations Conference on Trade and Development Statistics (UNCTADSTAT). Data on political rights and civil liberties however, have been obtained from Freedom house's annual surveys of freedom. The index of political rights and civil liberties rates countries based on the scale of 1 to 7, where 1 represents the highest degree of political rights and civil liberties and 7 the lowest. Both indexes were summed up to get one single index to capture

civil liberties and political rights. In this case 2 represents the highest degree of political rights and civil liberties and 14 the lowest. The factors that are considered in the measurement of civil liberties and political rights include electoral process, political pluralism and participation, functioning of Government, freedom of expression and belief; associational and organizational rights; rule of law; personal autonomy and individual rights. Quarterly versions of the annual series were calculated using Gandolfo (1981) statistical algorithm.

CHAPTER SIX

EMPIRICAL ANALYSIS OF THE DEMAND FOR INTERNATIONAL RESERVES

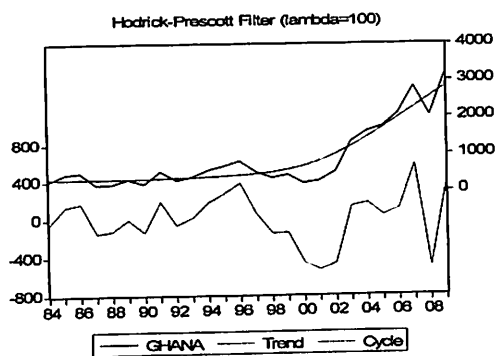
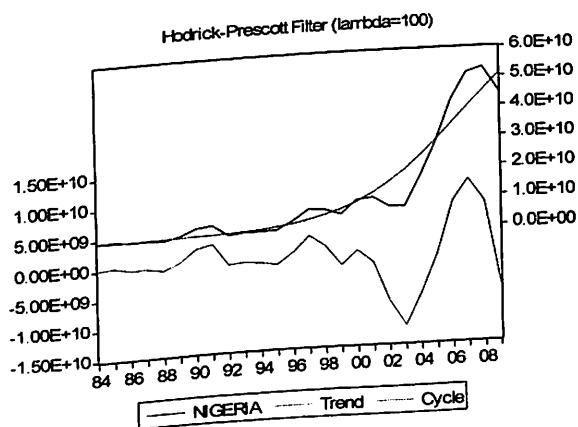
This chapter presents the estimation results as well as the analysis of the demand for international reserves. It begins by examining the extent to which the international reserves holdings of each member country of WAMZ departs from the long term trend using the Hodrick-Prescott filter method. This is followed by the results of the Augmented Dickey-Fuller unit roots tests and the Johansen Multivariate cointegration tests. The chapter also presents the analysis of the graphs derived using the LOWESS technique to show the possibility of a threshold effects in the demand for reserves. The static and dynamic panel regression estimations and the analysis of their results are also considered in this chapter.

Deviation of international reserves from the long run (optimum) levels

The Hodrick-Prescott filter approach was used to derive the long term trend of international reserves for each of the five countries and also to find out the extent to which the respective international reserves depart from their long term trends. The fine lines in Figure 29 are the long term trends whereas the fluctuations around the long term trends are the actual international reserves trends of the various countries as indicated. The bottom graphs capture the cycles. A look at the graphs shows that even though there are fluctuations, there is a general upward trend in reserves holdings. This gives some indication of a desire to add up international reserves irrespective of the

previous levels. This is what has been explained in the so-called Mrs. Machlup wardrobe theory, which has been further dealt with later in the chapter.

As can be seen from the graphs, apart from Sierra Leone which experienced relatively little fluctuations, the other countries experienced some amount of fluctuations around the long term trends indicating that in most cases reserves being accumulated either fell short or they were more than the long run values. Guinea experienced the most pronounced fluctuations implying a high rate of volatility in the reserves holdings. The periods which registered international reserves far below the optimal levels were: Ghana, 1997-2003, 2007-2008; Nigeria, 2000-2005; Gambia, 2002-2006, 2007-2008; Guinea, 2002-2006; and Sierra Leone, 1999-2005, 2005-2008. This state of affairs is not strange for developing countries such as these five, whose economies are very vulnerable to external shocks. Putting all together, it is noticeable that these countries registered international reserves which were well below the optimal levels between the period 1999/2000 and 2007/2008. This was the period that witnessed some major external shocks such as the fall in prices of some major export commodities, increase in oil prices and the financial crisis.



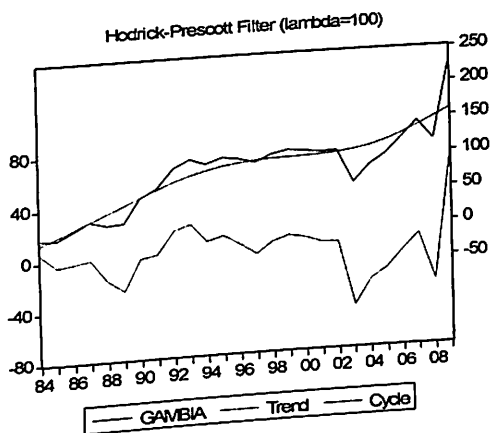
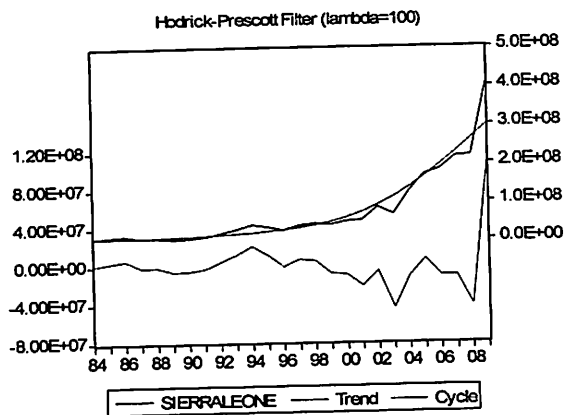
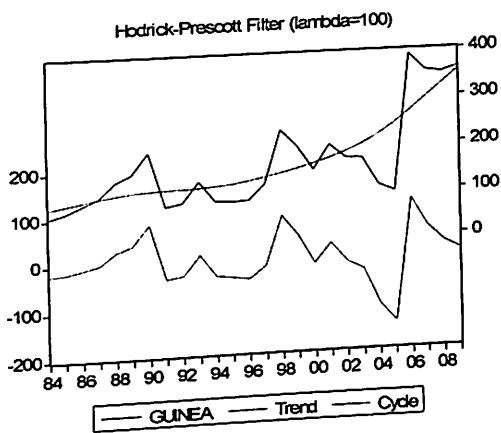


Figure 29: Deviation of international reserves from the long run (optimum) levels

Results of unit root test

Many time series are nonstationary and, in general, OLS regressions involving such variables are spurious. The presence of a unit root in the autoregressive representation of a time series leads to it being nonstationary, and such a series, being integrated of order one, $I(1)$, must be first-differenced to render it stationary or $I(0)$. Where $I(1)$ series move together and their linear combination is stationary, they are cointegrated, a meaningful long-run equilibrium exists (Granger, 1988), and there is no spurious regression problem. The information criteria were used to select the appropriate lag

length for the unit root tests and the estimation of the long run (cointegration) relations.

The results of the Augmented Dickey-Fuller test based on the individual country data shown in Appendix A indicate that almost all of the variables are non-stationary at their levels and stationary in the first difference at the 1% level of significance. This implies that almost all the variables are integrated of order one or I(1). The very few variables which fail the test have been shown in the tables and their presence in the cointegration relationship do not pose any problems since according to a number of studies such as Dawson (2005) for a cointegrating relationship to exist between n number of variables, at least $n-1$ of them must be integrated of the same order.

Measuring monetary disequilibrium

We proceed to apply the Johansen methodology for checking the presence of cointegration among the variables. The test is firstly, applied to the demand for money equation. Following the monetary approach, the first task is to estimate the monetary disequilibrium in each of the five countries. In order to measure domestic monetary disequilibrium, we need the observed demand for money equation. To measure demand for money, the set of variables include nominal money supply, M , real Gross Domestic Product, Y , nominal interest rate, I , and price, P . All variables except the interest rate are in log form. Thus,

$$\ln M = \alpha + \alpha_1 \ln Y + \alpha_2 I + \alpha_3 \ln P \quad (6.1)$$

Table 6: Ghana's estimated money demand equation

Cointegration equation			Parms		chi ²	P>chi ²
-cel	beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]
cel	InM	1				
	InP	1.05473	.3438884	3.07	0.002	.380728 1.72874
	InY	3.21769	1.053212	3.06	0.003	-.80652 7.24191
	I	-.479356	.1328573	-3.61	0.000	-.73975 -.21896
	-trend	-.174989	.0390876	-4.48	0.000	-.25160 -.09837
	_cons	-50.6260				

Table 7: Nigeria's estimated money demand equation

Cointegration equation			Parms		chi ²	P>chi ²
-cel	beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]
cel	InM	1				
	InP	1.84083	.4398976	4.18	0.000	.978653 2.70302
	InY	1.79061	.4075871	4.39	0.000	.991761 2.58947
	I	.114623	.0879968	1.30	0.193	-.05784 .287094
	-trend	-.081603				
	_cons	-72.0636				

Table 8: Gambia's estimated money demand equation

Cointegration equation			Parms		chi ²	P>chi ²
-cel			3		86.11109	0.0000
beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
cel						
InM	1					
InP	2.81780	.3769113	7.48	0.000	2.07907	3.55653
InY	2.41594	.3239817	-7.46	0.000	1.78094	3.05093
I	-.524138	.1141319	-4.59	0.000	-.74783	-.30044
-trend	-.016047					
_cons	33.4910					

Table 9: Guinea's estimated money demand equation

Cointegration equation			Parms		chi ²	P>chi ²
-cel			3		136.6081	0.0000
beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
cel						
InM	1					
InP	13.9592	7.648076	1.83	0.068	-1.0306	28.9492
InY	2.50629	.5064242	4.95	0.000	-7.4194	12.4320
I	-2.62034	.3425989	-7.65	0.000	-3.2918	-1.9488
-trend	-.055432	.0496753	-1.12	0.264	-.15279	.041928
_cons	-138.291					

The assumption of no cointegration has been rejected by both the trace and maximum eigenvalue statistics (see Appendix B). This implies that there is indeed a cointegration relationship among the variables in Equation (6.1).

The estimated long-run cointegrating relationship between money demand and its determinants is given in Table 6 to Table 10.

Table 10: Sierra Leone's estimated money demand equation

Cointegration equation			Parms		chi ²	P>chi ²
-cel	beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]
cel	InM	1				
	InP	.850965	.225484	3.77	0.000	-1.5509 3.25287
	InY	.585228	.9031366	2.88	0.002	-1.1848 2.35534
	I	-1.59364	.5769305	-2.76	0.006	-2.7244 -.46288
	-trend	-.072729	.0264076	-2.75	0.006	-.12448 -.02097
	_cons	-17.7555				

All the estimated parameters, apart from the interest rate in Nigeria, are significant at the one percent level and the signs of the coefficients are consistent with the theory that is the demand for money varies positively with income and price and negatively with the interest rate. We do not go into the model of short-run, but our ultimate goal is to estimate monetary disequilibrium and to capture its effects on reserves. Following Elbadawi (1990), the monetary disequilibrium is computed as:

Ghana

$$\ln M_{t-1} - \ln M_{t^*} = \ln M_{t-1} + 50.62606 - 3.217696 \ln Y - 1.054738 \ln P + 0.4793568 I$$

(6.2)

Nigeria

$$\ln M_{t-1} - \ln M_{t^*} = \ln M_{t-1} + 72.06362 - 1.790617 \ln Y - 1.840837 \ln P - 0.1146239I \quad (6.3)$$

Gambia

$$\ln M_{t-1} - \ln M_{t^*} = \ln M_{t-1} - 33.49103 - 2.41594 \ln Y - 2.817805 \ln P + 0.524138I \quad (6.4)$$

Guinea

$$\ln M_{t-1} - \ln M_{t^*} = \ln M_{t-1} + 138.2915 - 2.506296 \ln Y - 13.95928 \ln P + 2.60341I \quad (6.5)$$

Sierra Leone

$$\ln M_{t-1} - \ln M_{t^*} = \ln M_{t-1} + 17.75551 - 0.5852282 \ln Y - 0.850965 \ln P + 1.593646I \quad (6.6)$$

Since the monetary approach to balance of payments assumes a short run effect, the term for monetary disequilibrium does not enter into the long run cointegrating equation of demand for reserves but instead enters into the short run equation as exogenous variable.

Estimation and analysis of the international reserves functions: model 1

Equation (5.2) in chapter five is estimated to examine the long run relationship using the Johansen's methodology. The results in the tables show that the null hypothesis of no cointegration is strongly rejected for all the five countries. Both of the test-statistics (trace and max) indicate the existence of a cointegrating relationship among the variables (See Appendix C). In other words, there is a stable long run relationship among the variables.

Table 11: Ghana's estimated international reserves equation, model 1

Cointegration equation			Parms		chi ²	P>chi ²
-cel	beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]
cel	InFR	1				
	InY	92.6746	9.142198	10.14	0.000	74.756 110.593
	InTOp	1.29335	.6964272	1.86	0.063	-.0716 2.65833
	INFOp	1.67098	.7852059	2.13	0.033	.13200 3.20995
	InGP	-3.3559	.9548644	-3.51	0.000	-5.227 -1.4844
	InEv	.561000	.1632765	3.44	0.001	.24098 .881016
	InOp	-.00823	.5328236	-0.02	0.988	-1.052 1.03607
	-trend	-1.0863	.1033705	-10.5	0.000	-1.288 -.88371
	_cons	-107.80				

Table 12: Nigeria's estimated international reserves equation, model 1

Cointegration equation			Parms		chi ²	P>chi ²
-cel	beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]
cel	InFR	1				
	InY	3.90847	1.678641	2.33	0.020	.61839 7.19854
	InTOp	5.14199	1.728472	2.97	0.003	1.7542 8.52974
	INFOp	8.40657	1.296532	6.48	0.000	5.8654 10.9477
	InGP	7.21585	1.855586	3.89	0.000	3.5789 10.8527
	InEv	.095495	.2876283	0.33	0.740	-.4682 .659236
	InOp	-4.3078	1.297043	-3.32	0.001	-6.849 -1.7656
	-trend	.300289				
	_cons	-91.911				

Table 13: Gambia's estimated international reserves equation, model 1

Cointegration equation			Parms		chi ²	P>chi ²
-cel	beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]
cel						
InFR	1					
InY	10.1427	4.128058	2.46	0.014	2.0518	18.2335
InTOp	-3.6719	.7570434	-4.85	0.000	-5.155	-2.1881
INFOp	3.52457	.7488491	4.71	0.000	2.0568	4.99228
InGP	1.26054	.4215173	2.99	0.003	.43438	2.08670
InEv	-.04513	.0520096	-0.87	0.385	-.1470	.056802
InOp	-.98937	.1514013	-6.53	0.000	-1.286	-.69263
_trend	-.12374	.0365013	-3.39	0.001	-.1952	-1.7656
_cons	-221.93					

Table 14: Guinea's estimated international reserves equation, model 1

Cointegration equation			Parms		chi ²	P>chi ²
-cel	beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]
cel						
InFR	1					
InY	4.58840	2.65834	1.73	0.084	-.6218	9.7986
InTOp	.997032	.4626648	2.15	0.031	.09022	1.90383
INFOp	-1.6865	.335961	-5.02	0.000	-2.3450	-1.0280
InGP	.114353	.4552291	0.25	0.802	-.77787	1.00658
InEv	.060499	.0217389	2.78	0.005	.01789	.103106
InOp	.327202	.1829301	1.79	0.074	-.03133	.685739
_trend	-.08724					
_cons	-107.38					

Table 15: Sierra Leone's estimated international reserves equation model 1

Cointegration equation			Parms		chi ²	P>chi ²
beta	Coef.	Std. Err.	6	P>z	19621.12	0.0000
cel	[95% Conf. Interval]					
InFR	1					
InY	.130800	.0628625	2.08	0.037	.00759	.254008
InTOp	.886975	.1358349	6.53	0.000	.62074	1.15320
INFOp	.226075	.2636123	0.86	0.391	-.29059	.742745
InGP	-1.5093	.5176176	-2.92	0.004	-2.5238	-.49483
InEv	.079256	.0474628	1.67	0.095	-.0137	.172281
InOp	.350983	.3058601	1.15	0.251	-.24849	.95045

According to the normalized cointegrating equations presented in Table 11 to Table 15 for all the five countries, the income variable which measures the size of international transactions is significant and has the expected positive sign. Apart from Guinea which has the variable to be significant at 10%, all the others have theirs to be significant at either 5% or 1%. The economy size has positive relationship with reserve holdings. This result is very much consistent with theory. International transactions increase with economic size and therefore reserves are expected to increase with the real GDP. As the economy size increases more reserve holdings are required for transactions purposes.

Trade openness is positively correlated with reserve holdings in Ghana, Nigeria, Guinea and Sierra Leone. However, it is negatively correlated in the case of Gambia contrary to our expectation. Financial openness is also positively correlated with reserves holdings in Ghana, Nigeria Gambia and

Sierra Leone (even though not significant for Sierra Leone) but it is negatively correlated in the case of Guinea, contrary to expectation. The positive correlation between reserves holdings and trade and financial openness is also consistent with theoretical expectations in that reserves should be built up with the vulnerability of both real and financial external shocks such as terms-of-trade shocks and the currency and financial crises. To the extent that a country is more open in the real side as well as in the financial side, it is more vulnerable to such shocks.

Consistent with the findings of Bahmani-Oskooee, (1985), gold price has a negative relationship with international reserve holdings in Ghana and Sierra Leone. The relationship is however, positive in Nigeria, Gambia and insignificant in Guinea. It is expected that a higher price of gold will make countries feel wealthy and consequently their demand for liquidity will be less.

