EXCHANGE RATE DYNAMICS AND THE BALANCE OF PAYMENTS IN SIERRA LEONE

BY

JAMES FOMBA SANDY

(Matriculation Number: 168322)

B.Sc (Econ) (University of Sierra Leone)

M.A. (Econ) (University of Dar es Salaam)

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DEDICATION

This work is dedicated to my parents and entire family. Also to my late uncle, Pa James Sandy, who was called to rest during the critical stage of my Ph.D expedition. Little did I know he would not be alive to see me through this significant stage of my academic achievement. He led me through greater part of my academic pursuit. May the good Lord grant him eternal rest.

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CERTIFICATION

We, the undersigned, hereby certify that this work was carried out by James Fomba Sandy under our supervision in the Department of Economics, Faculty of the Social Sciences, University of Ibadan, Nigeria.

Festus O. EGWAIKHIDE
(Supervision and Chairman, Thesis Committee)
Professor of Economics and Head of Department
B.Sc (Econ), M.Sc (Econ), Ph.D (Ibadan)
Department of Economics
Faculty of the Social Sciences
University of Ibadan
Nigeria

Adeolu O. ADEWUYI
(Member, Thesis Committee)
B.Sc (Econ), M.Sc (Econ), Ph.D (Ibadan)
Department of Economics
Faculty of the Social Sciences
University of Ibadan
Nigeria

Mutiu A. OYINLOLA
(Member, Thesis Committee)
B.Sc (Econ) (OAU), M.Sc (Econ), Ph.D (Ibadan)
Department of Economics
Faculty of the Social Sciences
University of Ibadan
Nigeria

ABSTRACT

There is a strong relationship between exchange rate movements and the Balance of Payments (BoP). In Sierra Leone, exchange rate depreciated steadily from 1.05 Leone (Le) to 1.00 United States dollar (US$) in 1980 through Le151.45/US$1 in 1990, Le2,092/US$1 in 2000 to Le3,978.09/US$1 in 2010. In the same periods, the BoP as a percentage of gross domestic product fluctuated between -15.0% and 3.0%. The literature has focused mainly on the effects of exchange rate on inflation, revenue and economic growth, while its effects on the BoP are hardly examined. This study investigated the impact of exchange rate dynamics on the BoP in Sierra Leone covering the period between 1975 and 2010.

A structural macroeconomic model, derived from the elasticity, absorption and monetary theoretical frameworks to BoP determination, was estimated. The model was disaggregated into Current Account Balance (CAB), Financial Account Balance (FAB), Capital Account Balance (KAB) and the consumer price index. An Autoregressive Distributed Lag bounds testing technique was used to determine the dynamic (the short-run and long-run measured by elasticities) effects of exchange rate on the key variables. These elasticities were used to determine the time path of the changes in the CAB and BoP, as postulated by the J-curve phenomenon and the Marshall-Lerner condition (sum of exports and imports demand elasticities be greater than one for depreciation to improve the CAB and BoP). The data used for the estimations were collected from the *International Financial Statistics* of the International Monetary Fund. The problems of serial correlation and endogeneity were addressed using the Akaike and Schwarz criteria. The Cumulative Sum (CUSUM) and CUSUM squares of the recursive residuals were used to determine the stability and reliability of the parameter estimates.

A depreciation of the exchange rate had both short-run and long-run dynamic effects on the BoP. In the short-run, a 10.0% depreciation of the exchange rate deteriorated the overall BoP deficit by 4.6%, and improved it by 3.4% in the long-run. The effects of exchange rate on the components of BoP differed substantially as the total demand

elasticity for both exports and imports was 0.3 in the short-run and 1.2 in the long-run. This suggested that the depreciation initially led to a deterioration of the CAB deficit (due to time lags in executing trade contracts and delivery of goods) and then gradually improved thereafter. The effects on the FAB (0.03%) and KAB (0.01%) were negligible in the short-run, but improved to 0.7% and 0.5%, respectively in the long-run. The results confirmed the existence of the J-curve phenomenon and the Marshall-Lerner condition only in the CAB and the overall BoP positions. The effect on BoP of exchange rate pass-through to domestic price was 80.0%.

Exchange rate movements significantly influenced the current account balance and the balance of payments, both in the short-run and long-run, while it only affected the financial and capital account balances moderately in the long-run. Accordingly, exchange rate policy is important for the restoration of balance of payments equilibrium by the monetary authority.

Keywords: Exchange rate dynamics, Current account balance, Financial account balance, Balance of payments, Autoregressive distributed lag

Word count: 496

LIST OF ABBREVIATIONS AND ACRONYMS

AERC	African Economic Research Consortium
ARDL	Autoregressive Distributed Lag
BOP	Balance of Payments
CAB	Current Account Balance
CPI	Consumer Price Index
DFID	Department for International Development
ERPT	Exchange Rate Pass-Through
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
HIPC	Heavily Indebted Poor Countries
IMF	International Monetary Fund
KAB	Capital Account Balance
OECD	Organization of Economic Cooperation and Development
PRSP	Poverty Reduction Strategy Papers
SSA	Sub-Sahara Africa
SVAR	Structural Vector Autoregressive
UNCTAD	United Nations Conference in Trade and Development
UNICEF	United Nations Children's Fund
VAR	Vector Autoregressive
VECM	Vector Error Correction Model
WDI	World Development Indicators
WFP	World Food Programme

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CHAPTER ONE

INTRODUCTION

1.1 The Problem

Since the collapse of the Bretton-Woods controlled exchange rate system in the early 1970s, the effect of exchange rate policy on other economic fundamentals has been a perennial issue in macroeconomics. Exchange rate policy emerged as a controversial policy instrument especially in the 1980s with strong opposition to devaluation for fear of its possible negative impacts on both the internal and external sectors of most developing economies. According to Arize, Osang and Slottje (2000), the move from fixed to flexible exchange rate regime was an attempt to resolve the persistent problems in the external sector.