Exchange rate flexibility is positively related to reserve holdings in Ghana, Guinea and Sierra Leone (at 10% level). In the case of Nigeria and Gambia, the relationship is not significant even though the relationship is positive and negative respectively. In his study of India, Chakravarty (2011), using the ARDL approach to cointegration, also found that exchange rate flexibility does not have any significant impact on the reserve demand. According to Disyatat, 2001; Flood and Marion, 2002; Aizenman and Marion, 2004, a greater flexibility in the exchange rate should reduce the demand for reserves since central banks then do not need a large reserve stockpile to maintain a peg or to enhance the peg's credibility. However, central banks, in an attempt to dampen the appreciation of their currencies, may accumulate reserves (Dooley et.al 2004). The positive relationship registered in four out of

the five countries indicates the existence of the managed float system of exchange rate in these countries and the active role the central banks play in the exchange rate market. Using a panel of 136 countries and the GMM-System estimator, Bastourre et. al (2009) surprisingly, found that countries with flexible exchange rate regimes have higher ratios of reserves to GDP.

Consistent with our expectation, higher opportunity cost is negatively correlated with international reserve holdings in Nigeria and Gambia. This indicates that monetary authorities in these two countries are concerned with the cost of keeping reserves. However, in the cases of Ghana (even though it has the negative sign) and Sierra Leone opportunity cost is not significant. In the case of Guinea, the opportunity cost variable is significant but it has an unexpected positive sign. This lack of significant negative coefficient for the opportunity cost variable has been attributable to the fact that the variable may not be properly measured since the composition of reserves is not adequately reflected and that the standard measure does not take into account the cost of acquiring international currencies for building up reserves (see Flood and Marion, 2002; IMF, 2003; Aizenman and Marion, 2004). Also it is believed that when the motivation for reserves holdings is provoked by mercantilist concerns the opportunity cost tends to be insignificant. These countries may have some mercantilist motives.

Demand for international reserves: model 2

In this section, we tested to find out the effect of other variables such as capital flow volatility, export growth, deviation of the exchange rate from its long run trend, external position of the US and the IMF relative quota on

the demand for international reserves. Specifically we estimated Equation (5.3) in chapter 4 to examine the long run relationship using the Johansen's methodology. The results indicate that there is a long run stable relationship among the variables (see Appendix D).

The normalized cointegrating equations have been presented in Table 16 to Table 20. The capital flow volatility which captures the precautionary motive for holding reserves has the expected positive and significant relationship with international reserves holdings. This means that monetary authorities in these five countries hold high reserves as a precaution. This is consistent with the general thinking that developing countries with inefficient and immature financial sectors are vulnerable to the adverse effects of capital reversals and therefore should hold a high level of international reserves to reduce their vulnerability to financial crises and to boost confidence in their currencies (Aizenman et al., 2004; Feldstein, 1999).

The export growth, deviation of the exchange rate from its long run trend, external position of the US, all in one way or the other capture the mercantilist motive for holding reserves. It is expected that reserves hoarding provoked by mercantilist concerns should be associated with higher export growth rate. The export growth variable is positively correlated with international reserves in Ghana and Gambia as is expected. It is, however, negatively correlated with reserves holdings in Nigeria, Guinea and Sierra Leone.

Also the real exchange rate deviation which captures the mercantilist argument for undervalued exchange rate system is expected to have a positive relationship with international reserves holdings. This is the case in Ghana,

Nigeria and Sierra Leone and not the case in Gambia and Guinea according to the results.

Consistent with our expectation, the external position of the United States has a negative relationship with international reserves holdings for all the five countries. This indicates that the monetary authorities in these economies accumulate more reserves to mitigate appreciation of their currencies in order not to hurt their export trade (ie. not to make their exports less competitive).

Lastly, the IMF relative quota has been revealed to have a negative long run relationship with international reserves holdings. Increase in the quotas results in a decrease in reserves holdings in the long run. This finding is consistent with that of Joyce and Razo-Garcia (2010).

Table 16: Ghana's estimated international reserves equation, model 2

Cointegration equation			Parms		chi ²	P>chi ²
-cel	beta	Coef.	z	P>z	[95% Conf. Interval]	
cel		Std. Err.				
InFR	1					
InCy	.173585	.0091967	18.87	0.000	.15555	.191610
InEgr	2.53567	.3317619	7.64	0.000	1.8854	3.18591
InEd	1.53415	.2986034	5.14	0.000	.94889	2.11940
ExUS	-.00334	.000739	-4.53	0.000	-.00479	-.00189
InIMF	-.94624	.0645784	-14.6	0.000	-1.0728	-.81967

Table 17: Nigeria's estimated international reserves equation, model 2

Cointegration equation			Parms		chi ²	P>chi ²
-cel	beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]
cel	InFR	1				
	InCy	1.20569	.5018395	2.40	0.016	.22210 2.18927
	InEgr	-.08401	.0182707	-4.60	0.000	-.11982 -.04820
	InEd	2.20433	.9050139	2.44	0.015	.43054 3.97812
	ExUS	-.01780	.0074371	-2.39	0.017	-.03237 -.00322
	InIMF	-2.6954	.4227621	-6.38	0.000	-3.5240 -1.8668
	_trend	.043397	.0159084	2.73	0.006	.01221 5.07457
	_cons	-29.929				

Table 18: Gambia's estimated international reserves equation, model 2

Cointegration equation			Parms		chi ²	P>chi ²
-cel	beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]
cel	InFR	1				
	InCy	.517962	.0461819	11.22	0.000	.42744 .608477
	InEgr	5.65929	2.615602	2.16	0.030	.53281 10.7857
	InEd	-8.3279	1.330073	-6.26	0.000	-10.934 -5.7211
	ExUS	-.00642	.0016924	-3.79	0.000	-.00973 -.00310
	InIMF	-.96793	.0893246	-10.8	0.000	-1.1430 -.79286

Table 19: Guinea's estimated international reserves equation, model 2

Cointegration equation			Parms		chi ²	P>chi ²
-cel	beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]
cel		1				
InFR						
InCy	.168167	.015259	11.02	0.000	.13826	.198074
InEgr	-12.824	1.974128	-6.50	0.000	-16.694	-8.9556
InEd	-1.2688	.5557236	-2.28	0.022	-2.3580	-.17966
ExUS	-.00576	.0016857	-3.42	0.001	-.00906	-.00246
InIMF	-1.1075	.1573675	-7.04	0.000	-1.4159	-.79908

Table 20: Sierra Leone's estimated international reserves equation, model 2

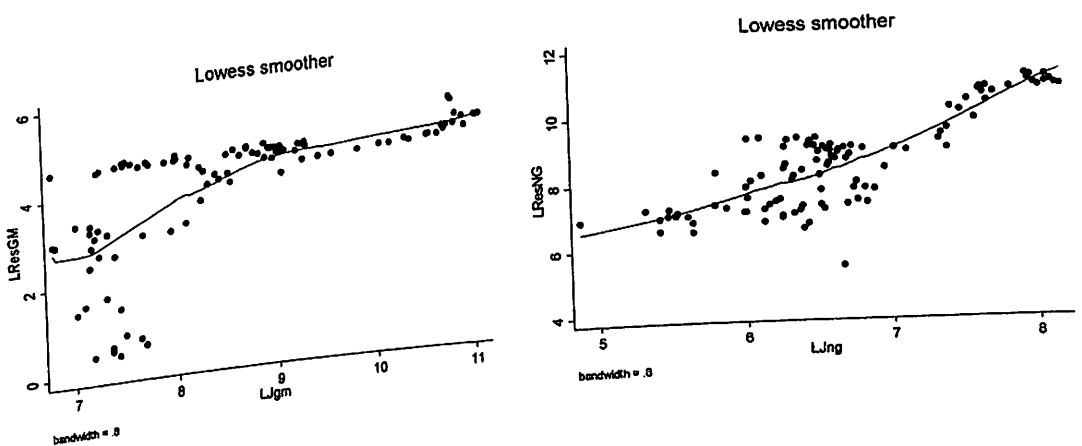
Cointegration equation			Parms		chi ²	P>chi ²
-cel	beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]
cel		1				
InFR						
InCy	.606603	.0563509	10.76	0.000	.49615	.717049
InEgr	-.86426	.2669144	-3.24	0.001	-1.3874	-.34112
InEd	3.66174	.6462334	5.67	0.000	2.3951	4.92833
ExUS	-.00454	.0021078	-2.16	0.031	-.00867	-.00041
InIMF	-1.1636	.125402	-9.28	0.000	-1.4094	-.91785

Mrs. Machlup and the Joneses argument

This section reports on the test of validity of the Mrs. Machlup wardrobe and the related Joneses argument. In the first place, the graphs showing the relationship between international reserves holdings of each of

the five countries and that of their respective Joneses derived using the LOWESS technique are reported in Figure 30. As can be seen from Figure 30, the relationship is positive indicating that increases in international reserves holdings of the Joneses lead to increases in international reserves of the respective countries and vice versa. There appears to be some level of dependence. To confirm whether there is a significant dependence on the Joneses or what is referred to as “peer” effects in reserve accumulation, we follow Pontines and Yongqiang (2011) and carry out a test using a paired data comparison such as the Wilcoxon test.

The null hypothesis of this test is that the two variables come from the same distribution with the same location, equivalent to the independence hypothesis, whereas, the alternative hypothesis is that the two variables come from two distributions of identical shape but different location, which is equivalent to the dependence hypothesis. An affirmation of the alternative hypothesis is interpreted as that the monetary authorities in the countries examined exhibit the Mrs. Machlup's wardrobe behavior.



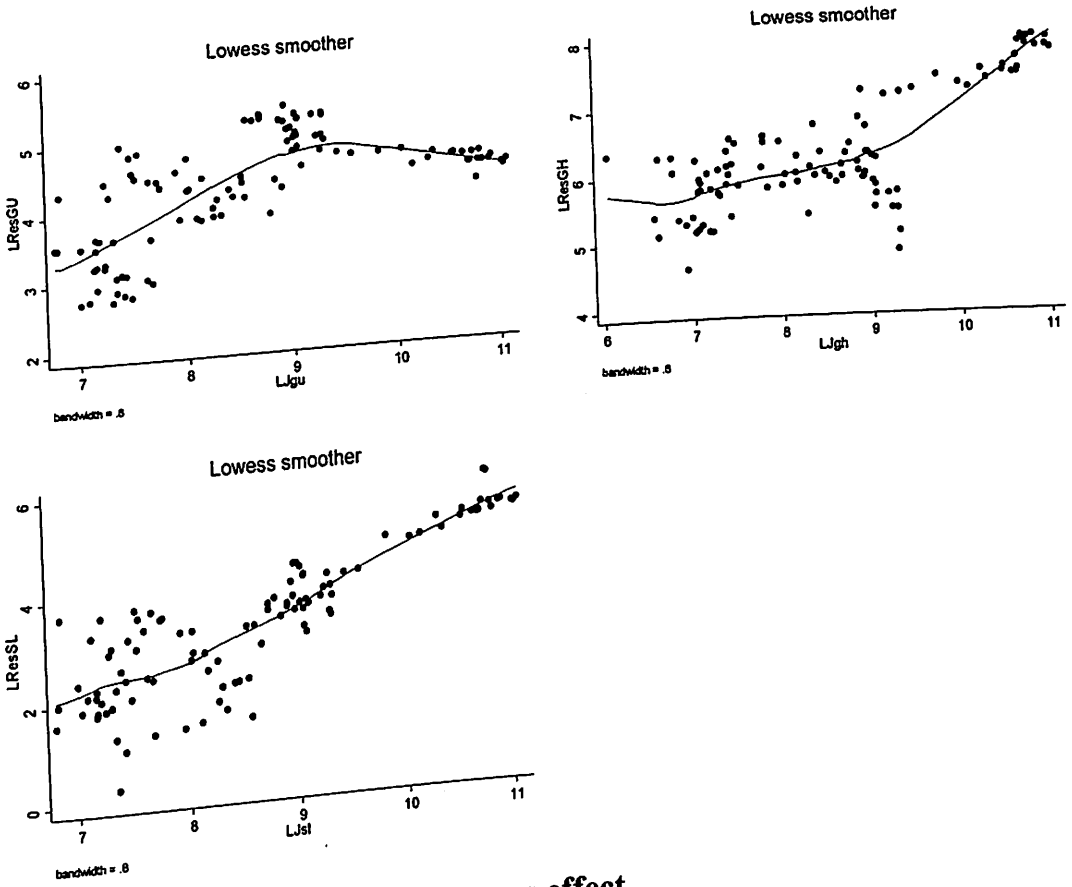


Figure 30: LOWESS Fit --- Joneses effect

Test for independence

Table 21: Ghana vrs Peers

Wilcoxon signed-rank test		sum ranks	expected
Sign	obs	1	2730
positive	1		
negative	103	5459	2730
zero	0	0	0
All	104	5460	5460

unadjusted variance 95095.00
 adjustment for ties 0.00
 adjustment for zeros 0.00
 adjusted variance 95095.00

Ho: Ghana = Peers

$$z = -8.850$$

$$\text{Prob} > |z| = 0.0000$$

Table 22: Nigeria vrs Peers

Wilcoxon signed-rank test			
Sign	obs	sum ranks	expected
positive	103	5432	2730
negative	1	28	2730
zero	0	0	0
All	104	5460	5460

unadjusted variance 95095.00

adjustment for ties 0.00

adjustment for zeros 0.00

adjusted variance 95095.00

Ho: Nigeria = Peers

$$z = 8.762$$

$$\text{Prob} > |z| = 0.0000$$

Table 23: Gambia vrs Peers

Wilcoxon signed-rank test			
Sign	obs	sum ranks	expected
positive	0	0	2730
negative	104	5460	2730
zero	0	0	0
All	104	5460	5460

unadjusted variance 95095.00
 adjustment for ties 0.00
 adjustment for zeros 0.00
 adjusted variance 95095.00

Ho: Gambia = Peers

$$z = -8.853$$

$$\text{Prob} > |z| = 0.0000$$

Table 24: Guinea vrs Peers

Wilcoxon signed-rank test		sum ranks	expected
Sign	obs		
positive	0	0	2730
negative	104	5460	2730
zero	0	0	0
All	104	5460	5460

unadjusted variance 95095.00
 adjustment for ties 0.00
 adjustment for zeros 0.00
 adjusted variance 95095.00

Ho: Guinea = Peers

$$z = -8.853$$

$$\text{Prob} > |z| = 0.0000$$

Table 25: Sierra Leone vrs Peers

Wilcoxon signed-rank test			
Sign	obs	sum ranks	expected
positive	0	0	2730
negative	104	5460	2730
zero	0	0	0
All	104	5460	5460

unadjusted variance 95095.00
 adjustment for ties 0.00
 adjustment for zeros 0.00
 adjusted variance 95095.00

Ho: Sierra Leone = Peers

$$z = -8.853$$

$$\text{Prob} > |z| = 0.0000$$

The results of the test of the independence hypothesis are reported in Table 21 to Table 25. As presented in these tables, the null hypothesis of independence is rejected in favor of the alternative of dependence. This suggests that the decision to accumulate international reserves is not independent of the decision of the relevant Joneses or 'peer' countries. This result is interpreted as providing significant empirical support to the Mrs. Machlup theory of international reserves for the case of countries of WAMZ. This confirms earlier studies by Cheung and Qian (2009), Cheung and Sengupta (2011) and Bird and Mandilaras (2010) on the validity of the Mrs. Machlup wardrobe and the related Joneses argument.

Results of panel unit root (stationarity) test

It is well-known from the time-series literature that regressions based on nonstationary data may lead to misleading inferences due to non-standard distributions of the estimators. This is the problem of spurious regression where variables are statistically significant but without economic meaning. An important result in the context of panel data is that nonstationarity is not so much a topic of concern. Phillips and Moon (1999, 2000) and Kao (1999) show that panels make it possible to obtain consistent estimators as the number of cross-section units goes towards infinity. A long-run average parameter can be estimated consistently even when each of the individual time-series regressions is spurious. The averaging over N attenuates the noise in the individual estimators and thus facilitates a consistent estimator of the mean effect. This is especially true if one uses cross-sections, pooled or averaged estimates across countries. Despite this result, we opt to consider the issue of stationarity and nonstationarity of our variables.

Although testing for unit roots in panels is recent, a number of different tests were proposed. In this study, we used Levin Levin, Lin and Chu (2002), Im, Pesaran and Shin (2003), ADF-Fisher and PP-Fisher Chi Squares tests to determine the stationary or otherwise of the variables. In comparison with unit root tests on single time-series, which lack power relative to the alternative hypothesis of a persistent but stationary process, these panel unit root tests increase the power of the test by combining information across units. The results of the panel unit root tests have been reported in Appendix F. The findings indicate that in most cases the variables are stationary only after differencing.

Analysis of the static and dynamic panel regression results

Following the standard approach, we estimate a static model for international reserves demand. For our specific analysis of a sample of countries, all mentioned considerations explained in Chapter five point to the fixed effects formulation. The sample is closed in the sense that it contains the whole population, namely all countries that make up the WAMZ. Moreover, it is likely that the individual effects are correlated with the observed explanatory variables. In other words, we are dealing with time-varying covariates.

The results of the static panel regression which are robust to disturbances being heteroscedastic and autocorrelated are shown in Table 26 and Table 27. The results in Table 26 indicate that consistent with the findings of many earlier studies, income has a positive effect on international reserves holdings. Trade openness also has the expected positive effect. Contrary to expectation, financial openness has a negative effect and opportunity cost has a positive effect. The negative effects of financial openness could be explained by the fact that financially open countries can – at least theoretically – finance a current account deficit by a capital account surplus that is by credits of the international financial market. Thus, financially open countries are expected to need fewer reserves to finance imbalances in the balance of payments or to smooth the adjustment process of the current account. The positive effect of opportunity cost on reserve holdings indicates that member countries of WAMZ would still want to keep reserves in spite of the cost in the short run. Gold price and exchange rate flexibility have the expected negative and positive effects respectively.