Primarily, changes in exchange rate influence the overall economic activities and it is considered a fundamental policy variable that determines the volume of external trade, capital flows, foreign direct investment, inflation, international reserves and remittances. As observed by Combes, Kinda and Plane (2011), an appreciation of the real exchange rate undermines competiveness, widens the current account deficit, and increases vulnerability which may lead to further crisis. A significant appreciation could lead to a reduction of capital inflows, causing adjustment to occur in the current account. Several discussions (Edwards (1998), Agenor (1998) and Lartey (2008)) on the argument that appreciation of exchange rate affects foreign capital inflows had been deepened.

In the last three to four decades, Sub-Sahara Africa (SSA) has been prone to enormous shocks which range from export price variability to civil unrest and political instability[1]. These have caused pressures on most of these economies to engage in financing activities

[1] In countries such as Angola, Democratic Republic of Congo, Cote d'lvoire, Liberia and Sierra Leone, among others.

that have very little direct bearing on growth (Alesina, Ozler, Roubini and Swagel (1996); Alesina and Perotti (1996); Darby, Li and Muscatelli (2000); and Carmignani (2003). Thus, the huge external debt burden[2] and the deteriorating foreign exchange reserves facing these countries tend to constrain their efforts towards responding adequately to the balance of payments shocks. Another problem that has exacerbated external debt is trade deficit. According to United Nations Conference on Trade and Development (UNCTAD, 2011), persistent trade deficits often go hand in hand with increases in external debt which may not be sustainable over a long period of time. Specifically, due to the high volatility in prices, exchange rate and capital mobility, SSA countries have not been able to improve their BoP through adequate investment inflows that will stimulate growth. This has continued to be one of the major obstacles to economic growth of these countries.

In Sierra Leone, exchange rate has been unprecedentedly unstable[3] with uneven analytical trend in its impact on the BoP position. For instance, the nominal exchange rate, the Leone to the US Dollar was Le0.90/US$1 in 1975. Five years later, in 1980, the currency depreciated by over 15.0 % to Le1.05/US$1. Afterward, the rate of depreciation became high and it was Le151.45/US$1 in 1990. This trend in depreciation has continued till date with the Leone being in excess of over Le4,000/US$1 as at the end of 2010. Similarly, the country started recording significant current account deficits[4] and low level of international reserves in the 1980s; and the trends in the components of the BoP have also been unpredictable. During the period the local currency was depreciating, the components of BoP were also depreciating. In 1975, the trade and current account deficits were $13 million and $40 million, respectively. Over a five year period, the deficits increased to $159 million and $165 million in that order. In 1990, both deficits improved leaving a trade surplus of $8 million, while the current account deficit decreased to $69 million. By the end of 2000, when the exchange rate was already in excess of Le2,000/US$1, both the trade balance and the current account balance

[2] Between 1970 and 2009, the continent's total external debt increased by over 20 folds from US$6.1 billion to US$127.8 billion.
[3] The exchange rate in 1970 was Le0.83/US$1, while it now stands at a little over Le4,000/US$1.
[4] The country's current account deficits was US$164.87 million (15% of GDP) in 1979 and has remained significantly high until 2010, while foreign reserves deteriorated from US$46.7 million in the same period to US$30.6 million in 1980; and subsequently to US$5.4 million in the 1990s.

worsened. The trade balance was a negative US$124 million while the current account deficit significantly increased to US$112 million. As at the end of 2010, both deficits were each in excess of US$100 million. Trend in foreign direct investment (FDI) followed similar flows from positive net inflow of US$10 million in 1975 to negative US$19 million in 1980. This, however, remained relatively positive till 2010 (World Development Indicators (WDI) and International Financial Statistics of the International Monetary Fund (IFS/IMF) (various years)).

As a policy instrument, the International Monetary Fund (IMF) has often recommended currency devaluations for countries suffering from balance of payments' (BoP) deficits and international reserve shortages. This is done with a view to correcting the BoP deficits by making the exports of the affected economies more attractive in the international market.

Despite the significant depreciation of the exchange rate over the years, none of the components of the country's BoP depicted improvements in its position. Also observed from the country's data, as exchange rate depreciated, the general price level increased. This implies that exchange rate movements have a role in the determination of other macroeconomic fundamentals including the consumer price level. The key question that may arise from the foregoing is, how, has exchange rate depreciation influenced Sierra Leonean BoP position. Previous studies, specifically on Sierra Leone (Korsu and Braima, 2009; and Dabo, 2010) have focused mainly on exchange rate and economic growth, determinants of exchange rate and exchange rate misalignments, while its effects on the components of the BoP have not been examined.

1.2 Objectives of the Research

The broad objective of this research is to examine the effects of exchange rate dynamics on the balance of payments in Sierra Leone. Specifically, the objectives are twofold. These are to:

i. examine the factors that influence the balance of payments with specific reference to exchange rate behaviour; and
ii. analyze the pass-through effects of exchange rate depreciation through domestic price level to the balance of payments.

1.3 Justification for the Study

Exchange rate behaviour has been a fundamental problem for most economies. Exchange rate adjusts in order to make the country's exports more competitive in the international market and make import relatively expensive thereby improving the trade performance and hence, the BoP. Similarly, exchange rate depreciation is expected to attract Foreign Direct Investment (FDI) inflows due to among others the inputs cost effects in domestic currency. As such, many countries have taken this policy as a major tool in the maintenance of their monetary policies.

In spite of the several exchange rate policies that have been implemented in Sierra Leone, the country is still entrapped in persistent BoP problems. The existing literature has shown that exchange rate behaviour influences the BoP. However, the effect on the BoP has been silent about its components that have been significantly influenced. Is it the current account, the financial account or the capital account? How has each of these components responded to such changes over the years? This study attempts to find answers to these questions by anlyzing exchange rate movements on each of the components of the balance of payments. Also, exchange rate and the consumer price index both being prices, analysing their relationship would inform the monetary authorities in the designing of policies that affect both the internal and the external sector.

Another salient rationale for the study is that empirical studies on exchange rate and BoP particularly for Sierra Leone are scanty and in-depth analysis of all the components of the BoP are hard to find. Three studies identified by this research in similar area are those by Korsu (2008), Korsu and Braima (2009) and Daboh (2010). Korsu (2008) adopted the Vector Autoregressive (VAR) technique to examine the relationship between exchange rate and BoP adjustment by concentrating on the absorption approach to BoP. The researcher generalized the effects of exchange rate on BoP with no consideration to the financial account balance and the capital account balance. Korsu and Braima (2009); and Daboh (2010) both employed the Ordinary Least Squares (OLS) estimation method to investigate the determinants of real exchange rate and, exchange rate misalignment in Sierra Leone and other West African Monetary Zone (WAMZ) countries, respectively.

The main pitfalls associated with the use of the OLS technique are the management of outliers in data series. The least squares method is concerned with minimizing the sum of the squared error, but any data series or point that has a dependent value that differs from the rest of the data will have a disproportionately large effect on the resulting coefficients that are being estimated. Hence a single outlier if not well managed can cause poor prediction in an analysis. Also, the OLS suffers from the linearity assumption, which in reality most systems or relationships are not linear. Again, handling of too many variables can cause serious difficulties. The OLS regression is particularly prone to this problem, for as soon as the number of features used approaches the number of data points, the least squares solution seizes to be unique, and hence its algorithm fails.

The studies by Korsu and Braima (2010); and Daboh (2010) also lack the high frequency data requirements in examining the dynamic effects in the relationships as annual data were used. This study, therefore, seeks to: i) add to the existing studies by using high frequency (quarterly) data; and ii) adopt the Autoregressive Distributed Lags (ARDL) approach, provides the to analyze both the short-and-long-run relationships between exchange rate and each of the components of the BoP. The ARDL estimation technique is suitable for analyzing either small or large sample size and relatively free from estimation restrictions that are common to other estimation techniques such as the

Johansen and Juselius (1990) maximum likelihood Vector Autoregressive (VAR) model, among others, in cointegration analysis.

Also of significance is that the identified studies on Sierra Leone used global gross domestic product as proxy for foreign income in examining the country's BoP. Although international trade is a global issue, no individual country can trade with all the countries of the world equally. Therefore, the influence of world GDP which is an aggregated GDP of all the countries may be misleading to certain degree. This study has used the GDP of highly influential trading partners, the European Union (EU) of the country as proxy for foreign GDP. The EU is a large trading bloc and accounts for almost two-thirds of Sierra Leone's trading activities and, therefore, using their GDP may provide a realistic analysis for the impact of global income on the country's BoP and, might be less fraught with measurement errors. On policy grounds, domestic policies may be adjusted based on what happens in such a market to influence its own domestic market in both the short and long runs. Furthermore, evaluating the effects of exchange rate behaviour on each of the components of the BoP helps in designing an adequate monetary policy to address the country's BoP problem.

1.4 Scope of the Research

The study is centered on Sierra Leone mainly due to the persistent problem in the BoP position despite the policy shifting of exchange rate policies and high depreciation of the policy variable in the country. The trade component of the current account is disaggregated into exports and imports to determine the effects of exchange rate on each of them covering quarterly time series data spanning from 1975 to 2010 for the current account balance and the general price level analysis. Annual data is employed in the analysis of the impacts of exchange rate on the capital account balance and financial account balance. This is mainly due to the nature of the available data for both the capital account and the financial account, which are provided on annual basis.

The choice of the period is driven by the time exchange rate volatility has gained grounds in empirical research since the adoption of the floating exchange rate and also by data availability from the official sources such as the International Financial Statistics of the International Monetary Fund (IFS/IMF) and the World Development Indicators from the World Bank.

1.5 Plan of the Study

The rest of the study is organized into five chapters. Following the introductory chapter, chapter two describes development in exchange rate policies and its interrelationship with the components of the BoP and the consumer price index. Presented in chapter three is the literature review, which entails theoretical and empirical review of related studies. Chapter four presents the theoretical foundation and the research methodology including the models and the estimation procedure adopted. Chapter five contains the statistical analysis of the time series data used, estimation and interpretation of the results; while the summary, conclusion, policy recommendations are provided in chapter six.

CHAPTER TWO

SIERRA LEONE'S EXCHANGE RATE POLICIES AND THE DEVELOPMENT OF THE BALANCE OF PAYMENTS

This chapter describes the exchange rate regimes and the development of the balance of payments in Sierra Leone. It is divided into three main sub sections: the exchange rate policies or regimes over the years, relationships between exchange rate behaviour and the balance of payments in general; and exchange rate on each of the components of the balance of payments and, the consumer price level. Provided also is, selected macroeconomic indicators of the country.

2.1 Developments in the Exchange Rate Policies/Regimes

Traditionally, two categories of exchange rate systems, the fixed exchange rate and the flexible exchange rate, which includes the managed floating, have continued to dominate exchange rate policies in both developed and developing economies. The systems are classified on the basis of the flexibility that the monetary authorities demonstrate towards fluctuations in the exchange rates of their individual economy.

As with many developing countries, Sierra Leone maintained the fixed exchange rate policy for a long period following the Bretton Woods System. The Authorities were at first reluctant to devalue the local currency (the Leone (Le)) or to adopt a (managed) flexible exchange rate regime for fear that such an action would reduce the external value of the currency and further increase pressure on the general price level through the exchange rate pass-through phenomenon. But as the problems in the external sector, especially with the persistent deterioration in the trade balance, the fixed exchange rate was abandoned. The first exchange rate policy measure took place in the late 1970s when the Leone was de-linked from the pound and set at the rate of Le2.25 per special drawing

right (SDR). This caused the currency to appreciate marginally by 8.7% from Le1.15/US$1 in 1977 to Le1.05/US$1 in 1978.

As the country's economic performance continued to weaken, the Central Bank changed its intervention strategy by introducing a dual exchange rate system under the Modified Exchange Rate Arrangement (MERA) in early 1980. This involved an official exchange rate[5] pegged to the US dollar on one hand and a commercial market rate on the other. This policy was, however, not quite prudent as the external sector performance continued to decline with export earnings being diverted to the parallel market in order to reap the marginal gain in the exchange rate differential. Subsequently, by mid-1986, the exchange rate system was unified but this distorted other macroeconomic operations. Prominent among others was the high growth in fiscal deficits, from 3.71% of GDP in 1986 to 18.63% of GDP in 1987. The subsequent financing of the fiscal deficits through borrowing from the banking system caused the domestic financing-to-GDP ratio to increase from 1.92% of GDP to over 10.74% of GDP of the same period. This increased money growth concurrently with high inflation.