The results from the panel regression also show that the variables capturing the Joneses effect (*je*) and that of the monetary disequilibrium (*md*) are both significant confirming the existence of the Joneses' effect and the validity of the monetary approach to balance of payments. The small size of the coefficient of the monetary disequilibrium which is less than one infers that the central banks in these countries take measures to (at least partly) correct the money market disequilibrium by changing rate of the interest rate and domestic credit and does not leave the correction completely to the market forces (induced reserve flows) to restore the equilibrium.

Table 26: Static model - model 1

Fixed-effects (within) regression		Number of obs = 520				
Group variable: country		Number of groups = 5				
R-sq: within = 0.5740		Obs per group: min = 104				
F(8,507) = 85.39						
Prob > F = 0.0000						
	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
lfr						
ly	1.097368	.0307555	35.68	0.000	1.037088	1.157647
ltop	.1991934	.0158748	12.55	0.000	.1680793	.2303076
lfop	-1.603724	.0836049	-19.18	0.000	-1.767587	-1.439862
lgp	-2.01156	.202289	-9.94	0.000	-2.408039	-1.61508
lev	.0513385	.0155844	3.29	0.001	.0207937	.0818833
lop	.9727877	.0762675	12.75	0.000	.8233061	1.122269
je	.46006	.0546854	5.02	0.000	.1674192	.381781
md	.0229931	.0018598	12.36	0.000	.019348	.0266383
_cons	4.667554	1.149492	4.06	0.000	2.414591	6.920517

The results in Table 27 indicates that for the panel as a whole the mercantilist motive is the overriding factor as far as the demand for international reserves is concerned in the short run. There is an attempt to prevent the domestic currencies from appreciating in order to enhance export competitiveness. This is indicated by the significant positive relationship between international reserves holdings and the deviation of the exchange rate from its long term trend and also the negative relationship between international reserves holdings and the external balance of the United States. The IMF relative quotas have the expected negative sign in the short run. Capital flow volatility is seen to be insignificant in the short run even though has the expected positive sign.

Table 27: Static model -model 2

Fixed-effects (within) regression						
Group variable: country						
R-sq: within = 0.7866						
F(7,510) = 375.96						
Prob > F = 0.0000						
					Number of obs = 520	
					Number of groups = 5	
					Obs per group: min = 104	
	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
lfr						
exus	-.0068987	.001077	-6.41	0.000	-.0090095	-.0047878
legr	-.1680463	.1297762	-1.29	0.195	-.422403	.0863103
led	.1490101	.0229247	6.7	0.000	-.2879143	.5859345
lcv	.0156569	.0224855	0.70	0.486	-.0284138	.0597276
limf	-.0551712	.0136531	-4.04	0.000	-.0819307	-.0284117
je	.1265456	.0483074	2.62	0.009	.0318648	.2212264
md	.0032979	.0017763	1.86	0.063	-.0001837	.0067794
_cons	-3.719831	1.089445	-3.41	0.001	-5.855104	-1.584558

The empirical tests also point to dynamics in the level of reserves. The results from the dynamic specifications which are robust to disturbances being heteroscedastic and autocorrelated are presented in Table 28 and Table 29. As expected, the lagged level of reserves is highly significant in both specifications. The coefficients of the lagged endogenous variable (γ) are 0.94 for Model 1 and 0.73 for Model 2. The coefficient of adjustment, which equals $(1 - \gamma)$, is very low in each case. This means that the Central banks adjust the level of reserves over a long time period.

The results from the dynamic panel regression also show that the variables capturing the Joneses effect (je) and that of the monetary disequilibrium (md) are both significant confirming the earlier results of the existence of the Joneses' effect and the validity of the monetary approach to balance of payments.

The dynamic model in Table 29 indicates a significant positive relationship between international reserves holdings and the deviation of the exchange rate from its long term trend and also an insignificant negative relationship between international reserves holdings and the external balance of the United States. These results confirm the earlier one that there is some attempt to prevent the domestic currencies from appreciating in order to enhance export competitiveness. The IMF relative quotas have the expected negative sign even though not significant in this case.

Table 28: Dynamic model - model 1

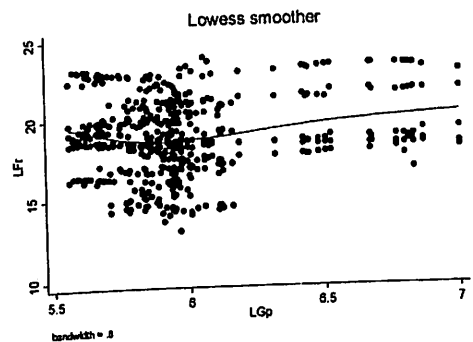
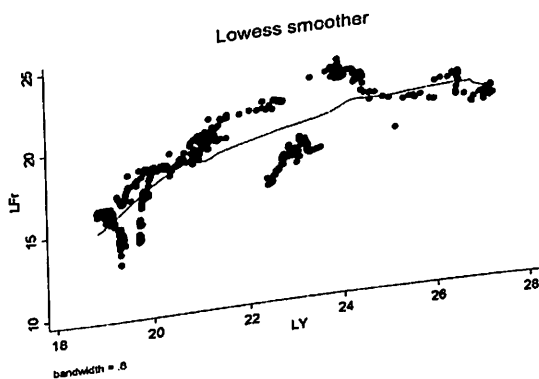
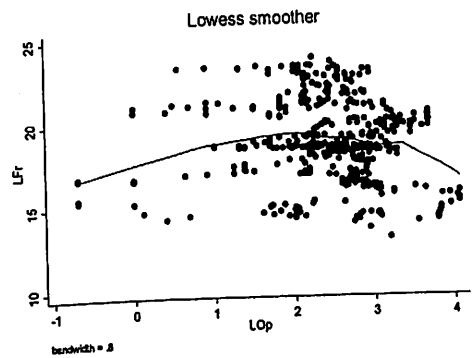
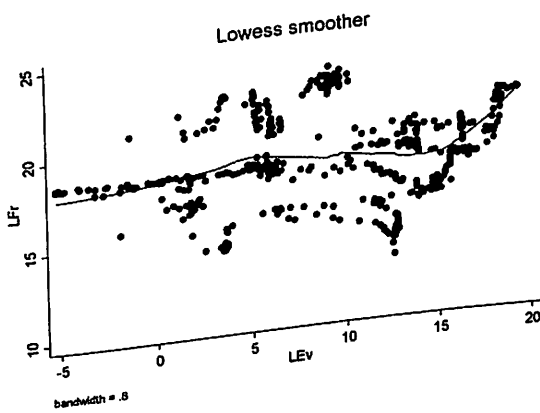
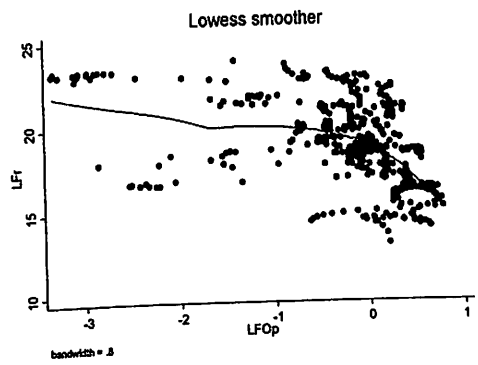
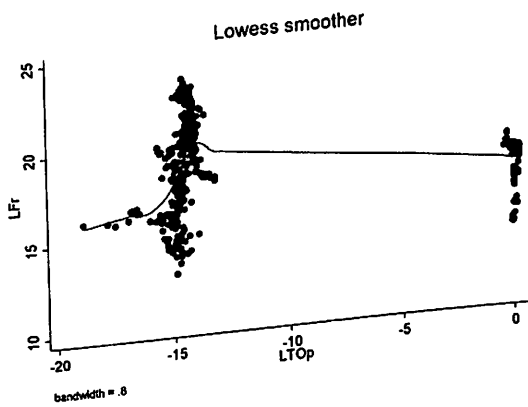
System dynamic panel-data estimation				Wald chi ² (9)	= 14920.29	
lfr	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
Prob > chi ² = 0.0000						
lfr						
L1.	.9382174	.0117408	79.91	0.000	.9152058	.961229
ly	.039447	.0150124	2.63	0.009	.0100232	.0688707
ltop	-.0068575	.0064128	-1.07	0.285	-.0194262	.0057113
lfop	-.0349003	.0264168	-1.32	0.186	-.0866763	.0168758
lgp	-.0297367	.0524636	-0.57	0.571	-.1325636	.0730901
lev	-.007873	.0044079	-1.79	0.074	-.0165123	.0007663
lop	.0265524	.0209516	1.27	0.205	-.0145119	.0676168
je	.0344268	.0146682	2.35	0.019	.0056776	.063176
md	.0023334	.0010783	2.16	0.030	.0002199	.0044469
_cons	.2396871	.3313115	0.72	0.469	-.4096715	.8890456

Table 29: Dynamic model - model 2

System dynamic panel-data estimation				Wald chi 2(8)	= 1224.49	
lfr	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
Prob > chi ² = 0.0000						
lfr						
L1.	.7343233	.0269399	27.26	0.000	.6815221	.7871246
exus	-.0001441	.0005229	-0.28	0.783	-.001169	.0008808
legr	-.0532517	.0497828	-1.07	0.285	-.1508241	.0443208
led	.2978427	.0941841	3.16	0.002	.1132453	.4824401
lcv	.0106262	.0095856	1.11	0.268	-.0081611	.0294136
limf	-.0093157	.0085435	-1.09	0.276	-.0260606	.0074292
je	.1016256	.0268913	3.78	0.000	.0489195	.1543316
md	.004191	.0013696	3.06	0.002	.0015067	.0068754
_cons	-1.571751	.4719014	-3.33	0.001	-2.496661	-.6468416

Panel threshold effects --- LOWESS technique

It is quite clear from the graphs that all the variables are possible threshold variables in the demand for international reserves in the West African Monetary Zone. There is the possibility of a threshold effect in the demand for international reserves in the WAMZ. In other words, the relationship could be non-linear. Again, these results could be subjected to further tests to concretely establish the non-linearity in the demand for international reserves in the WAMZ.



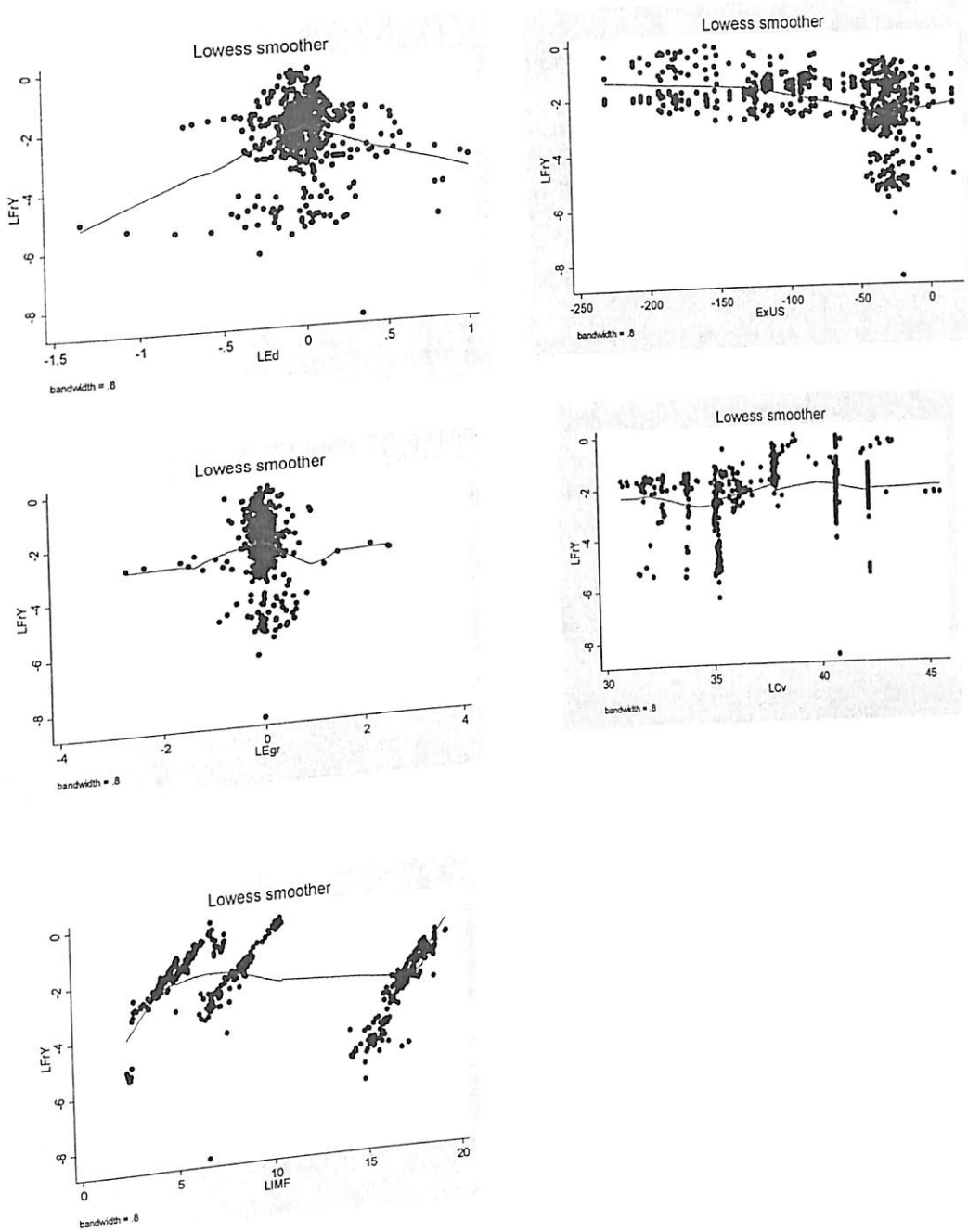


Figure 31: LOWESS Fit --- Panel

Panel threshold effects --- Panel regression analysis

In this section, quadratic functions are formulated and estimated in order to test for the existence of the threshold effects in the demand for international reserves. The results as indicated in Table 30 confirm the existence of a threshold effect in the demand for international reserves in the West African Monetary Zone. The squared terms of income, exchange rate

flexibility and opportunity cost are all significant. International reserves holdings in the WAMZ has an inverted U-shaped relationship with income meaning that at lower levels of income the relationship is positive but at higher levels the relationship tends to be negative. This result is consistent with earlier studies such as Choi and Baek (2008) and Bastourre et. al (2009). Some explanation given to this result is that at higher levels of income monetary authorities become more confident in the economy and therefore would tend to keep lower levels of reserves.

Exchange rate flexibility is seen to have a U-shaped relationship with international reserves holdings. This implies that at lower levels of exchange rate the relationship is negative while at higher levels the relationship tends to be positive. This aptly describes the situation in the WAMZ since the exchange rate system prevailing in the Zone is a managed float system where monetary authorities intervene in the exchange rate market occasionally to prevent excessive exchange rate volatility. The central banks would therefore, need to hold more reserves to do that when the exchange rate goes beyond a certain threshold. This result is contrary to that of Choi and Baek (2008) who found an inverted U-shaped relationship. According to their findings at lower level of exchange rate the relationship is positive while at higher levels it is negative meaning that less flexible exchange rate system would require more reserves and more flexible exchange rate system would require lower reserves. Their result could be understandable in the sense that the data they used concentrated more on advanced countries or countries which have operated flexible exchange rate system for a long time.

Another threshold variable is the opportunity cost which has an inverted U-shaped relationship meaning that at lower levels of opportunity cost monetary authorities would be willing to hold more reserves but when the opportunity cost increases beyond a certain threshold they would be prepared to reduce their holdings of reserves. Trade openness, financial openness and the price of gold are not significant threshold variables.

The results also show that the variables capturing the Joneses effect (*je*) and that of the monetary disequilibrium (*md*) are both significant confirming the earlier results of the existence of the Joneses' effect and the validity of the monetary approach to balance of payments.

In the second model in Table 31, the results indicate that the external balance of the United States and the IMF relative quota exhibit some points of inflexion in the demand for international reserves. Exports growth and the deviation of exchange rate from its long term trends also confirm the existence of threshold effects. Export growth has a U-shaped relationship with international reserves holdings meaning that lower levels of exports are associated with lower reserves while higher levels are associated with higher reserves. The deviation of exchange rate from its long term trend exhibits an inverted U-shaped relationship with reserves holdings. This implies that within a certain threshold the monetary authorities would be willing to hold more reserves to register some level of exchange rate undervaluation to enhance export competitiveness. These results give credence to the mercantilist motives for holding reserves in the WAMZ. The squared term of capital flow volatility is not significant meaning that capital flow volatility is not a significant threshold variable.

Table 30: Non-linear model 1

Fixed-effects (within) regression		R-sq: within = 0.6474				
F(14,501)	= 65.71					
Prob > F	= 0.0000					
	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
lfr	5.742635	1.046766	5.49	0.000	3.686042	7.799228
ly						
ltop	.0212212	.4244167	0.05	0.960	-.8126346	.855077
lfop	-.4443041	.1196769	-3.71	0.000	-.6794346	-.2091736
lgp	-2.952963	3.113285	-0.95	0.343	-9.069666	3.16374
lev	-.1039489	.0200771	-5.18	0.000	-.1433946	-.0645033
lop	.9091045	.1214063	7.49	0.000	.6705762	1.147633
je	.4848442	.0520558	9.31	0.000	.3825697	.5871187
md	.0688142	.0272105	2.53	0.012	.0153534	.1222749
ly ²	-.1166322	.0209874	-5.56	0.000	-.1578664	-.075398
ltop ²	.0080124	.0138758	0.58	0.564	-.0192495	.0352743
lfop ²	-.0341633	.041415	-0.82	0.410	-.1155319	.0472052
lgp ²	.1819696	.2534328	0.72	0.473	-.3159524	.6798915
lev ²	.0029362	.001176	2.50	0.013	.0006256	.0052467
lop ²	-.1804578	.0281019	-6.42	0.000	-.2356698	-.1252457
_cons	-42.21043	14.46857	-2.92	0.004	-70.63697	-13.78389

Table 31: Non-linear - model 2

Fixed-effects (within) regression		R-sq: within = 0.8055				
F(10,505)	=209.14					
Prob > F	= 0.0000					
lfr	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
exus	-.0017928	.0013191	-1.36	0.175	-.0043844	.0007988
legr	-.0190206	.0558641	-0.34	0.734	-.1287754	.0907342
led	.2574289	.095811	2.69	0.007	.0691917	.445666
lcv	-.0642886	.2259182	-0.28	0.776	-.5081438	.3795666
limf	.7172145	.0526966	13.61	0.000	.6136829	.8207462
exus ²	-.0000139	6.19e-06	-2.25	0.025	-.0000261	-1.79e-06
legr ²	.069448	.0330616	2.10	0.036	.0044927	.1344032
led ²	-.9393118	.1531399	-6.13	0.000	-1.240181	-.6384421
lcv ²	.0006888	.0029145	0.24	0.813	-.0050373	.0064149
limf ²	.0057523	.0018989	3.03	0.003	.0020215	.009483
_cons	-9.18358	4.37359	-2.10	0.036	-17.77625	-.5909078

Summary

This chapter presented an analysis of the demand for international reserves for each of the five member countries of WAMZ as well as the WAMZ as a group/panel. The Hodrick-Prescott filter method was used to determine the extent to which international reserves holdings of each member country departs from the long term trend. A look at the graphs shows that even though there are fluctuations, there is a general upward trend in reserves holdings. This gives some indication of a desire to add up international reserves irrespective of the previous levels. This is what has been explained in the so-called Mrs. Machlup wardrobe theory. The results also indicated that

reserves holdings of these countries fluctuate around the long term trend with Guinea's situation being much more pronounced implying that there is a high rate of volatility in Guinea's reserve holdings.

Since the estimates involved the use of time series data they were first subjected to the unit root test to determine whether they were stationary or otherwise. The Augmented Dickey-Fuller test results revealed that almost all the variables were I(1) series (non-stationary) in levels but became I(0) (stationary) after first-differencing. The Johansen multivariate cointegration technique was used to determine whether there is a stable long run relationship among the variables. The results indicated that the variables were cointegrated ie. there exists a stable long run relationship among the variables for each of the member countries. International reserves holdings are driven by economy size, trade openness, financial openness, opportunity cost, price of gold and exchange rate flexibility and that the mercantilist motives as well as the precautionary motives are the main drivers in the long run. The LOWESS technique was used to show the nature of the relationship between international reserves holdings and each of the factors identified. The results indicated the existence of a possible threshold effects in the demand for international reserves.

The static as well as the dynamic panel data estimations found monetary disequilibrium significant and therefore supporting the validity of the monetary approach to the balance of payments. The results also confirmed the existence of the Joneses effect as well as the threshold effect in the demand for international reserves. The results meant that Mrs. Machlup wardrobe and the related Joneses argument were valid and that there is a non-linear

relationship in the demand for international reserves. Income was found to have an inverted U-shaped relationship, exchange rate flexibility a U-shaped relationship, opportunity cost an inverted U-shaped relationship, Export growth a U-shaped relationship and the deviation of exchange rate from its long term trend, an inverted U-shaped relationship. Trade openness, financial openness and the price of gold were not found to be significant threshold variables. The results also gave credence to the mercantilist motives for holding reserves in the WAMZ.

CHAPTER SEVEN

EFFECTS OF INTERNATIONAL RESERVES ACCUMULATION ON ECONOMIC GROWTH

This chapter presents the estimation results and the analysis of the effects of international reserves accumulation on economic growth. It begins with a look at the basic descriptive statistics of the two main variables, gross domestic product and international reserves. This is followed by the results of the Johansen Multivariate cointegration tests. The issues about panel cointegration tests are also dealt with. The chapter also presents the analysis of the graphs derived using the LOWESS technique to show the possibility of a threshold effects in economic growth-international reserves nexus. The static as well as the dynamic panel regression estimations and the analysis of their results are also considered in this chapter.

Basic descriptive statistics

Table 32 to Table 34 present the basic descriptive statistics of the two main variables, gross domestic product and international reserves, over the full sample. The basic descriptive statistics for the panel are however presented in Appendix G. To determine the normality of the distributions of the two variables, the Jarque-Bera normality tests have been performed and the results are also reported in the tables. For a variable to be normally distributed, the Jarque-Bera normality test statistic should not be significant.

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Table 32: Basic descriptive statistics for Gross Domestic Product (in logs)

Country	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera Normality Test
Ghana	21.295	0.37717	1.0467	0.14610	51.246 [0.0000]**
Nigeria	23.815	0.43615	0.29642	-0.78152	6.8305 [0.0329]*
Gambia	20.131	0.28359	0.40926	-0.71964	10.007 [0.0067]**
Guinea	22.959	0.30414	-0.25027	-1.1155	12.619 [0.0018]**
Sierra Leone	21.042	2.1455	1.0965	-0.15610	84.667 [0.0000]**

Notes: Statistical significance at the 1%, 5%, levels is indicated by **, *, respectively.

Table 33: Basic descriptive statistics for Per Capita Gross Domestic Product (in logs)

Country	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera Normality Test
Ghana	5.5307	0.16331	0.59260	-0.613119	3.6620[0.1602]
Nigeria	5.9252	0.13930	0.62153	-0.19108	2.3943[0.3021]
Gambia	5.7907	0.038172	-0.065773	-0.93266	0.62412[0.7319]
Guinea	5.8892	0.081784	0.15287	-1.5581	8.2551[0.0161]*
Sierra Leone	5.3956	0.18584	-0.71493	-0.56910	6.0402[0.0488]*

Notes: Statistical significance at the 1%, 5%, levels is indicated by **, *, respectively.

Table 34: Basic Descriptive Statistics for International Reserves (in logs)

Country	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera Normality Test
Ghana	20.110	0.82534	0.49636	-0.62203	12.542[0.0019]**
Nigeria	22.293	1.3567	0.28581	-0.86930	8.0244 [0.0181]*
Gambia	17.799	1.2329	-1.7172	1.9066	160.63[0.0000]**
Guinea	18.133	0.72851	-0.61406	-0.51696	18.090[0.0001]**
Sierra Leone	17.209	1.2552	0.044138	-0.70150	1.9846 [0.3707]

Notes: Statistical significance at the 1%, 5%, levels is indicated by **, *, respectively.

All the five countries reject the normality assumption for the GDP whereas in the case of per capita GDP the normality assumption is rejected for only two countries, Guinea and Sierra Leone. This means that the GDP in all the five countries are not normally distributed whereas in the case of per capita GDP that of Guinea and Sierra Leone are not normally distributed as depicted in Table 32 and Table 33. In the case of international reserves accumulation, except that of Sierra Leone all the rest are not normally distributed. This, to some extent, confirms the analysis on the deviation of international reserves from its long term trend reported in Chapter 6.

Moreover, in most of these countries except Guinea, the distributions of GDP are right-skewed (positively skewed). This means that apart from Guinea the larger values of GDP vary more than the lower and that the majority of values are less than the mean. In the case of per capita GDP, the distributions are right-skewed (positively skewed) for Ghana, Gambia and Guinea whereas that of Nigeria and Sierra Leone are left-skewed (negatively skewed). Concerning international reserves, three countries, Ghana, Nigeria

and Sierra Leone have the distributions of their international reserves being right-skewed implying that the majority of values are less than the mean whereas Gambia and Guinea have theirs being left-skewed (negatively skewed) meaning that the majority of values are greater than the mean.

Results of the cointegration tests

The results of the cointegration tests in the tables show that the null hypothesis of no cointegration is strongly rejected for all the five countries. Both of the test-statistics (trace and max) indicate the existence of a cointegrating relationship among the variables. In other words, there is a stable long run relationship among the variables (see the tables in Appendix E). The normalized cointegration equations are shown in Table 35 to Table 39.

Table 35: Ghana's estimated economic growth equation

Equation	Parms	chi2	P>chi2			
_cel	8	208.7289	0.0000			
Identification: beta is exactly identified						
Johansen normalization restriction imposed						
beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
_cel	1					
ly						
lfr	1.491211	.5761862	2.59	0.010	.361907	2.620515
lcpr	17.83618	2.842937	6.27	0.000	12.26413	23.40823
llab	169.7354	32.83343	5.17	0.000	105.383	234.0877
lrmt	.5813665	.1952646	2.98	0.003	.1986549	.9640781
lm2y	1.110162	2.481679	0.45	0.655	-3.75384	5.974163
lfdi	5.339849	1.410536	3.79	0.000	2.575249	8.104448
ltop	.7999021	1.004308	0.80	0.426	-1.168505	2.768309
lgcf	1.589561	1.111154	1.43	0.153	-.5882595	3.767382
_trend	-1.464838					
_cons	-2575.346					

Table 36: Nigeria's estimated economic growth equation

Equation	Parms		chi2		P>chi2	
_cel	8		186.1526		0.0000	
Identification: beta is exactly identified						
Johansen normalization restriction imposed						
beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
_cel						
ly	1					
lfr	.5432963	.0633681	8.57	0.000	.4190972	.6674954
lcpr	-2.118944	.2455721	-8.63	0.000	-2.600256	-1.637632
llab	16.75232	2.515269	6.66	0.000	11.82249	21.68216
lrmt	.2447626	.0384254	6.37	0.000	.1694503	.3200749
lm2y	-1.229267	.2835359	-4.34	0.000	-1.784987	-.6735466
lfdi	-.2645625	.0623224	-4.25	0.000	-.3867122	-.1424128
ltop	-.6257061	.2158729	-2.90	0.004	-1.048809	-.202603
lgcf	.3752352	.1027699	3.65	0.000	.17381	.5766604
_trend	-.100826					
_cons	-305.2681					

Table 37: Gambia's estimated economic growth equation

Equation	Parms		chi ²		P>chi ²	
_cel	8		199.4706		0.0000	
Identification: beta is exactly identified						
Johansen normalization restriction imposed						
beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
_cel						
ly	1					
lfr	.0356822	.004782	7.46	0.000	.0263097	.0450548
lcpr	.0808174	.0115193	7.02	0.000	.0582399	.1033949
llab	-1.414149	.2263284	-6.25	0.000	-1.857744	-.9705534
lrmt	.0046847	.0047061	1.00	0.320	-.0045392	.0139086
lm2y	.0333229	.0423906	0.79	0.432	-.0497611	.1164068
lfdi	.0960364	.0311708	3.08	0.002	.0349428	.15713
ltop	.0113493	.0339685	0.33	0.738	-.0552278	.0779264
lgfc	.0247875	.0075778	3.27	0.001	.0099352	.0396398
_trend	-.0011932					
_cons	-4.542505					

Table 38: Guinea's estimated economic growth equation

Equation	Parms		chi ²		P>chi ²	
_cel	8		762.7251		0.0000	
Identification: beta is exactly identified						
Johansen normalization restriction imposed						
beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
_cel						
ly	1					
lfr	.5275677	.1680136	3.14	0.002	.198267	.8568684
lcpr	.3526534	1.568256	0.22	0.822	-2.721073	3.426379
llab	4.510855	.6795917	6.64	0.000	3.17888	5.84283
lrmt	.1224085	.0359815	3.40	0.001	.051886	.192931
lm2y	.3792783	.0971388	3.90	0.000	.1888898	.5696668
lfdi	-1.334514	.1228905	-10.86	0.000	-1.575375	-1.093654
ltop	.8427353	.250854	3.36	0.001	.3510704	1.3344
lgfc	-.4882208	.3541342	-1.38	0.168	-1.182311	.2058694
_cons	-55.41642	13.00975	-4.26	0.000	-80.91506	-29.91778

Table 39: Sierra Leone estimated economic growth equation

Equation	Parms		chi ²		P>chi ²	
_cel	8		467.119		0.0000	
Identification: beta is exactly identified						
Johansen normalization restriction imposed						
beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
_cel						
ly	1					
lfr	1799164	.0250869	7.17	0.000	.130747	.2290858
lcpr	.711321	.1225386	5.80	0.000	.4711497	.9514923
llab	-1.05764	.2808883	-3.77	0.000	-1.608171	-.5071095
lrmt	-.0340046	.0091923	-3.70	0.000	-.0520211	-.0159881
lm2y	.4880965	.0935765	5.22	0.000	.3046899	.6715031
lfdi	.3502103	.0737029	4.75	0.000	.2057552	.4946654
ltop	.1046079	.0836519	1.25	0.211	-.0593469	.2685627
lgfc	-.4751901	.0428684	-11.08	0.000	.5592107	-.3911696
_trend	.0022442					
_cons	-6.41641					

From the economic growth cointegration equations (Table 35 to Table 39), foreign reserves holdings have positive relationship with economic growth in all the five countries. Labour force impacts positively on economic growth in Ghana, Nigeria and Guinea. It however, impacts negatively on economic growth in Gambia and Sierra Leone in the long run. High population growth and the dominance of unskilled labour may be the reason. Labour force is revealed as the dominant factor either promoting or retarding growth in the WAMZ which is not strange.

Remittances correlate positively with economic growth in Ghana, Nigeria and Guinea. Even though, remittances are positively related to economic growth in Gambia, the relationship is not significant whereas in Sierra Leone, the relationship is significantly negative. One possible reason for the case in Sierra Leone may be that these resources mainly go into consumption and not channeled into investment to propel growth.

Foreign direct investments have significant positive relationship with economic growth in Ghana, Gambia and Sierra Leone whereas in Nigeria and Guinea, the relationship is unexpectedly negative. As shown in the study by Alfaro (2003), the negative effect of foreign direct investment on economic growth is possible if foreign direct investments are concentrated in the primary sector instead of the manufacturing sector. Financial development impacts positively on economic growth in Ghana, Gambia, Guinea and Sierra Leone although in Ghana and Gambia it is not significant. Nigeria, however, registers negative relationship between financial development and economic growth in the long run.

Trade openness exerts a significant positive impact on economic growth in Guinea. In Ghana, Gambia and Sierra Leone even though, the relationship between trade openness and economic growth is positive, it is insignificant. The relationship is however, negative for Nigeria. Gross capital formation also has a significant positive correlation with economic growth in Nigeria and Gambia and insignificant positive correlation in Ghana. The relationship is unexpectedly negative in the case of Sierra Leone and not significant in Guinea.

Contrary to expectation, the variable capturing civil liberties and political rights has a significant positive relationship with economic growth in Ghana, Gambia, Sierra Leone and positive but insignificant in Guinea meaning that expansion of civil liberties and political rights reduces economic growth. This result is however not too strange as Barro (1996) has shown that the relationship between political freedoms and economic growth could be non-linear with the explanation that at low levels of political rights, an expansion of these rights stimulates economic growth. However, once a moderate amount of democracy has been attained, a further expansion reduces growth. In Nigeria, the relationship is significantly negative as expected meaning that expansion of civil liberties and political rights boosts economic growth. It should be noted that the civil liberties and political rights indexes are constructed such that lower values indicate expansion of civil liberties and political rights and higher values indicate curtailment of civil liberties and political rights. Therefore, a negative relationship is expected between economic growth and civil liberties and political rights.

According to the normalized cointegrating equations presented in Table 35 to Table 39, international reserves accumulation leads to economic growth in all the five countries. The results indicate that 1% increase in reserves increases economic growth by 1.49% in Ghana, 0.54% in Nigeria, 0.04% in Gambia, 0.52% in Guinea and 0.18% in Sierra Leone in the long run. This result is consistent with that of Polterovich and Popov (2003) and Fukuda and Kon (2010). Holding foreign reserves would be an important tool for stimulating economy in these countries. This could be the intention of manipulating the exchange rate or the self-insurance for currency crisis. According to the arguments put forward by Polterovich and Popov (2003) international reserves accumulation may bring about economic growth through increased exports, investment and increased inflow of foreign direct investment. Fukuda and Kon(2010) also, argue that international reserves accumulation may lead to economic growth through increased investment.

Panel regression analysis

According to the static and dynamic panel regression results which are robust to disturbances being heteroscedastic and autocorrelated shown in Table 40 and Table 42, international reserves accumulation has a positive correlation with economic growth (measured by GDP growth) in both the static and the dynamic models. However, the relationship is not significant in the dynamic model. Promotion of more civil liberties and political rights also boost economic growth. Labour force and gross capital formation have the expected positive effects on economic growth. Remittances have negative relationship with economic growth in the static model whereas in the case of

the dynamic model, the relationship is positive. Trade openness has negative relationship with economic growth. Whereas financial development and foreign direct investment have positive effects on economic growth in the static model, they are not significant in the dynamic model.

The relationship between economic growth measured by GDP per capita growth and international reserves is negative as shown in Table 41 and Table 43. This means that the accumulation of international reserves decreases GDP per capita growth. The coefficient of the lagged dependent variable in the dynamic models is significant and less than one. This result thus far shows evidence of uniform convergence in this group of similar countries. This result supports the findings of earlier researchers such as Lee *et al.*, 1997; Islam, 1995; Chua, 1992 who used cross-sectional and pooled cross-section time series and Abdullahi and Suardi (2007) who used system GMM and difference GMM estimators although they found conditional convergence.