Due to the wide disparity of the premium between the fixed exchange rate and the parallel market rate, the exchange rate was liberalized in 1990. The period of exchange rate liberalization, between 1990 and 2000 was a period of economic difficulties. The country was in political crisis with greater proportion of the domestic policies designed towards managing the crisis. Most of the monetary policies of price stability, attainment of higher and stable economic growth, low level of unemployment were not adequately addressed. Hence, there was rapid deterioration of the local currency, which was followed by high inflation.

Presented in Figure 2.1 is the exchange rate development under different exchange rate policies from 1975 to 2010, while Figures 2.2 and 2.3 show exchange rate under different exchange rate regimes (using logarithmic scale) and short-term exchange rate variability, respectively. Even though no comprehensive exchange rate policies were formulated to the period before 1981, it is evident from figure 2.2 that the exchange rate maintained a

[5] The official exchange rate was set at Le1.52/US$1, while the commercial market rate floated with no definite rate.

path of stable depreciation during the period. Between the period 1982 and 1990, the exchange rate apparently left its path of stable depreciation. Exchange rate was thus, highly volatile during this period. The situation petween the period of 1990 and 2000, however, did not improve but was relatively better than the previous period. The situation from 2000 to 2010, which was the period the Central Bank embarked on a managed/dual exchange rate system, has been characterized by a stable variability in the exchange rate compared with other periods of exchange rate policies.

Presented in Figure 2.3 is the short-term variability of the exchange rate. The figure shows that the variability of the exchnage rate increased significantly from 1981 and 2000. High volatility could be observed between period 1981 and 1990. This period was characterised by a one party State with little or no monitoring of government operations. Also, during this same period, the government hosted the Organization of Africa Unity, now the Africa Union in 1980. Available data (see Table 2.4) show that, in 1980, government expeniture as a percentage of GDP stood at 30 percent, while domestic revenue was 17 percent. This caused a budget deficit of 13 percent of GDP, which could be considered enormous when compared to other years covered by the study. This placed pressure on the domestic economy in general, as greater percentage of the deficit was financed from domestic borrowing thereby hampering domestic investment. Specifically, the hosting of the OAU conference exacerbated the country's economic problems in the following ways: Prior to the OAU, the government embarked on huge infrastructural development in the areas of housing, hotels and conference centres, roads; and electricity, which were concentrated mainly in the capital city, Freetown. Government recurrent expenditure also hikened with the procurement of more government vehicles, thus increased government fuel consumption during the period and years after. During the same period from 1980 to 1991 when the civil war broke out, both monetary and fiscal policy were in disarray as the interest of the central government was seen overriding all other policy intentions.

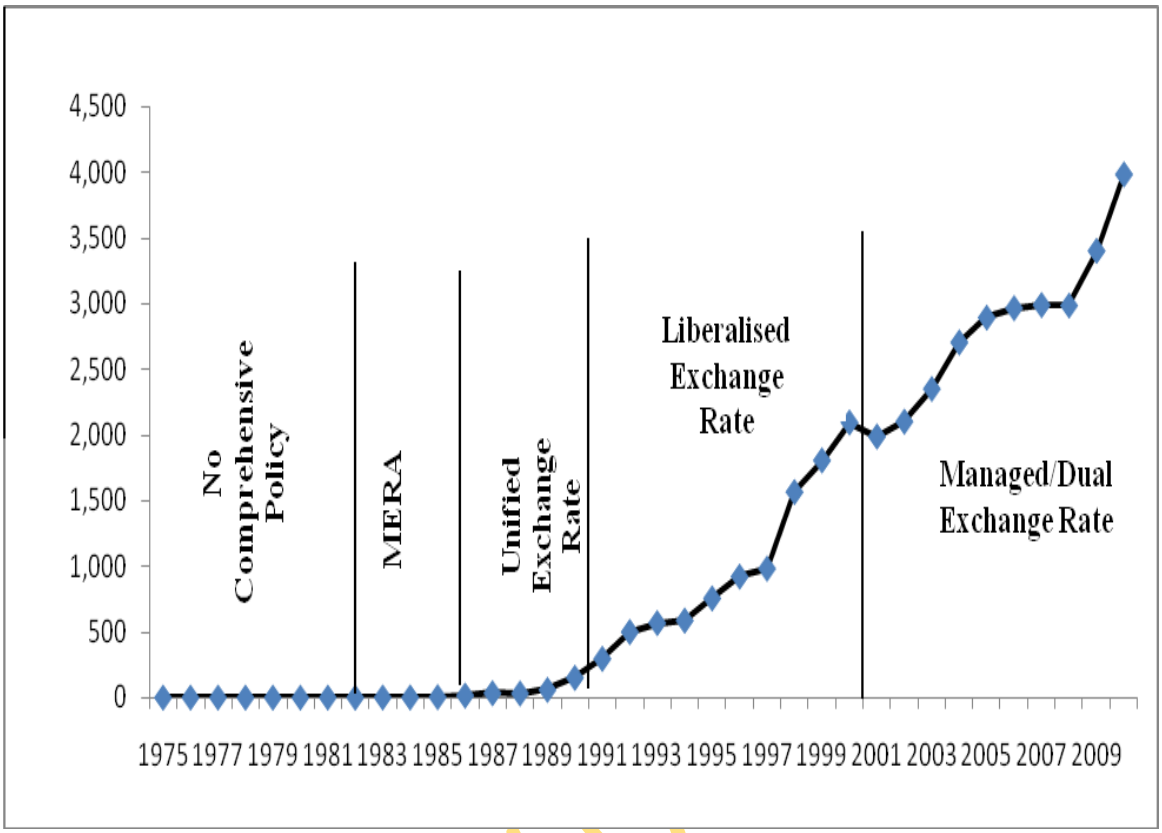

Figure 2.1: Exchange Rate Policy Regimes and Exchange Rate Movements

Source: International Monetary Fund (IMF), *International Financial Statistics* CD-ROM (2010).

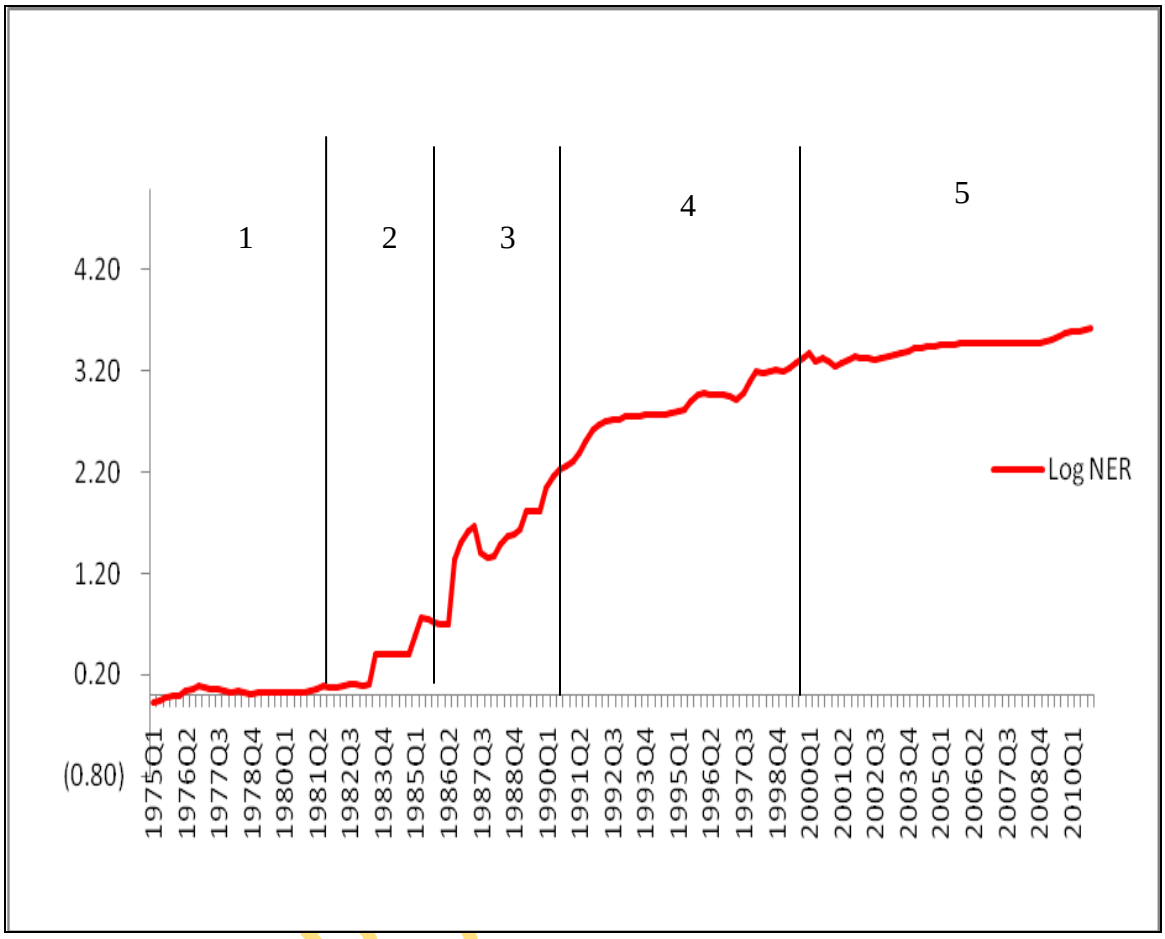

Figure 2.2: Exchange Rate under the different Regimes (Logarithmic Scale)

Note:

1: Throughout the end of 1981 (No comprehensive exchange rate policy was adopted)

2: 1981-1985: Modified Exchange Rate Arrangement (MERA)