Table 40: Economic Growth (GDP) equation- Static panel regression

Fixed-effects (within) regression		R-sq: within =0.7902				
F(8,507)	= 238.65					
Prob > F	= 0.0000					
ly	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
lfr	.0319179	.0098336	3.25	0.001	.0125983	.0512375
lcpr	-.0979371	.0239329	-4.09	0.000	-.144957	-.0509173
llab	.5773923	.0925638	6.24	0.000	.3955365	.7592481
lrmt	-.0122857	.0042781	-2.87	0.004	-.0206906	-.0038807
lm2y	.058624	.0129735	4.52	0.000	.0331355	.0841125
lfdi	.044281	.010928	4.05	0.000	.0228112	.0657508
ltop	-.0917928	.0160951	-5.70	0.000	-.1234141	-.0601715
lgcf	.1151591	.0162812	7.07	0.000	.0831722	.147146
_cons	9.764743	1.164607	8.38	0.000	7.476694	12.05279

Table 41: Estimated economic growth (GDP per Capita) equation- static panel regression

Fixed-effects (within) regression			R-sq: within = 0.5347			
F(8,507)	=	72.83				
Prob> F	=	0.0000				
lyp	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
lfr	-.0234822	.0057655	-4.07	0.000	-.0348094	-.0121549
lcpr	-.0795979	.014032	-5.67	0.000	-.107166	-.0520298
llab	.1430197	.0542709	2.64	0.009	.0363962	.2496431
lrmt	-.0118349	.0025083	-4.72	0.000	-.0167628	-.006907
lm2y	.0188451	.0076065	2.48	0.014	.0039009	.0337892
lfdi	.0418254	.0064072	6.53	0.000	.0292375	.0544133
ltop	.0327875	.0094367	3.47	0.001	.0142477	.0513274
lgcf	.0485332	.0095458	5.08	0.000	.0297791	.0672874
_cons	1.469626	.6828179	2.15	0.032	.1281247	2.811126

Table 42: Estimated economic growth (GDP) equation- dynamic panel regression

System dynamic panel-data estimation						
Wald chi2(9)	=	151054.14				
Prob> chi2	=	0.0000				
ly	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
ly						
L1.	.8946339	.0077175	115.92	0.000	.879508	.9097598
lfr	.0018243	.0023542	0.77	0.438	-.0027898	.0064383
lcpr	-.012359	.0056542	-2.19	0.029	-.0234411	-.001277
llab	.1068225	.0103489	10.32	0.000	.0865391	.1271059
lrmt	.0020552	.0009399	2.19	0.029	.000213	.0038974
lm2y	-.0004855	.001707	-0.28	0.776	-.0038311	.00286
lfdi	-.0016616	.0023929	-0.69	0.487	-.0063516	.0030284
ltop	-.0393952	.0033649	-11.71	0.000	-.0459903	-.0328002
lgcf	.0252157	.0039886	6.32	0.000	.0173981	.0330333
_cons	.1848705	.0793305	2.33	0.020	.0293856	.3403554

Table 43: Estimated economic growth (GDP per capita) equation-

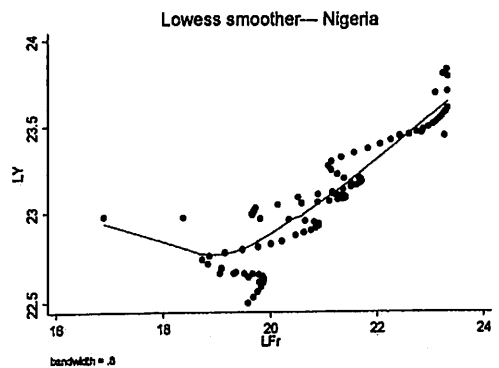
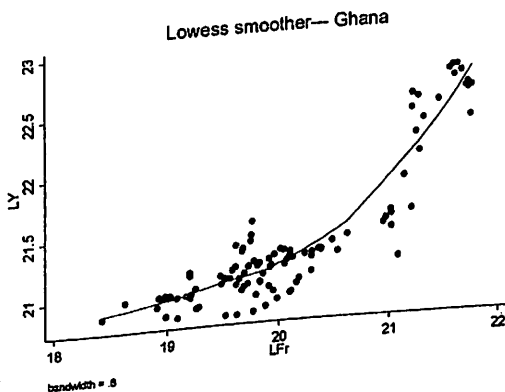
dynamic panel regression

System dynamic panel-data estimation
 Wald chi2(9) = 21860.49
 Prob> chi2 = 0.0000

lyp	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
lyp						
L1.	.9218801	.0102149	90.25	0.000	.9018592	.941901
lfr	-.0046901	.0016949	-2.77	0.006	-.0080121	-.0013682
lcpr	.006633	.0042552	1.56	0.119	-.001707	.014973
llab	.0060032	.0048584	1.24	0.217	-.003519	.0155255
lrmt	.000397	.0006924	0.57	0.566	-.0009601	.0017542
lm2y	-.002726	.0014344	-1.90	0.057	-.0055374	.0000854
lfdi	.0089449	.0024082	3.71	0.000	.0042248	.0136649
ltop	-.0017426	.0014637	-1.19	0.234	-.0046114	.0011262
lgcf	.0091158	.0027852	3.27	0.001	.0036569	.0145747
_cons	-.0129713	.046706	-0.28	0.781	-.1045134	.0785709

Possibility of threshold effects in economic growth-international reserves

nexus—LOWESS technique



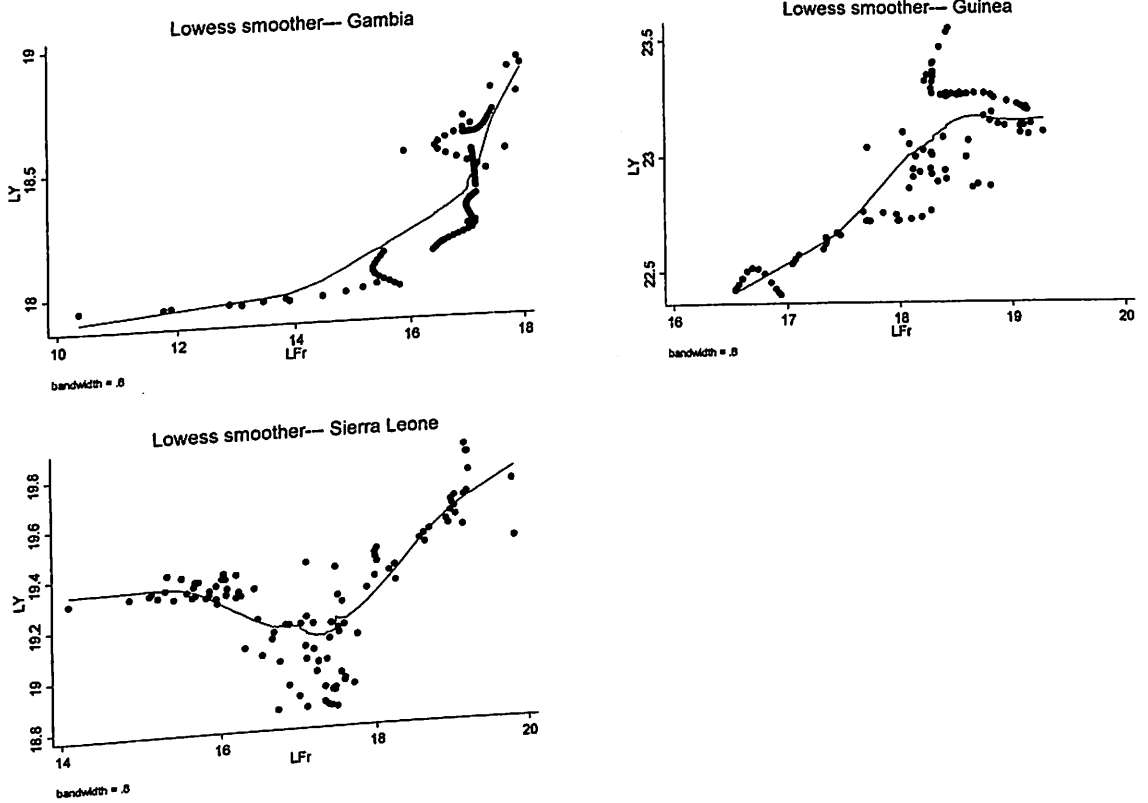


Figure 32: Relationship between economic growth and international reserves --- LOWESS Fit

An examination of the graphs reveals the possibility of threshold effects in the relationship between economic growth and international reserves accumulation in Nigeria, Guinea, and Sierra Leone. In Nigeria and Sierra Leone, there is clearly a U-shaped relationship meaning that international reserves accumulation initially retards growth but later on promotes it. In the cases of Ghana and Gambia, it is not quite clear.

To confirm or reject the non-linearity in the relationship between economic growth and international reserves for the panel as a whole, we incorporated a squared term of international reserves in the growth model. In the non-linear model of the economic growth shown in Table 44 to Table 47, the squared term of foreign exchange reserves is significant implying that there is indeed a threshold effect in the relationship. The result is the same for

both the static and dynamic regressions. There is a U-shaped relationship between international reserves accumulation and economic growth in the WAMZ. In other words, international reserves accumulation initially causes a decrease in economic growth(both GDP and GDP per capita) but after a certain threshold it increases economic growth.

The U-shaped nature of the curve may be explained by the fact that at the initial stages, international reserves accumulation may fuel inflation because of increase in supply of money, and also may increase interest rates because of possible sterilization measures monetary authorities may put in place such as sale of government bonds, causing a decrease in economic growth but after some time when some critical amount of reserves are accumulated then it may give a strong signal to prospective foreign investors about the financial health of the economy and about the falling/lower prices of domestic assets in dollar terms (because the build up of reserves underprices the exchange rate), resulting in increased inflow of foreign direct investment. Even more important is probably the demonstration effect – the ability of authorities to accumulate reserves for a considerable period of time is taken as a sign of the government credibility and consistency of its policy. Also, the attainment of that critical amount of reserves may be enough to cause a significant exchange rate undervaluation to enhance export competitiveness bringing about exports growth. The cumulative effects of these may outweigh any negative effect of inflation and interest rates thereby bringing about long term economic growth.

This threshold effect established in the relationship between economic growth and international reserves is new to the literature on economic growth

and international reserves. Although, Polterovich and Popov (2003) and Fukuda and Kon (2010) studied the relationship between economic growth and international reserves, they did not attempt to find out the possibility of a threshold effect in the relationship as this study has done.

Table 44: Estimated economic growth (GDP) --- static panel non-linear

model 1

Fixed-effects (within) regression			R-sq: within = 0.8365			
F(9,506)	=	287.72				
Prob > F	=	0.0000				
	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
ly						
lfr	-.5098827	.0460517	-11.07	0.000	-.6003588	-.4194065
lcpr	-.0789242	.0212042	-3.72	0.000	-.1205833	-.0372651
llab	.7835165	.0835703	9.38	0.000	.6193289	.9477041
lrmt	-.0141746	.003783	-3.75	0.000	-.0216068	-.0067423
m2y	.0235083	.011831	1.99	0.047	.0002644	.0467522
lfdi	.032016	.009709	3.30	0.001	.012941	.051091
ltop	-.1572455	.0152335	-10.32	0.000	-.1871741	-.1273169
lgcf	.1147002	.0143845	7.97	0.000	.0864396	.1429609
lfr ²	.0153367	.0012802	1.98	0.000	.0128216	.0178519
_cons	11.6862	1.041355	11.22	0.000	9.64029	13.73211

Table 45: Estimated economic growth (GDP per capita) --- static panel

non-linear model 2

Fixed-effects (within) regression			R-sq: within= 0.6359			
F(9,506)	=	98.20				
Prob> F	=	0.0000				
	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
lyp						
lfr	-.3386375	.0270606	-12.51	0.000	-.3918025	-.2854725
lcpr	-.0685384	.0124599	-5.50	0.000	-.0930178	-.044059
llab	.2629182	.049107	5.35	0.000	.1664394	.359397
lrmt	-.0129336	.0022229	-5.82	0.000	-.0173009	-.0085663
lm2y	-.0015811	.006952	-0.23	0.820	-.0152395	.0120773
lfdi	.0346911	.0057052	6.08	0.000	.0234824	.0458998
ltop	-.0052851	.0089514	-0.59	0.555	-.0228715	.0123014
lgcf	.0482663	.0084525	5.71	0.000	.03166	.0648726
lfr ²	.0089211	.0007522	11.86	0.000	.0074432	.010399
_cons	2.587302	.6119137	4.23	0.000	1.385097	3.789506

Table 46: Estimated economic growth (GDP) --dynamic panel non-linear model 1

System dynamic panel-data estimation						
Wald chi ² (10)	=	153823.65				
Prob> chi ²	=	0.0000				
	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
ly						
ly						
L1.	.8635975	.0086165	100.23	0.000	.8467094	.8804856
lfr	-.1196395	.0156812	-7.63	0.000	-.1503741	-.0889049
lcpr	-.0111065	.0056064	-1.98	0.048	-.0220948	-.0001181
llab	.1416321	.0111763	12.67	0.000	.1197269	.1635372
lrmt	.0023089	.0009322	2.48	0.013	.0004819	.0041359
lm2y	-.0020022	.0017015	-1.18	0.239	-.0053371	.0013327
lfdi	-.0036278	.0023784	-1.53	0.127	-.0082893	.0010338
ltop	-.0543295	.003842	-14.14	0.000	-.0618598	-.0467993
lgcf	.0275119	.0039614	6.95	0.000	.0197477	.0352761
lfr ²	.0033795	.0004315	7.83	0.000	.0025337	.0042253
_cons	1.391907	.1730691	8.04	0.000	1.052698	1.731117

Table 47: Estimated economic growth (GDP per capita) --- dynamic panel non-linear model 2

System dynamic panel-data estimation						
Wald $\chi^2(10) = 22002.05$						
Prob> $\chi^2 = 0.0000$						
lyp	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
lyp						
L1.	.9082077	.0112791	80.52	0.000	.886101	.9303143
lfr	-.0321366	.0099493	-3.23	0.001	-.0516368	-.0126363
lcpr	.007199	.0042467	1.70	0.090	-.0011244	.0155225
llab	.0057044	.0048453	1.18	0.239	-.0037923	.015201
lrmt	.0004229	.0006898	0.61	0.540	-.0009291	.001775
lm2y	-.0029724	.0014316	-2.08	0.038	-.0057783	-.0001665
lfdi	.0089672	.0024012	3.73	0.000	.004261	.0136735
ltop	-.002965	.0015242	-1.95	0.052	-.0059523	.0000223
lgcf	.0102571	.002798	3.67	0.000	.0047732	.015741
lfr ²	.0007556	.00027	2.80	0.005	.0002264	.0012848
_cons	.2707319	.1114002	2.43	0.015	.0523916	.4890722

Analysis of panel cointegration tests results

Since the main objective of this study is to find the effect of international reserves accumulation on economic growth, we try to isolate international reserves and examine its long term effect on economic growth in a panel setting using the Westerlund error correction model.

Table 48: Economic growth and international reserves – panel cointegration

Results for H0: no cointegration

With 5 series and 1 covariate

Average AIC selected lag length: 2.4

Average AIC selected lead length: 0

Staistic	Value	Z-value	P-value
Gt	-3.449	-3.044	0.001
Ga	-34.595	-7.630	0.000
Pt	-6.152	-1.663	0.048
Pa	-12.673	-1.392	0.082

Long run Coefficients

Country	Coefficient of International Reserves
Ghana	0.4893 (0.0240308)**
Nigeria	0.0266 (0.0058245)**
Gambia	0.0232 (0.0043301)**
Guinea	0.1111 (0.0116565)**
Sierra Leone	0.1199 (0.0119893)**

“**” significant at 1%. In the parenthesis are the standard errors.

The results of the cointegration tests indicate a rejection of the null hypothesis of no cointegration in favour of cointegration. This means that there is a stable long run relationship between economic growth and international reserves. The long run coefficients also indicate that international reserves accumulation impacts positively on economic growth as postulated by Polterovich and Popov (2003) and Fukuda and Kon (2010). A 10% percent

increase in international reserves would increase economic growth by about 4.9% in Ghana, 0.3% in Nigeria, 0.2% in Gambia, 1.1% in Guinea and 1.2% in Sierra Leone in the long run.

Undervaluation of the currency associated with reserves accumulation stimulates the increase in exports. This increase in exports raises accumulated knowledge due to the learning by doing externality and therefore economic productivity as well. Undervaluation also, increases prices of tradables in local currency and increases profits (business savings) because wages and prices for non-tradables lag behind the growth of prices of tradable goods. Investment therefore increases as a result. The rate of growth rises and this more than compensates the potential gain from spending reserves for current needs.

Also, undervaluation lowers foreign currency prices of domestic real assets and thus attracts foreign direct investment. Technologically backward countries on obvious reasons have much more to gain from export externality and from the inflow of foreign direct investment. That is why benefits of reserve accumulation should be especially promising for developing countries.

Summary

The chapter mainly looked at the effects of international reserves accumulation on economic growth in the five countries of the West African Monetary Zone. An examination of the basic descriptive statistics of the two main variables of interest, gross domestic product and international reserves for each of the five countries indicated that the gross domestic products for all the five countries are not normally distributed. In the case of international reserves, except that of Sierra Leone, all the rest are not normally distributed.

The results of the cointegration tests indicated that there is a positive long run relationship between economic growth and international reserves for all the five countries meaning that accumulation of international reserves promotes economic growth as postulated by Polterovich and Popov (2003) and Fukuda and Kon (2010). The static panel regression analysis and the panel cointegration tests also confirmed that international reserves accumulation promotes economic growth, a result which is consistent with that of Polterovich and Popov (2003) and Fukuda and Kon (2010).

Finally, the results from the LOWESS technique as well as the non-linear models (both static and dynamic) indicated the existence of the threshold effects in the economic growth-international reserves nexus. A U-shaped relationship between economic growth and international reserves was established, a result which is new to the literature on economic growth and international reserves.