3: 1985-1990: Unified Exchange Rate System

4: 1990-2000: Liberalized Exchange Rate System

5: 2000-2010: Managed/Dual Exchange Rate System

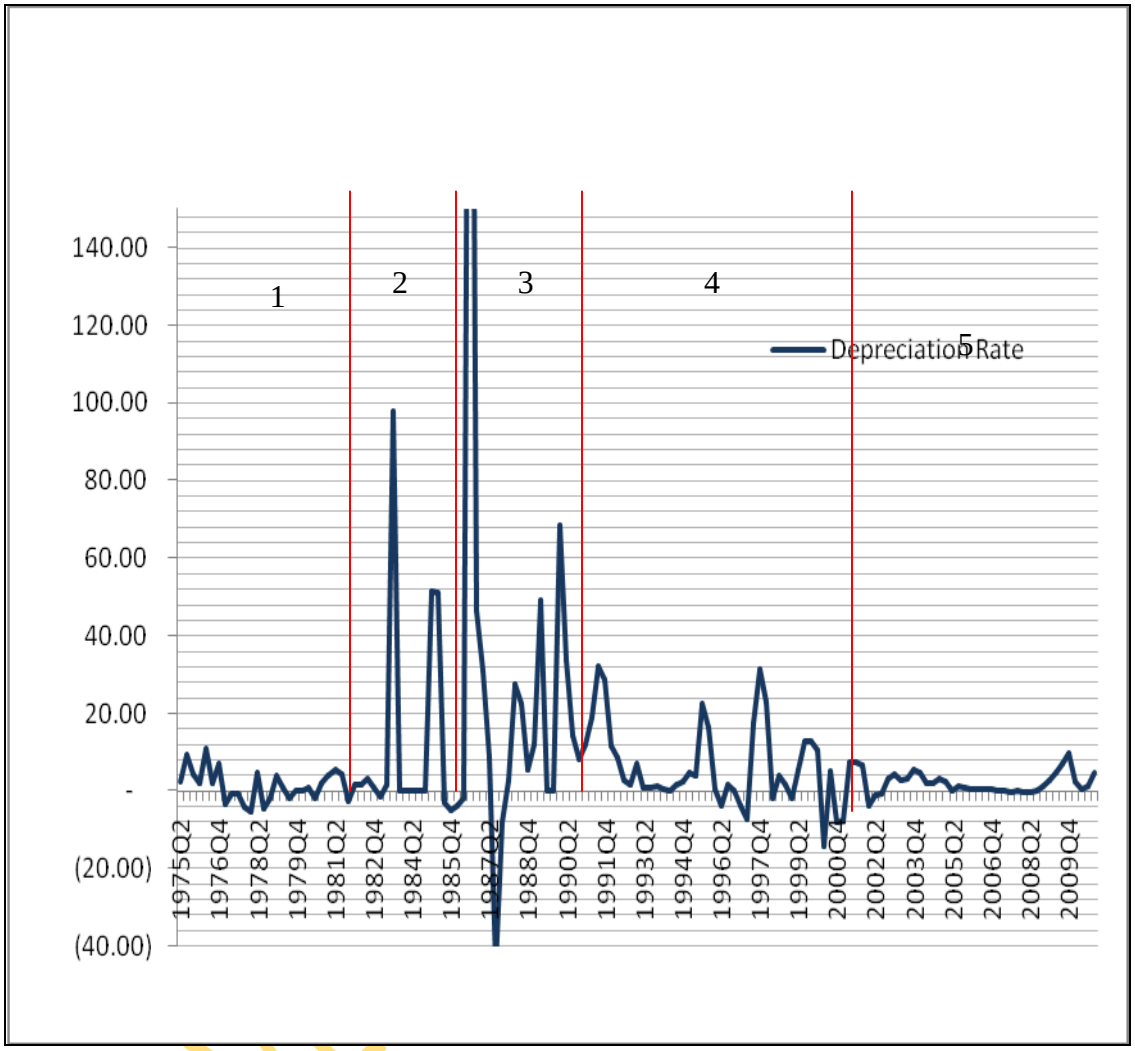

Figure 2.3: Short-Term Variability of the Exchange Rate

Source: Author's, using data from the IMF *International Financial Statistics* CD-ROM

Note:

1: Throughout the end of 1981 (No comprehensive exchange rate policy was adopted)

2: 1981-1985: Modified Exchange Rate Arrangement (MERA)

3: 1985-1990: Unified Exchange Rate System

4: 1990-2000: Liberalized Exchange Rate System

5: 2000-2010: Managed/Dual Exchange Rate System

2.1.1 Exchange Rate Policy in the Post-War Era: 2000-2010

In Sierra Leone, the cessation of the civil war was officially declared in 2002 but before this time, monetary authorities had already insinuated negative repercussion of the war on both the domestic and external sector of the economy. Among the precautionary actions taken was the redesigning of the foreign exchange market operations. This policy was not new for countries mostly emergeed from civil war. For instance, after the Asian crisis that occurred between 1997 and 1999, the Central Banks of five countries[6] intervened in the foreign exchange market. Their sole intention was to smooth out high frequency in the exchange rate fluctuation. The banks were, therefore, obliged to maintain a stock of foreign exchange reserves to facilitate their policy actions (Tiwari, 2003).

In 2000, the monetary authorities introduced a new exchange rate policy-the weekly auction process on sectoral basis alongside the market determined exchange rate system. Table 2.1 provides annual exchange rate movements and the sectoral distribution of foreign currency auctioned by the Central Bank of Sierra Leone for the period 2000 to 2010. The rationale for this policy was obvious as it eased pressure in the foreign exchange market for the importation of essential commodities such as rice, flour for domestic consumption and raw materials for industries and petroleum products. From the table, the highest amount was allocated for the importation of general marchandise of an average annual amount of US$15.86 million (34.2 percent of the average annual total amount). Second to this, was the amount allocated to the oil companies for the importation of petroleum products of US$ 14.96 million (32.3 percent) of the total amount per year. Industries such as Flour Mill, Cement factory, Brewery, were allocated annually US$5.44 million, while Commercial Banks were provided on average US$10.10 million per annum. Also, shown is the relative stable position of the exchnage rate. In 2000, the exchange rate was Le2,092.12 per US$1 and depreciated by 16.0 percent from 1999. The exchange rate, however, appreciated relatively to Le1,986.15 (by 5.1 percent) in 2001 and depreciated but at relatively low rates. This trend continued up to the period 2008 to 2010 when the global food crisis and economic meltdown seriously affected and forced the exchange rates to depreciated by over 15.0 percent to nearly Le4,000/US$1.

[6] Indonesia, Korea, Malaysia, Philippines and Thailand.

Nevertheless, this policy has indeed greatly supported the the local currency from high frequency fluctuations during the period.

Table 2.1: Sectoral Distribution of Foreign Currency Auction: 2000-2010
(Amount in US$'million)

Year	Exchange Rate	Rate of Depreciation	Banks	Industries	General Merchandize	Oil Company	Total
2000	2,092.12	15.96	8.31	4.70	18.18	8.66	**39.86**
2001	1,986.15	-5.07	4.19	3.48	17.19	2.05	**26.90**
2002	2,099.03	5.68	5.80	5.63	21.63	1.79	**34.86**
2003	2,347.94	11.89	9.52	7.46	26.90	12.85	**56.73**
2004	2,701.30	15.05	9.10	11.09	4.55	31.54	**56.28**
2005	2,889.59	6.97	9.72	6.55	6.40	18.71	**41.37**
2006	2,961.91	2.50	14.20	6.36	20.67	19.78	**61.01**
2007	2,985.19	0.79	12.66	5.58	18.63	6.10	**42.97**
2008	2,981.51	-0.12	12.23	4.43	7.92	9.70	**34.28**
2009	3,396.86	13.93	13.59	2.21	16.07	36.11	**67.98**
2010	3,978.09	17.11	11.82	2.35	16.33	17.24	**47.75**
Total	**2,765.43**[1]	**7.70**[1]	**111.14**	**59.84**	**174.47**	**164.54**	**509.99**
Average Annual			**10.10**	**5.44**	**15.86**	**14.96**	**46.36**
% of Total Amount			**21.79**	**11.73**	**34.21**	**32.26**	**100.00**

Source: Central Bank of Sierra Leone (2012).