CHAPTER EIGHT

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This last chapter of the thesis covers the summary and conclusions of the study. It also considers the recommendations based on the findings of the study and lastly the limitations of the study.

Summary of the study

Regional alliances are common in Sub-Saharan Africa (SSA), and there are substantial initiatives to promote integration as a means of stimulating economic development. Given the importance of monetary integration to the economic development of the West African sub-region, the Authority of Heads of State and Government of the Economic Community of West African States (ECOWAS) in 1975 created the West African Clearing House (WACH) as a payment mechanism to facilitate intra-regional trade within the sub-region. In 1986 WACH was restructured and metamorphosed into the West African Monetary Agency (WAMA) with an expanded mandate of promoting trade liberalization and monetary cooperation. In addition, it is expected to ensure the establishment of a single monetary zone by creating the necessary conditions leading to the implementation of uniform monetary policy and creation of a single currency.

In furtherance of the monetary integration initiatives, the Authority of Heads of State and Government at the Abuja (Nigeria) Summit in 1987 adopted the ECOWAS Monetary Cooperation Programme (EMCP). The main objective is to achieve a harmonised monetary system through the observance of a set of macroeconomic convergence criteria that would ultimately result in

the strengthening of the economies of member states. One of the convergence criteria of the West African Monetary Zone (comprising Ghana, Nigeria, Gambia, Guinea and Sierra Leone) was that the gross reserves of each country should be at least three months import cover by the end of 2000 and six months by the end of 2003. The attainment of this criterion has been very challenging if not difficult for member countries. Member countries are striving to build up more reserves in order to meet the criterion.

The crave for international reserves accumulation even in the face of challenges associated with low investment, culminating in low economic growth in the sub-region brings to mind new questions to be answered by international macroeconomics literature. There appears to be some peer pressure on each member country to meet this criterion and to keep up with the other members of the monetary zone. Common to every economic phenomenon, these developments have earned the praises of many as they equally have drawn severe criticisms from others who question the rationale for building reserves in the face of crippling domestic economic activities and high incidence of poverty in these countries. This study therefore sought to find out (i) the factors that have influenced the accumulation of international reserves in the WAMZ (ii) the extent to which the international reserves of these countries depart from their respective optimal levels (iii) whether there is a threshold effect in the demand for international reserves (iv) the effect of international reserves accumulation on economic growth and (v) whether there is a threshold effect in the international reserves-economic growth nexus.

The review of the empirical literature on the demand for international reserves revealed a number of possible factors that might influence reserve

holdings. These included: economy size, payment variability, openness, opportunity cost, money supply and monetary disequilibrium, exchange rate variability, gold price, IMF quota and external position of the United States.

While some of the studies revealed the precautionary motive as the main driver of international reserve holdings others revealed the mercantilist motive as the major driver. There were some others which showed the two motives as driving the demand for international reserves. A number of the studies also tested the validity of the monetary approach to balance of payments, the Mrs. Machlup Wardrobe and the related Joneses argument and found them to be valid.

From the review of the growth literature, the variables identified included: investment; human capital; government policies and macroeconomic conditions (such as inflation, government investment, government consumption); financial system; openness; political factors; technological progress; institutional framework; and socio-cultural/demographic factors. However, none of the studies reviewed apart from Polterovich and Popov (2003), Fukuda and Kon(2010) and to some extent Elhiraika and Ndikumana (2007) found out the relationship between international reserves and economic growth. International reserves variable did not appear in any of the growth equations estimated by the reviewed studies at all not to talk about the possibility of a threshold effect in the international reserves-economic growth nexus. This current study therefore has helped expand the frontier of knowledge by finding out the effect of international reserves hoarding on economic growth and also the possibility of a threshold effect in the international reserves–growth nexus.

In terms of the adequacy of international reserves, the analysis, based on the three standard measures indicates that the Gambia's international reserves position is the strongest of all the five countries whereas Guinea's position is the weakest. The Hodrick-Prescott filter method was used to determine the extent to which international reserves holdings of each member country departs from the long term trend. A look at the graphs shows that even though there are fluctuations, there is a general upward trend in reserves holdings. This gives some indication of a desire to add up international reserves irrespective of the previous levels. This is what has been explained in the so-called Mrs. Machlup wardrobe theory. The results also indicated that reserves holdings of these countries fluctuate around the long term trend with Guinea's situation being much more pronounced implying that there is a high rate of volatility in Guinea's reserve holdings.

Using quarterly data from 1984 to 2009 and parametric as well as non-parametric estimation methods, the study estimated international reserves demand functions and economic growth functions. Since the estimates involved the use of time series data they were first subjected to the unit root test to determine whether they were stationary or otherwise. The Augmented Dickey-Fuller test results revealed that almost all the variables were I(1) series (non-stationary) in levels but became I(0) (stationary) after first-differencing. The Johansen multivariate cointegration technique was used to determine whether there is a stable long run relationship among the variables. The results indicated that the variables were cointegrated ie. there exists a stable long run relationship among the variables for each of the member countries. International reserves holdings are driven by economy size, trade openness,

financial openness, opportunity cost, price of gold and exchange rate flexibility and that the mercantilist as well as the precautionary motives are the main drivers in the long run. The external position of the US and IMF relative quotas have negative effects on the demand for international reserves in the long run.

The LOWESS technique was used to show the nature of the relationship between international reserves holdings and each of the factors identified. The results indicated the existence of a threshold effects in the demand for international reserves. The static and the dynamic panel data estimations and analysis confirmed the existence of the Joneses effect as well as the threshold effect in the demand for international reserves. The results meant that Mrs. Machlup wardrobe and the related Joneses argument were valid and that there is a non-linear relationship in the demand for international reserves. Income was found to have an inverted U-shaped relationship, exchange rate flexibility a U-shaped relationship, opportunity cost an inverted U-shaped relationship, export growth a U-shaped relationship and the deviation of exchange rate from its long term trend, an inverted U-shaped relationship. Trade openness, financial openness and the price of gold were not found to be significant threshold variables. The results also gave credence to the mercantilist motives for holding reserves in the WAMZ.

The validity of the monetary approach was also confirmed by the static as well as the dynamic panel regression analysis. The small size of the coefficient which is less than one infers that the central banks in these countries take measures to (at least partly) correct the money market disequilibrium by changing rate of the interest rate and domestic credit and

does not leave the correction completely to the market forces (induced reserve flows) to restore the equilibrium. The dynamic panel estimations of the demand for international reserves indicate that the coefficient of adjustment, which equals $(1 - \gamma)$, is very low. This means that the Central banks adjust the level of reserves over a long time period.

The results of the Johansen multivariate cointegration tests as well as the panel cointegration tests indicated that there is a positive long run relationship between economic growth and international reserves for all the five countries meaning that accumulation of international reserves promotes economic growth. The result is consistent with that of Polterovich and Popov (2003) and Fukuda and Kon(2010).

Finally, the results from the LOWESS technique as well as the non-linear models indicated the existence of the threshold effects in the economic growth-international reserves nexus. A U-shaped relationship between economic growth and international reserves was established, a result which is quite new to the literature on economic growth and international reserves.

Conclusions

The conclusions that are/can be drawn from the study are as follows:
Based on the three standard measures of international reserves adequacy Gambia's international reserves position is the strongest of all the five countries whereas Guinea's position is the weakest. Also, the analysis of the data shows that by integrating their economies culminating in the establishment of the monetary zone and a single currency may strengthen the economy of the zone. All the advantages that go with the accumulation of

adequate reserves could be gained. The analysis of the graphs for the entire monetary zone in terms of the three standard benchmarks reveals that if the five countries succeed in pooling their resources together to form the monetary union it may be very beneficial to the member countries. The reserves position of the zone will meet all the three standard benchmarks. The economy of WAMZ may be able to withstand any current account shocks, such as a fall in the price of a country's main export which is a major problem facing low income countries including the countries of WAMZ. The economy of WAMZ may also not be vulnerable to capital account crisis and may be in the position to avert any currency crisis and engender a lot of confidence in the economy of the WAMZ and the single currency, the ECO, which they wish to introduce.

There is a stable long run relationship among international reserves, economy size, trade openness, financial openness, opportunity cost, price of gold and exchange rate flexibility. There is also a long run relationship among international reserves, capital flow volatility, export growth, deviation of exchange rate from its long run trend, external sector of the US and IMF relative quota. The IMF relative quotas have a negative long run relationship with international reserves holdings. The mercantilist motives as well as the precautionary motives are the main drivers of international reserves holdings in the long run.

The monetary approach to the balance of payments is valid and that domestic monetary policy affects the level of reserves. Excess demand for (supply of) money leads to an increase (decrease) in reserves. The central banks in these countries take measures to (at least partly) correct the money market disequilibrium by changing rate of the interest rate and domestic credit

and does not leave the correction completely to the market forces (induced reserve flows) to restore the equilibrium. Also, the Central Banks adjust the level of reserves over a long time period. This is indicated by the very low values of the coefficients of adjustment.

There is the existence of the Joneses effect as well as the threshold effect in the demand for international reserves. The Mrs. Machlup wardrobe and the related Joneses argument were valid. Thus, the 'peer group' effect on international reserve accumulation is not unique to the East Asian economies explored in Cheung and Qian (2009) and Latin American economies explored in Cheung and Sengupta (2010). There is a non-linear relationship in the demand for international reserves in the West African Monetary Zone.

There is a positive long run relationship between economic growth and international reserves for all the five countries meaning that accumulation of international reserves promotes economic growth. There is the existence of the threshold effects in the economic growth-international reserves nexus. There is a U-shaped relationship between economic growth and international reserves, a result which is new to the literature on economic growth and international reserves.

Policy implications and recommendations

Using three measures of reserve adequacy, the analysis shows that individual member countries of WAMZ do not stand in a somewhat comfortable zone with the existing stock of reserves. Member countries need to keep sufficient amount of international reserves to avoid any unnecessary financial calamity, to meet its external debt obligations, to ensure a healthy

rating of its creditworthiness and overall macroeconomic stability. Accumulating more reserves will promote investments, enhance export competitiveness and promote export-led growth. It also has the potential of driving in more foreign direct investment with its attendant technology transfers thereby speeding up growth and development.

Also, much more efforts and energy should be put in to speed up the integration process culminating in the establishment of the monetary zone and a single currency. This may strengthen the economy of the zone. All the advantages that go with the accumulation of adequate reserves could be gained. The economy of WAMZ may be in a better position to withstand any current account shocks, such as a fall in the price of a country's main export which is a major problem facing low income countries including the countries of WAMZ. The economy of WAMZ may also not be vulnerable to capital account crisis and may be in the position to avert any currency crisis and engender a lot of confidence in the economy of the WAMZ.

The empirical Joneses effect points to some interesting policy issues. For instance, it is believed, in general, that holding international reserves incurs a net economic cost. In that case, the competitive hoarding behavior implied by the observed Joneses effect is likely to inflate the cost of holding international reserves for the countries of WAMZ. This is because the competitive behavior pushes the demand for international reserves above levels justified by standard economic fundamentals. While the behavior may be a rational one from an individual economy's point of view, it may not necessarily be an optimal scenario for all economies as a group. If the economies could instead co-ordinate their international reserve accumulation

policies and alleviate or even eradicate the motivations underlying the competitive behavior, then they could maintain an optimal level of international reserves to smooth out trade and capital account variations instead of competing with their peers. Such a co-operation strategy could bring down individual economies' costs of holding international reserves. The resultant cost saving could have some implications for economic development in these countries. Member countries of WAMZ should therefore work harder to bring into being the monetary union and the common currency. This would promote the level of cooperation among member countries and help to reduce the opportunity cost associated with reserves accumulation.

Although the central banks are responding actively to the disequilibrium in domestic money market, the size of response is relatively small and still more than half of the disequilibrium is corrected by the inflows of international reserves. It seems advisable that the central banks should increase the size of their operations to correct domestic disequilibrium. The main reason behind this is that it does not seem reasonable to leave the domestic monetary disequilibrium on the mercy of highly volatile international inflows. Also, the favourable evidence for the monetary approach to the balance of payments is very important for a country with managed floating exchange rate regime. Because it is possible that persistent monetary disequilibrium in the domestic money market may neutralize the serious efforts of the central banks to restore payments equilibrium. In other words, persistent distortions on the national money market may counteract any reasonable effort to bring the balance of payments back to equilibrium.

The general proposal to increase the role of special drawing rights (SDRs) in the international monetary system by increasing their allocations and/or making these allocations more frequent is not new and has been the subject of debate and discussion since before the spate of multiple crises in the 1990s. The important point to include in this debate is that if countries are indeed self-insuring, then an additional argument could be made for further SDR allocations. Such allocations could improve both the quantity as well as the quality of reserves in the developing world. That is, further allocations would limit the need to hold excessive reserves and lower the deadweight losses from such a strategy. However, the prospects for a one-off SDR allocation let alone further regular allocations are presently dim. Since any allocation would primarily create benefits for those countries that presently do not have as much access to the international capital markets, there is stronger support for it among developing countries. In fact, for many industrial countries, SDR allocations would be irrelevant, considering that they have adequate access to international capital at much the same cost. Our results suggest that one way to reduce the build-up of international reserves would be to raise the relative quota holdings of the developing countries. This study therefore reiterates and supports the call for increasing SDR allocations for developing countries and making the allocations more frequent.

The mercantilist motives as well as the precautionary motives are the main drivers of international reserves holdings in the long run. This result suggests that the monetary authorities are holding reserves for both mercantilist and precautionary purposes or as self-insurance against future crises as well as enhancing export competitiveness to increase exports. To

reduce the impact of a crisis, and increase export competitiveness it is advisable or recommended that the monetary authorities of WAMZ hold high levels of reserves.

Finally, the convergence criterion that member countries of WAMZ should accumulate reserves is in the right direction and makes a lot of economic sense since it promotes economic growth in the long run. The study therefore, recommends that international reserves be used as a tool to promote economic growth in the West African Monetary Zone. The policy makers should put in place appropriate policy measures that will help promote a sustained increase in the reserve holdings of the countries of WAMZ. For instance, the international reserves build up could be financed – either through a government budget surplus or via money printing, or through the accumulation of debt. In the short term, it may adversely affect economic growth but in the long term economic growth would be promoted since international reserves accumulation would send a good signal that would attract foreign direct investments and also increase exports. The membercountries of WAMZ should therefore, not reduce their foreign reserves because reserves accumulation really helps the economic growth.

Limitations of the study

The study used quarterly data to do the estimation. Some of the variables which did not have quarterly series had to be interpolated using Gandolfo (1981) statistical algorithm. The results from this approach, even though generally acceptable and reliable might not be comparable to or more efficient than the results from using the actual quarterly data to do the

estimation. Also, the data for some of the variables of some countries (Guinea especially) were either missing or not up to date. Period average growth rates of such variables were employed to generate the missing ones. This might have affected the quality of some results. Overall, these limitations could not have affected the general outcome of the study in any significant way.

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APPENDICES

APPENDIX A

Unit root test results (individual countries)

Ghana

Variables in levels	Lag Length	t-statistic	Variables in first differences	t-statistic
lnM	4	-2.778	DlnM	-4.526**
lnP	4	-1.814	DlnP	-4.060**
lnY	5	-0.6484	DlnY	-7.357**
I	3	-2.030	DI	-7.088**
lnFR	4	-2.168	DlnFR	-4.278**
lnTOP	5	-2.808	DlnTOP	-4.884**
lnFOP	4	-1.327	DlnFOP	-5.307**
lnOP	3	-2.372	DlnOP	-5.737**
lnGP	4	0.3482	DlnGP	-3.655**
lnEv	3	-1.747	DlnEV	-5.872**
lnIMF	4	-2.110	DlnIMF	-4.242**
Egr	8	-3.999*	DEgr	-5.715**
lnCv	5	-3.197	DlnCv	-6.001**
lnEd	3	-2.937	DlnEd	-4.176**
ExUS	2	-0.7760	DExUS	-6.595**
lnCpr	4	-3.167	DlnCpr	-5.023**
lnLab	0	3.109	DlnLab	-4.033*
lnRmt	1	-3.578*	DlnRmt	-6.486**
lnM2Y	0	-1.800	DlnM2Y	-5.833**
lnFDI	0	-0.4248	DlnFDI	-4.338**
lnGCF	3	-2.153	DlnGCF	-4.286**

Note: "*" and "**" indicate significance at 5% and 1% level of significance respectively.

Nigeria

Variables in levels	Lag Length	t-statistic	Variables in first differences	t-statistic
lnM	4	-2.833	DlnM	-4.802**
lnP	1	-0.7942	DlnP	-6.501**
lnY	1	-1.791	DlnY	-4.877**
I	4	-1.415	DI	-5.982**
lnFR	4	-2.747	DlnFR	-4.527**
lnTOP	4	-2.962	DlnTOP	-6.427**
lnFOP	3	-1.587	DlnFOP	-4.328**
lnOP	4	-2.667	DlnOP	-5.237**

APPENDICES

APPENDIX A

Unit root test results (individual countries)

Ghana

Variables in levels	Lag Length	t-statistic	Variables in first differences	t-statistic
lnM	4	-2.778	DlnM	-4.526**
lnP	4	-1.814	DlnP	-4.060**
lnY	5	-0.6484	DlnY	-7.357**
I	3	-2.030	DI	-7.088**
lnFR	4	-2.168	DlnFR	-4.278**
lnTOP	5	-2.808	DlnTOP	-4.884**
lnFOP	4	-1.327	DlnFOP	-5.307**
lnOP	3	-2.372	DlnOP	-5.737**
lnGP	4	0.3482	DlnGP	-3.655**
lnEv	3	-1.747	DlnEV	-5.872**
lnIMF	4	-2.110	DlnIMF	-4.242**
Egr	8	-3.999*	DEgr	-5.715**
lnCv	5	-3.197	DlnCv	-6.001**
lnEd	3	-2.937	DlnEd	-4.176**
ExUS	2	-0.7760	DExUS	-6.595**
lnCpr	4	-3.167	DlnCpr	-5.023**
lnLab	0	3.109	DlnLab	-4.033*
lnRmt	1	-3.578*	DlnRmt	-6.486**
lnM2Y	0	-1.800	DlnM2Y	-5.833**
lnFDI	0	-0.4248	DlnFDI	-4.338**
lnGCF	0	-2.153	DlnGCF	-4.286**
	3			

Note: “*” and “**” indicate significance at 5% and 1% level of significance respectively.