1/--Average exchange rates and rate of depreciation for the period

2/-A negative rate of depreciation implies an appreciation of the exchange rate

2.2 Development in the Balance of Payments Performance

The balance of payments (BoP) resides at the crux of development of any economy. It shows the intersection of trade and finance and discloses the relationship of a given economy to the international marketplace. A nation's BoP is where its trade and finance flow converge. The term balance of payments refers to a statement showing all of a nation's transactions with the rest of the world for a given period (Chantal, 2000).

In Sierra Leone, there are significant differences when comparing the country's balance of payments dynamics during the study period. Its dynamic can be examined during three periods. These periods include the following: years before the civil war (1980-1991), the period of the war (1991-2002) and after the war (2002-2010). Prior to 1980 there was no comprehensive exchange rate policy precision. The local currency, the Leone was relatively stable and much stronger against the U.S. dollar (see Figures 2.1, 2.2. and 2.3 for the currency's none variability prior to 1980). This implies that there was no significant variation in both international trade and capital mobility during the period. Following the period from 1980, the country's balance of payments problems started developing and in 1986 the balance of payments deficit reached 20 percent of GDP (see Figure 2.4). Even though the deficit persisted, the BoP shifted into surplus at two year interval during the period of war: 1992 and 1993, 1997 and 1998, and 2000 and 2001. The performance during these years were $16.18mn (2.4 percent of GDP) in 1992, $7.52mn (1.0 percent of GDP) in 1993, and jumped significantly to $19.66mn (2.3 percent of GDP) in 1997 but dropped quite substantially to $2.09mn (0.3 percent of GDP) in 1998. In the following two set of years, 2000 and 2001, the surpluses attained in 2000 and 2001 were $9.76mn and $29.63mn, respectively. Apart from these years, the BoP had been in deficits throughout the study period except in 2006 when it attained a sharp surplus of $60.36mn (4.2% of GDP).

The reasons behind the laudable performance of the BoP during the aforementioned period were that during the war the country attracted the attentions of many international bodies and countries including the United Nations, the Department for International Development (DFID), and other agencies. These agencies provided humanitarian assistance in the form of food aid, medicine, clothing and housing. Some of these

agencies assisted in the provision of military gadgets, vehicles and training of personnel to fight the war and the cost of the importation of these goods and the payments for the services of the personnel (both foreign and local) were financed by the agencies and not the central government. Even though exports did not improve substantially to bring the trade balance into surpluses, it also observed that imports on commercial basis were low relative to the total domestic consumption. Combining the low imports with donor and humanitarians aid inflows improved the country's overall performance of the BoP during the war period.

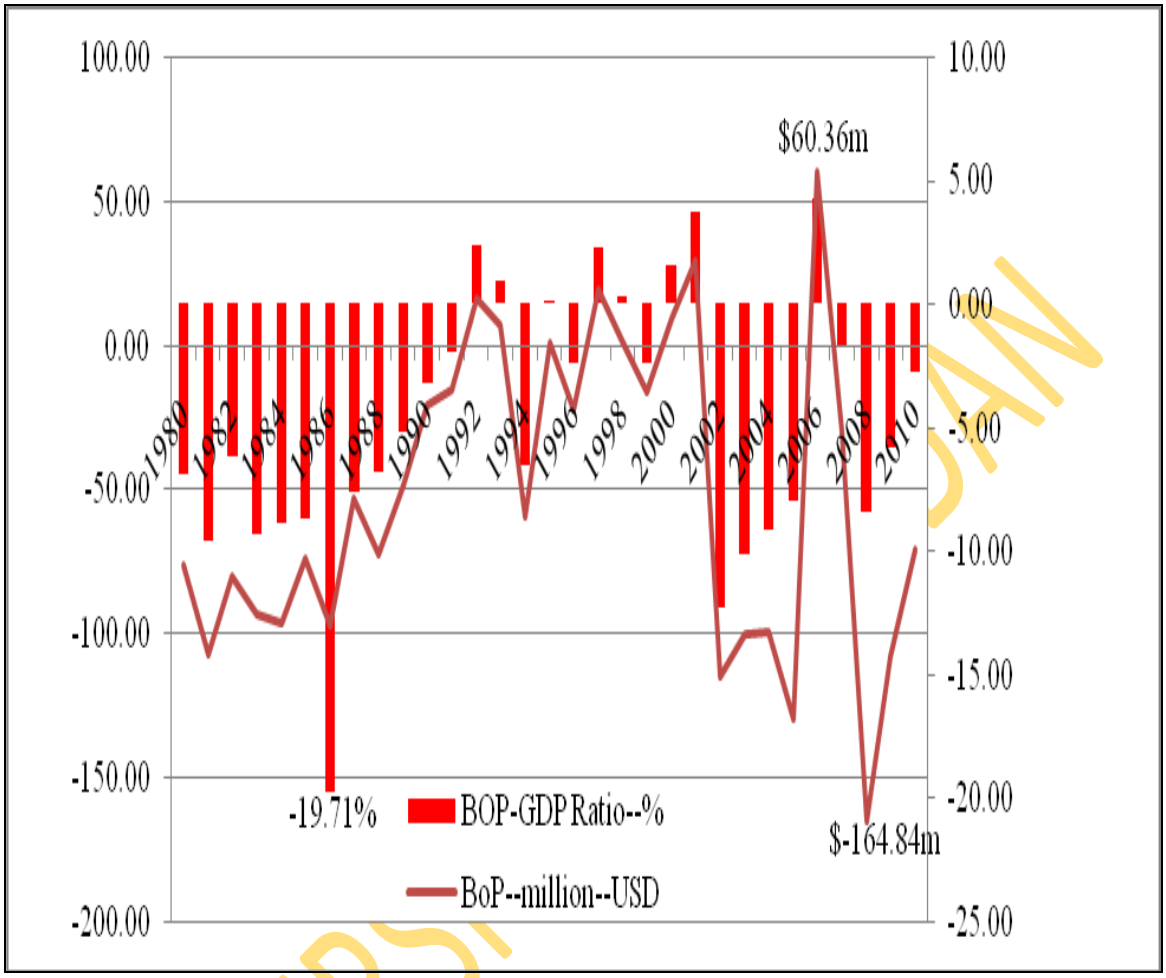

Figure 2.4: Trends in Balance of Payments

What component(s) of the BoP that caused it to attain the dramatic surplus especially during certain years of the civil strife but plunged into deficits during the period of serenity (that is, before and after the war). One explanation for this, therefore, lies on the current account balance (CAB). Data depicted that huge CAB deficits took place during the two periods of tranquility adjoining the civil war period. Throughout the period before the war with the exception of 1986, the Current Account Balances were all deficits. The highest CAB deficit was $169.87mn in 1982. Comparison between the current account balance during the war period and that after the war show mixed results. For most of the years after the war the CAB was negative with the highest being $585.30mn in 2010, while the CAB deficits that existed during the war were on the low side with the highest being $124.61mn in 2002.