Nigeria

Variables in levels	Lag Length	t-statistic	Variables in first differences	t-statistic
lnM	4	-2.833	DlnM	-4.802**
lnP	1	-0.7942	DlnP	-6.501**
lnY	1	-1.791	DlnY	-4.877**
I	1	-1.415	DI	-5.982**
lnFR	4	-2.747	DlnFR	-4.527**
lnTOP	4	-2.962	DlnTOP	-6.427**
lnFOP	3	-1.587	DlnFOP	-4.328**
lnOP	4	-2.667	DlnOP	-5.237**

lnGP	4	0.3482	DlnGP	-3.655**
lnEv	3	-1.811	DlnEV	-4.998**
lnIMF	4	-2.873	DlnIMF	-4.367**
Egr	4	-5.639**	DEgr	-7.349**
lnCv	1	-3.384	DlnCv	-7.890**
lnEd	6	-3.379	DlnEd	-4.580*
ExUS	2	-0.7760	DExUS	-6.595**
lnCpr	4	-2.580	DlnCpr	-4.525**
lnLab	5	-2.543	DlnLab	-12.07**
lnRmt	4	-1.926	DlnRmt	-5.715**
lnM2Y	0	-0.9923	DlnM2Y	-4.339**
lnFDI	0	-3.085	DlnFDI	-6.778**
lnGCF	4	-2.741	DlnGCF	-4.276**

Note: “*” and “ ** ” indicate significance at 5% and 1% level of significance respectively.

Gambia

Variables in levels	Lag Length	t-statistic	Variables in first differences	t-statistic
lnM	3	-0.6980	DlnM	-4.310**
lnP	4	-2.405	DlnP	-5.646**
lnY	4	-1.557	DlnY	-4.828**
I	1	-1.911	DI	-4.883**
lnFR	3	-2.994	DlnFR	-5.692**
lnTOP	4	-2.572	DlnTOP	-5.564**
lnFOP	4	-1.946	DlnFOP	-6.151**
lnFOP	3	-2.567	DlnOP	-4.153**
lnOP	1	-2.567	DlnGP	-3.655**
lnGP	4	0.3482	DlnEV	-5.079**
lnEV	4	-1.897	DlnIMF	-4.566**
lnIMF	4	-6.427**	DEgr	-5.028**
Egr	4	-3.128	DlnCv	-4.185**
Egr	5	0.5928	DlnEd	-5.712**
lnCv	3	-3.360	DExUS	-6.595**
lnEd	7	-0.7760	DlnCpr	-4.362**
ExUS	2	-1.919	DlnLab	-4.959**
lnCpr	4	-2.835	DlnRmt	-5.597**
lnLab	6	-2.892	DlnM2Y	-4.758**
lnRmt	4	-1.500	DlnFDI	-4.671**
lnM2Y	4	0.8484	DlnGCF	-5.205**
lnFDI	4	-2.892		
lnGCF	2			
	3			

Note: “*” and “ ** ” indicate significance at 5% and 1% level of significance respectively

Guinea

Variables in levels	Lag Length	t-statistic	Variables in first differences	t-statistic
lnM	4	-2.115	DlnM	-4.574**
lnP	4	-3.017	DlnP	-6.584**
lnY	4	-0.5691	DlnY	-4.501**
I	4	-2.003	DI	-4.131**
lnFR	4	-1.437	DlnFR	-5.994**
lnTOP	4	-1.358	DlnTOP	-6.616**
lnFOP	4	-2.944	DlnFOP	-7.465**
lnOP	3	-2.360	DlnOP	-5.761**
lnGP	4	0.3482	DlnGP	-3.655**
lnEV	2	-1.607	DlnEV	-7.156**
lnIMF	4	-1.339	DlnIMF	-5.902**
Egr	7	-3.423	DEgr	-7.479**
lnCv	4	-0.4989	DlnCv	-4.452**
lnEd	3	-2.765	DlnEd	-7.613**
ExUS	2	-0.7760	DExUS	-6.595**
lnCpr	4	-3.064	DlnCpr	-6.632**
lnLab	3	-3.225	DlnLab	-4.830**
lnRmt	4	-2.840	DlnRmt	-5.612**
lnM2Y	3	-2.185	DlnM2Y	-5.021**
lnFDI	1	-2.995	DlnFDI	-4.070**
lnGCF	4	-2.220	DlnGCF	-5.593**

Note: “*” and “**” indicate significance at 5% and 1% level of significance respectively

Sierra Leone

Variables in levels	Lag Length	t-statistic	Variables in first differences	t-statistic
lnM	2	-3.853*	DlnM	-5.357**
lnP	4	-3.414	DlnP	-3.875**
lnY	2	-2.766	DlnY	-5.142**
I	4	-3.294	DI	-4.247**
lnFR	3	-2.249	DlnFR	-5.500**
lnTOP	4	-1.867	DlnTOP	-5.746**
lnFOP	4	-1.979	DlnFOP	-4.455**
lnOP	4	-3.339	DlnOP	-4.189**
lnGP	5	-3.339	DlnGP	-3.655**
lnEV	4	0.3482	DlnEV	-4.932**
lnIMF	4	-1.925	DlnIMF	-5.530**
Egr	3	-3.156	DEgr	-7.705**
lnCv	4	-3.067	DlnCv	-5.153**
lnEd	8	0.3482	DlnEd	-6.383**
	7	-4.457**		
	4			

ExUS	2	-0.7760	DExUS	-6.595**
InCpr	4	-2.105	DInCpr	-6.396**
InLab	4	-1.459	DInLab	-6.546**
InRmt	4	-2.476	DInRmt	-5.015**
InM2Y	4	-2.582	DInM2Y	-5.245**
InFDI	5	-3.378	DInFDI	-5.244**
InGCF	4	-1.524	DInGCF	-7.654**

Note: “*” and “ ** ” indicate significance at 5% and 1% level of significance respectively

APPENDIX B

Demand for Money - Johansen's Multivariate Cointegration Test Results

Ghana

Trend: rtrend			Number of obs = 98						
Sample: 1984q1 - 2009q4			Lags = 6						
rank	parms	LL	eigenvalue	trace statistic	5% critical value	1% critical value	max value	5% critical statistic	1% critical value
0	84	836.85499		72.2441	62.99	70.05	32.8687	31.46	36.65
1	92	853.28936	0.28494	39.3754 [#]	42.44	48.45	21.1628 [#]	25.54	30.34
2	98	863.87076	0.19422	18.2126	25.32	30.45	11.3529	18.96	23.65
3	102	869.54721	0.10939	6.8597	12.25	16.26	6.8597	12.52	16.26

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

Nigeria

Trend: trend			Number of obs = 97						
Sample: 1984q1 - 2009q4			Lags = 7						
rank	parms	LL	eigenvalue	trace statistic	5% critical value	1% critical value	max value	5% critical statistic	1% critical value
0	104	677.81374		89.1919	54.64	61.21	55.1543	30.33	35.68
1	111	705.39088	0.43368	34.0377 [#]	34.55	40.49	22.7738 [#]	23.78	28.83
2	116	716.77776	0.20926	11.2639	18.17	23.46	11.1659	16.87	21.47
3	119	722.36072	0.10873	0.0980	3.74	6.40	0.0980	3.74	6.40

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

Gambia

Trend: trend			Number of obs = 100						
Sample: 1984q1 - 2009q4			Lags = 4						
rank	parms	LL	eigenvalue	trace statistic	5% critical value	1% critical value	max value	5% critical statistic	1% critical value
0	56	705.87976		71.1125	54.64	61.21	31.9270 ^{**}	30.33	35.68
1	63	721.84324	0.27332	39.1855 ^{**}	34.55	40.49	24.0268	23.78	28.83
2	68	733.85664	0.21358	15.1587 [*]	18.17	23.46	10.9257 [*]	16.87	21.47
3	71	739.31947	0.10350	4.2330	3.74	6.40	4.2330	3.74	6.40

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

Guinea

Trend: rtrend									
Sample: 1984q1 - 2009q4									
Maximum									
rank	parms	LL	eigenvalue	trace 5% critical	1% critical	max	5% critical	1% critical	
			statistic	value	value	statistic	value	value	
0	100	710.16982		75.0208	62.99	70.05	37.7487	31.46	36.65
1	108	729.04419	0.32238	37.2721 [#]	42.44	48.45	20.7235 [#]	25.54	30.34
2	114	739.40595	0.19236	16.5486	25.32	30.45	9.3517	18.96	23.65
3	118	744.08182	0.09191	7.1969	12.25	16.26	7.1969	12.52	16.26

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

Sierra Leone

Trend: rtrend									
Sample: 1984q1 - 2009q4									
Maximum									
rank	parms	LL	eigenvalue	trace 5% critical	1% critical	max	5% critical	1% critical	
			statistic	value	value	statistic	value	value	
0	68	646.21802		79.6254	62.99	70.05	50.1801	31.46	36.65
1	76	671.30807	0.39762	29.4453 [#]	42.44	48.45	14.2663 [#]	25.54	30.34
2	82	678.44124	0.13420	15.1790	25.32	30.45	11.0053	18.96	23.65
3	86	683.9439	0.10521	4.1737	12.25	16.26	4.1737	12.52	16.26

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

APPENDIX C

Demand for international reserves, model 1, --- Johansen's multivariate cointegration test results (Equation 4.2)

Ghana

				Number of obs = 101					
Trend: rtrend						Lags = 3			
Sample: 1984q1 - 2009q4									
Maximum				trace	5% critical	1% critical	max	5% critical	1% critical
rank	parms	LL	eigenvalue	statistic	value	value	statistic	value	value
0	105	611.26021		198.7460	146.76	158.49	97.7859	49.42	54.71
1	119	660.15318	0.62023	100.9601**	114.90	124.75	32.5304**	43.97	49.51
2	131	676.41839	0.27536	68.4296	87.31	96.58	23.1883	37.52	42.36
3	141	688.01253	0.20514	45.2414	62.99	70.05	19.2030	31.46	36.65
4	149	697.61401	0.17315	26.0384	42.44	48.45	12.9884	25.54	30.34
5	155	704.10822	0.12067	13.0500	25.32	30.45	8.6803	18.96	23.65
6	159	708.44838	0.08235	4.3697	12.25	16.26	4.3697	12.52	16.26

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

Nigeria

				Number of obs = 99					
Trend: trend						Lags = 5			
Sample: 1984q1 - 2009q4									
Maximum				trace	5% critical	1% critical	max	5% critical	1% critical
rank	parms	LL	eigenvalue	statistic	value	value	statistic	value	value
0	210	422.26386		183.5513	136.61	146.99	58.6656	48.45	54.48
1	223	451.59667	0.44710	124.8857	104.94	114.36	50.8827	42.48	48.17
2	234	477.03803	0.40188	74.0029#	77.74	85.78	26.4849#	36.41	41.58
3	243	490.28049	0.23473	47.5180	54.64	61.21	22.1250	30.33	5.68
4	250	501.34299	0.20027	25.3930	34.55	40.49	16.8522	23.78	28.83
5	255	509.76911	0.15652	8.5408	18.17	23.46	7.2677	16.87	21.47
6	258	513.40296	0.07078	1.2731	3.74	6.40	1.2731	3.74	6.40

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

Gambia

				Number of obs = 97					
				Lags = 7					
				trace		5% critical		1% critical	
Maximum			eigenvalue	statistic	value	value	statistic	value	value
rank	parms	LL							
0	301	879.21666		272.1041	146.76	158.49	78.7993	49.42	54.71
1	315	918.61628	0.55619	193.3049	114.90	124.75	64.8624	43.97	49.51
2	327	951.0475	0.48762	128.4425	87.31	96.58	41.6166**	37.52	42.36
3	337	971.85579	0.34886	86.8259	62.99	70.05	39.9490	31.46	36.65
4	345	991.83029	0.33757	46.8769**	42.44	48.45	22.4032*	25.54	30.34
5	351	1003.0319	0.20623	24.4736*	25.32	30.45	15.8294	18.96	23.65
6	355	1010.9466	0.15057	8.6442	12.25	16.26	8.6442	12.52	16.26

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

Guinea

				Number of obs = 98					
				Lags = 6					
				trace		5% critical		1% critical	
Maximum			eigenvalue	statistic	value	value	statistic	value	value
rank	parms	LL							
0	259	625.35004		187.5323	136.61	146.99	60.4011	48.45	54.48
1	272	655.55058	0.46008	127.1313	104.94	114.36	39.5522#	42.48	48.17
2	283	675.32669	0.33208	87.5790	77.74	85.78	33.1339	36.41	41.58
3	292	691.89362	0.28688	54.4452#	54.64	61.21	22.6558	30.33	35.68
4	299	703.22151	0.20640	31.7894	34.55	40.49	20.4031	23.78	28.83
5	304	713.42305	0.18795	11.3863	18.17	23.46	11.3827	16.87	21.47
6	307	719.1144	0.10966	0.0036	3.74	6.40	0.0036	3.74	6.40

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

Sierra Leone

				Number of obs = 102		Lags = 2			
Trend: none									
Sample: 1984q1 - 2009q4									
Maximum				trace	5% critical	1% critical	max	5% critical	1% critical
rank	parms	LL	eigenvalue	statistic	value	value	statistic	value	value
0	49	68.728313		157.7370	109.99	119.80	49.1863	41.51	47.15
1	62	93.321456	0.38259	108.5507	82.49	90.45	43.6864	36.36	41.00
2	73	115.16466	0.34838	64.8643**	59.46	66.52	26.3920#	30.04	35.17
3	82	128.36066	0.22798	38.4723*	39.89	45.58	21.8378	23.80	28.82
4	89	139.27956	0.19273	16.6345	24.31	29.75	11.2125	17.89	22.99
5	94	144.88579	0.10410	5.4220	12.53	16.31	4.7804	11.44	15.69
6	97	147.27602	0.04579	0.6415	3.84	6.51	0.6415	3.84	6.51

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

APPENDIX D

Demand for International Reserves, model 2, --- Johansen's multivariate cointegration test results (Equation 4.3)

Ghana

						Number of obs = 101			
						Lags = 3			
Trend: none									
Sample: 1984q1 - 2009q4									
Maximum				trace	5% critical	1% critical	max	5% critical	1% critical
rank	parms	LL	eigenvalue	statistic	value	value	statistic	value	value
0	72	-183.45254		153.1996	82.49	90.45	74.0043	36.36	41.00
1	83	-146.45041	0.51940	79.1953	59.46	66.52	47.0268	30.04	35.17
2	92	-122.93699	0.37225	32.1685 [#]	39.89	45.58	20.1381 [#]	23.80	28.82
3	99	-112.86795	0.18077	12.0304	24.31	29.75	9.5610	17.89	22.99
4	104	-108.08747	0.09032	2.4695	12.53	16.31	2.3873	11.44	15.69
5	107	-106.89385	0.02336	0.0822	3.84	6.51	0.0822	3.84	6.51

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

Nigeria

						Number of obs = 98			
						Lags = 6			
Trend: rtrend									
Sample: 1984q1 - 2009q4									
Maximum				trace	5% critical	1% critical	max	5% critical	1% critical
rank	parms	LL	eigenvalue	statistic	value	value	statistic	value	value
0	186	-774.41815		170.5586	114.90	124.75	59.0742	43.97	49.51
1	198	-744.88104	0.45272	111.4843	87.31	96.58	42.8788	37.52	42.36
2	208	-723.44164	0.35438	68.6055 ^{**}	62.99	70.05	25.2444 [#]	31.46	36.65
3	216	-710.81946	0.22709	43.3612	42.44	48.45	22.1348	25.54	30.34
4	222	-699.75205	0.20217	21.2264 [*]	25.32	30.45	16.9098	18.96	23.65
5	226	-691.29715	0.15848	4.3166	12.25	16.26	4.3166	12.52	16.26

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

Gambia

Trend: none

Number of obs = 102

Sample: 1984q1 - 2009q4

Lags = 3

rank	parms	LL	eigenvalue	trace statistic	5% critical value	1% critical value	max statistic	5% critical value	1% critical value
0	72	41.819337		114.2780	82.49	90.45	46.9723	36.36	41.00
1	83	65.305483	0.37191	67.3057	59.46	66.52	27.7081#	30.04	35.17
2	92	79.159524	0.23992	39.5976#	39.89	45.58	22.2940	23.80	28.82
3	99	90.306514	0.19807	17.3036	24.31	29.75	10.5649	17.89	22.99
4	104	95.58896	0.09932	6.7388	12.53	16.31	6.7336	11.44	15.69
5	107	98.955753	0.06450	0.0052	3.84	6.51	0.0052	3.84	6.51

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

Guinea

Trend: rtrend/none

Number of obs = 99

Sample: 1984q1 - 2009q4

Lags = 5

rank	parms	LL	eigenvalue	trace statistic	5% critical value	1% critical value	max statistic	5% critical value	1% critical value
0	144	-237.89775		122.4026	82.49	90.45	50.7946	36.36	41.00
1	155	-212.50043	0.40135	71.6080	59.46	66.52	39.7144	30.04	35.17
2	164	-192.64323	0.33045	31.8936#	39.89	45.58	16.7234#	23.80	28.82
3	171	-184.28154	0.15543	15.1702	24.31	29.75	8.4376	17.89	22.99
4	176	-180.06276	0.08170	6.7327	12.53	16.31	4.7841	11.44	15.69
5	179	-177.67071	0.04718	1.9486	3.84	6.51	1.9486	3.84	6.51

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

Sierra Leone

Trend: none

Number of obs = 100

Sample: 1984q1 - 2009q4

Lags = 4

rank	parms	LL	eigenvalue	trace statistic	5% critical value	1% critical value	max statistic	5% critical value	1% critical value
0	108	-419.69881		125.9338	82.49	90.45	55.7177	36.36	41.00
1	119	-391.83995	0.42718	70.2161	59.46	66.52	32.8649**	30.04	35.17
2	128	-375.40751	0.28010	37.3512#	39.89	45.58	30.5659	23.80	28.82
3	135	-360.12456	0.26336	6.7853	24.31	29.75	4.1626*	17.89	22.99
4	140	-358.04328	0.04077	2.6228	12.53	16.31	2.1089	11.44	15.69
5	143	-356.9888	0.02087	0.5138	3.84	6.51	0.5138	3.84	6.51

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

APPENDIX E

Economic Growth model - Johansen's multivariate cointegration test results

Ghana

				Number of obs = 103					
Trend: trend				Lags = 1					
Sample: 1984q1 - 2009q4									
Maximum			trace	5% critical	1% critical	max	5% critical	1% critical	
rank	parms	LL	eigenvalue	statistic	value	value	statistic	value	
0	18	1261.0901		300.6233	208.97	222.46	106.6593	60.29	66.91
1	35	1314.4197	0.64496	193.9640	170.80	182.51	68.7370	54.25	60.81
2	50	1348.7883	0.48693	125.2270 [#]	136.61	146.99	48.5946 ^{**}	48.45	54.48
3	63	1373.0856	0.37612	76.6324	104.94	114.36	23.8230 [*]	42.48	48.17
4	74	1384.9971	0.20649	52.8094	77.74	85.78	20.2894	36.41	41.58
5	83	1395.1418	0.17880	32.5199	54.64	61.21	16.3609	30.33	35.68
6	90	1403.3222	0.14687	16.1591	34.55	40.49	11.5470	23.78	28.83
7	95	1409.0957	0.10605	4.6121	18.17	23.46	4.6000	16.87	21.47
8	98	1411.3957	0.04368	0.0120	3.74	6.40	0.0120	3.74	6.40

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

Nigeria

				Number of obs = 96					
Trend: trend				Lags = 8					
Sample: 1984q1 - 2009q4									
Maximum			trace	5% critical	1% critical	max	5% critical	1% critical	
rank	parms	LL	eigenvalue	statistic	value	value	statistic	value	
0	464	1184.7516		347.5598	170.80	182.51	86.4481	54.25	60.81
1	479	1227.9756	0.59363	261.1117	136.61	146.99	69.4715	48.45	54.48
2	492	1262.7113	0.51503	191.6403	104.94	114.36	58.4597	42.48	48.17
3	503	1291.9412	0.45608	133.1806	77.74	85.78	49.9006	36.41	41.58
4	512	1316.8915	0.40536	83.2800	54.64	61.21	37.2334	30.33	35.68
5	519	1335.5082	0.32148	46.0466	34.55	40.49	32.0602	23.78	28.83
6	524	1351.5383	0.28392	13.9864 [#]	18.17	23.46	8.4232 [#]	16.87	21.47
7	527	1355.7499	0.08400	5.5632	3.74	6.40	5.5632	3.74	6.40

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

Gambia

		Number of obs = 101								
Trend: trend		Lags = 3								
Sample: 1984q1 - 2009q4										
rank	parms	LL	eigenvalue	trace statistic	5% critical value	1% critical value	max statistic	5% critical value	1% critical value	
0	180	1297.2151		261.2243	208.97	222.46	74.3747	60.29	66.91	
1	197	1334.4025	0.52116	186.8496	170.80	182.51	60.2753	54.25	60.81	
2	212	1364.5402	0.44942	126.5743 [#]	136.61	146.99	32.5246 [#]	48.45	54.48	
3	225	1380.8024	0.27532	94.0497	104.94	114.36	27.9777	42.48	48.17	
4	236	1394.7913	0.24195	66.0720	77.74	85.78	24.2758	36.41	41.58	
5	245	1406.9292	0.21365	41.7962	54.64	61.21	20.2798	30.33	35.68	
6	252	1417.0691	0.18192	21.5164	34.55	40.49	13.4684	23.78	28.83	
7	257	1423.8033	0.12484	8.0480	18.17	23.46	7.8959	16.87	21.47	
8	260	1427.7513	0.07520	0.1521	3.74	6.40	0.1521	3.74	6.40	

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

Guinea

		Number of obs = 100								
Trend: rconstant		Lags = 4								
Sample: 1984q1 - 2009q4										
rank	parms	LL	eigenvalue	trace statistic	5% critical value	1% critical value	max statistic	5% critical value	1% critical value	
0	243	863.16197		479.7340	202.92	215.74	236.4517	57.42	63.71	
1	261	981.38782	0.90601	243.2824	165.58	177.20	58.8661	52.00	57.95	
2	277	1010.8209	0.44493	184.4163	131.70	143.09	43.4491 [#]	46.45	51.91	
3	291	1032.5454	0.35241	140.9672	102.14	111.01	39.8967	40.30	46.82	
4	303	1052.4937	0.32899	101.0705	76.07	84.45	35.2316	34.40	39.79	
5	313	1070.1096	0.29694	65.8388	53.12	60.16	28.0959	28.14	33.24	
6	321	1084.1575	0.24494	37.7429 ^{**}	34.91	41.07	19.1433	22.00	26.81	
7	327	1093.7292	0.17423	18.5996 [*]	19.96	24.60	11.1840	15.67	20.20	
8	331	1099.3212	0.10581	7.4156	9.42	12.97	7.4156	9.24	12.97	

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

Sierra Leone

		Number of obs = 103								
Trend: trend		Lags = 1								
Sample: 1984q1 - 2009q4										
Maximum			trace	5% critical	1% critical	max	5% critical	1% critical		
rank	parms	LL	eigenvalue	statistic	value	value	statistic	value	value	value
0	18	751.03669		252.8099	208.97	222.46	92.7160	60.29	66.91	
1	35	797.39467	0.59349	160.0939#	170.80	182.51	46.4387#	54.25	60.81	
2	50	820.61401	0.36292	113.6552	136.61	146.99	36.3330	48.45	54.48	
3	63	838.7805	0.29725	77.3223	104.94	114.36	22.6913	42.48	48.17	
4	74	850.12614	0.19772	54.6310	77.74	85.78	20.8939	36.41	41.58	
5	83	860.57307	0.18360	33.7371	54.64	61.21	15.9225	30.33	35.68	
6	90	868.53434	0.14323	17.8146	34.55	40.49	10.2251	23.78	28.83	
7	95	873.64689	0.09450	7.5895	18.17	23.46	7.0301	16.87	21.47	
8	98	877.16192	0.06598	0.5594	3.74	6.40	0.5594	3.74	6.40	

“ ** ” “ * ” “ # ” indicates significant at 1%, 5%, both 1% and 5% level of significance respectively.

APPENDIX F

Result of panel unit root tests

Variable	Levin Lin & Chu		Im, Pesaran & Shin		ADF-Fisher Chi-square		PP-Fisher Chi-square	
	Statistic	P-value	Statistic	P-value	Statistic	P-value	Statistic	P-value
lnFr	-0.7259	0.2339	-0.2220	0.4121	8.60977	0.5695	8.02948	0.620
DlnFr	-22.444	0.0000	-22.078	0.0000	284.589	0.0000	317.196	0.000
lnY	-1.1900	0.1170	1.05367	0.8540	4.70593	0.9099	5.13670	0.881
DlnY	-2.1260	0.0167	-9.0909	0.0000	107.671	0.0000	87.7533	0.000
lnTOP	-0.9740	0.1650	-1.4580	0.0724	15.3249	0.1207	34.3687	0.000
DlnTOP	-6.3152	0.0000	-10.856	0.0000	125.939	0.0000	270.347	0.000
lnFOP	0.63016	0.7357	-0.6906	0.2449	30.9869	0.0006	11.0948	0.3502
DlnFOP	-2.6784	0.0037	-7.2285	0.0000	239.423	0.0000	239.423	0.0000
lnOP	-2.2453	0.0124	-3.3719	0.0004	31.5513	0.0005	23.1098	0.0103
DlnOP	-4.3563	0.0000	-7.6368	0.0000	79.0902	0.0000	214.837	0.0000
lnGP	7.00358	1.0000	6.29577	1.0000	0.03848	1.0000	0.00796	1.0000
DlnGP	-0.1800	0.4286	-4.5209	0.0000	39.6592	0.0000	218.467	0.0000
lnEV	1.1720	0.8794	1.47443	0.9298	3.03029	0.980	79.8076	0.000
DlnEV	13.031	1.0000	-6.6681	0.0000	5.8782	0.000	247.256	0.000
EXUS	-1.0765	0.1408	0.23011	0.5910	5.48888	0.8562	4.47244	0.9235
DEXUS	6.3019	1.0000	-2.8292	0.0023	23.5134	0.0090	284.365	0.0000
lnCV	3.49370	0.9998	-2.2515	0.0122	32.8080	0.0003	211.168	0.0000
DlnCV	12.0409	1.0000	-9.9410	0.0000	110.579	0.0000	151.455	0.0000
lnED	-1.7753	0.0379	-6.8246	0.0000	68.0052	0.0000	85.8543	0.0000
DlnED	3.65448	0.9999	-10.368	0.0000	119.344	0.0000	348.449	0.0000
lnEgr	4.27947	1.0000	-9.2765	0.0000	103.791	0.0000	178.590	0.0000
DlnEgr	18.1724	1.0000	-14.516	0.0000	167.711	0.0000	706.736	0.7191
lnIMF	-1.2996	0.0969	-0.1301	0.4482	13.5059	0.1967	341.011	0.0000
DlnIMF	-1.2636	0.1032	-9.1070	0.0000	99.9511	0.0000	2.47002	0.9913
JE	1.34064	0.9100	2.43988	0.9927	1.31361	0.9994	328.511	0.0000
DJE	-2.9949	0.0014	-6.8381	0.0000	67.8128	0.0000	14.3896	0.1560
MD	-1.6186	0.0528	0.12133	0.5483	11.6331	0.3104	192.753	0.0000
DMD	9.98974	1.0000	-6.0738	0.0000	62.4142	0.0000	47.2152	0.0000
lnCPR	2.11149	0.9826	0.20493	0.5812	11.2559	0.3379	217.065	0.0000
DlnCPR	1.55061	0.9395	-10.089	0.0000	114.487	0.0000	11.1916	0.3428
lnLab	-1.3620	0.0866	1.13218	0.8712	3.37012	0.9713	43.8647	0.0000
DlnLab	7.92308	1.0000	-12.280	0.0000	132.835	0.0000	2.81792	0.9854
lnM2Y	0.09970	0.5397	2.32485	0.9900	2.57341	0.9898	201.235	0.0000
DlnM2Y	-0.7809	0.2174	-6.9528	0.0000	71.6439	0.0000	18.9808	0.0405
lnRmt	-0.4371	0.3310	-0.6370	0.2621	11.2900	0.3354	365.591	0.0000
DlnRmt	-2.0804	0.0187	-10.860	0.0000	126.254	0.0000	2.82420	0.9853
lnFDI	2.32254	0.9899	0.08261	0.5329	3.42122	0.9697	692.889	0.0000
DlnFDI	-14.210	0.0000	-8.2995	0.0000	706.088	0.0000	12.5169	0.2520
lnGCF	-1.4472	0.0739	-0.9805	0.1634	12.2514	0.2686	293.996	0.0000
DlnGCF	-24.585	0.0000	-21.630	0.0000	293.222	0.0000		

APPENDIX F

Result of panel unit root tests

Variable	Levin Lin & Chu		Im, Pesaran & Shin		ADF-Fisher Chi-square		PP-Fisher Chi-square	
	Statistic	P-value	Statistic	P-value	Statistic	P-value	Statistic	P-value
InFr	-0.7259	0.2339	-0.2220	0.4121	8.60977	0.5695	8.02948	0.620
DlnFr	-22.444	0.0000	-22.078	0.0000	284.589	0.0000	317.196	0.000
InY	-1.1900	0.1170	1.05367	0.8540	4.70593	0.9099	5.13670	0.881
DlnY	-2.1260	0.0167	-9.0909	0.0000	107.671	0.0000	87.7533	0.000
InTOP	-0.9740	0.1650	-1.4580	0.0724	15.3249	0.1207	34.3687	0.000
DlnTOP	-6.3152	0.0000	-10.856	0.0000	125.939	0.0000	270.347	0.000
InFOP	0.63016	0.7357	-0.6906	0.2449	30.9869	0.0006	11.0948	0.3502
DlnFOP	-2.6784	0.0037	-7.2285	0.0000	239.423	0.0000	239.423	0.0000
InOP	-2.2453	0.0124	-3.3719	0.0004	31.5513	0.0005	23.1098	0.0103
DlnOP	-4.3563	0.0000	-7.6368	0.0000	79.0902	0.0000	214.837	0.0000
InGP	7.00358	1.0000	6.29577	1.0000	0.03848	1.0000	0.00796	1.0000
DlnGP	-0.1800	0.4286	-4.5209	0.0000	39.6592	0.0000	218.467	0.0000
InEV	1.1720	0.8794	1.4743	0.9298	3.03029	0.980	79.8076	0.000
DlnEV	13.031	1.0000	-6.6681	0.0000	5.8782	0.000	247.256	0.000
EXUS	-1.0765	0.1408	0.23011	0.5910	5.48888	0.8562	4.47244	0.9235
DEXUS	6.3019	1.0000	-2.8292	0.0023	23.5134	0.0090	284.365	0.0000
InCV	3.49370	0.9998	-2.2515	0.0122	110.579	0.0000	151.455	0.0000
DlnCV	12.0409	1.0000	-9.9410	0.0000	68.0052	0.0000	85.8543	0.0000
InED	-1.7753	0.0379	-6.8246	0.0000	119.344	0.0000	348.449	0.0000
DlnED	3.65448	0.9999	-10.368	0.0000	103.791	0.0000	312.616	0.0000
InEgr	4.27947	1.0000	-9.2765	0.0000	167.711	0.0000	178.590	0.0000
DlnEgr	18.1724	1.0000	-14.516	0.0000	13.5059	0.1967	7.06736	0.7191
InIMF	-1.2996	0.0969	-0.1301	0.4482	99.9511	0.0000	341.011	0.0000
DlnIMF	-1.2636	0.1032	-9.1070	0.0000	1.31361	0.9994	2.47002	0.9913
JE	1.34064	0.9100	2.43988	0.9927	67.8128	0.0000	328.511	0.0000
DJE	-2.9949	0.0014	-6.8381	0.0000	11.6331	0.3104	14.3896	0.1560
MD	-1.6186	1.0000	-6.0738	0.0000	62.4142	0.0000	192.753	0.0000
DMD	9.98974	0.0000	0.20493	0.5812	11.2559	0.3379	47.2152	0.0000
InCPR	2.11149	0.9826	-10.089	0.0000	114.487	0.0000	217.065	0.0000
DlnCPR	1.55061	0.9395	1.13218	0.8712	3.37012	0.9713	11.1916	0.3428
InLab	-1.3620	0.0866	-12.280	0.0000	132.835	0.0000	43.8647	0.0000
DlnLab	7.92308	1.0000	2.32485	0.9900	2.57341	0.9898	2.81792	0.9854
InM2Y	0.09970	0.5397	-6.9528	0.0000	71.6439	0.0000	18.9808	0.0405
DlnM2Y	-0.7809	0.2174	-0.6370	0.2621	11.2900	0.3354	18.9808	0.0405
InRmt	-0.4371	0.0187	-10.860	0.0000	126.254	0.0000	365.591	0.0000
DlnRmt	-2.0804	0.9899	-8.2995	0.0000	3.42122	0.9697	2.82420	0.9853
InFDI	-14.210	0.0000	-0.9805	0.1634	706.088	0.0000	692.889	0.0000
DlnFDI	-1.4472	0.0739	-21.630	0.0000	12.2514	0.2686	12.5169	0.2520
InGCF	-24.585	0.0000	-0.9805	0.1634	293.222	0.0000	293.996	0.0000

APPENDIX G

Basic descriptive statistics for the panel data

Variable	Obs	Mean	Std. Dev.	Min	Max
ly	520	21.00907	1.949994	17.94346	23.83435
lfr	520	18.56552	2.054269	10.35546	23.331
lcpr	520	.7955728	.3919719	-1.019797	1.472502
llab	520	13.72072	1.461492	11.26444	16.44908
lrmt	520	15.11875	3.036563	5.43327	22.38569
lm2y	520	-2.336016	1.886968	-7.717888	1.246411
lfdi	520	18.34634	1.477219	10.57035	21.61145
ltop	520	-1.883819	2.94729	-8.647013	.936379
lgcf	520	18.62476	1.805005	13.22391	22.38414
lfop	520	-.2093483	.7552417	-3.342783	.7765679
lgp	520	5.991464	.3218891	5.557997	7.00198
lev	520	9.976774	5.853295	-5.163437	19.46096
lop	520	2.453444	.7807411	-.6931472	4.069596
je	520	8.228625	1.421837	4.874722	11.07858
md	520	-37.74932	31.25803	-95.58436	3.871722
exus	520	-74.22523	61.94098	-229.979	17.737
legr	520	.0247518	.3580948	-2.678649	2.550147
led	520	1.92e-09	.2081177	-1.337294	1.007038
lcv	520	37.37994	3.244175	30.78802	45.6377
limf	520	10.50439	5.727322	2.386194	19.36971