Although the CAB did not attain surplus during the war period except in 1991, it attained a remarkable improvement when compared to the years after the war. One possible explanation for such performance was that most of the imports of goods especially food and drugs were in the form of humanitarian assistance by International Non-Governmental Organizations (INGOs) and the United Nations in particular. Most of the goods imported that were in the form of food, medicines and agricultural inputs, among others during the war were purchased and paid for through non-commercial windows, thus had little or no effects on the overall current account balance.

Also, the Financial Account Balance (FAB) showed a favourable flow during the period between 1980 ($114.49mn) and 1982 ($21.84mn); and turned negative, implying an outflow during the rest of the years before the war. The FAB also remained negative for some of the years during the war time but became positive in (1993, 1995 through to 1999[7]) great part of the war. This meant that even though there was civil unrest, the country still attracted investment inflows predominantly in the diamond mining sector, which was difficult to monitor and control due to the artisanal mining nature system. This gave rise to the so-called 'blood diamond' (proceeds from diamond used to fuel the country's civil war). Immediately after the end of the war in 2002, the international bodies that deal in diamond instituted 'certification of origin' for all diamonds exported

[7] The heat period of the war.

particularly from Africa. This significantly contributed to serenity in this sector in the country.

Financing of balance of payments deficits highly depends on the country's total reserves. The higher the reserves, the better the country would be in position to finance trades (particularly imports) for specific number of months without resulting to borrowing. Being capable to finance trade implies that the country is in a satisfactory position to solve the BoP deficits in the short run. Data showed that the total reserves minus Gold greatly fluctuated during the early years of the study period, from $30.6mn (2.8 percent of GDP) in 1980 to $5.43mn (0.8 percent of GDP) in 1990. Conversely, it improved considerably from $9.63mn (1.2 percent of GDP) in 1991 to $84.69mn (9.0 percent of GDP) in 2002. The reserves continued to increase to over $200mn (9.7 percent of GDP) in 2010.

Specifically, over the years, exchange rate depreciated steadily from 1.05 Leone (Le) to 1.00 United States dollar (US$) in 1980 through Le151.45/US$1 in 1990, Le2,092/US$1 in 2000 to Le3,979.09/US$1 in 2010. In the same periods, the BoP as a percentage of Gross Domestic Product fluctuated between -15.0 percent and 3.0 percent. From the aforementioned relationship, it can, therefore, be concluded that exchange rate remains one of the key factors that have influenced the Sierra Leone's BoP position. Exclusively, the development in the exchange rate policy in Sierra Leone portrays a relationship between exchange rate movements and the balance of payments. Most of the control exchange rate behaviour has on BoP may occur through its components, which is described using trend analysis. Sections 2.2.1 to 2.2.4 discuss each of the links.

The Dynamic behaviour of BoP could be attributed to either permanent or temporary factors such as policies that depict the objectives of the monetary authorities, which might work mainly on the current account balance of the BoP. Other factors may be related to structural changes of the country's socio-economic and political landscapes during certain time period. In diverse ways, the government has adopted a number of policy mentions. As already illustrated, the government through the Bank of Sierra Leone[8] had adopted

[8] Bank of Sierra Leone is the country's central bank

series of exchange rate policies (pegged, managed and floating) since the end of the Bretton woods system and has continued to implement other monetary policies like inflation targeting. On the fiscal policy front, the government in 2003, committed to fiscal consolidation by establishing a one revenue collecting agency, the National Revenue Authority (NRA), aimed at a sustainable budgetary system and subsequently embarked on fiscal decentralization in 2005. In a similar way, established investment codes, trade policies and joined other regional organizations, which were geared towards improving the CAB, hence, the BoP.

Table 2.2: Exchange Rates and the Balance of Payments for Selected Years 1997-2010 (Amount in USD'million)

Year	1980	1985	1990	1995	2000	2005	2010
NER	1.05	5.09	151.45	755.22	2,092.12	2,889.59	3,978.09
RER	1,842.04	1,428.31	2,251.12	2,032.62	2,505.55	2,894.65	5,864.10
REER	220.46	396.01	124.72	134.97	142.51	100.00	110.20
GDP	1,100.69	856.89	649.64	870.77	635.88	1,627.85	2,575.47
CAB	-165.16	2.80	-69.41	-118.07	-112.28	-104.94	-585.3
FAB	111.49	-67.64	-0.78	97.91	124.57	62.75	61.62
KAB	0.10	0.04	0.03	0.05	0.00	67.81	304.11
BoP	-75.86	-74.05	-20.91	1.35	9.76	-129.57	-70.86
Memo Items (as % of GDP)							
CAB/GDP	-15.01	-1.45	-10.68	-13.56	-17.66	-13.77	-27.21
FAB/GDP	10.13	-7.89	-0.12	11.24	19.59	3.85	2.39
KAB/GDP	0.01	0.00	0.00	0.01	0.00	4.17	11.81
BoP/GDP	-6.89	-8.64	-3.22	0.15	1.53	-7.96	-2.75

Source: Computed from Data provided by the IMF/IFS Yearly CD/ROM

2.2.1 Exchange Rate and the Current Account Balance

The current account balance which, is made up of the balance of trade, remains the most dominant component of the Sierra Leone's balance of payments. It has a trade openness[9] of over 30% of GDP. Hence, different exchange rate policies would imply diverse responses of the current account position. For instance, with all these policies, trade balance has remained negative for a prolonged period of years. Export earnings continued to be exogenously affected by economic events such as the global financial crisis in 2008. The country continues to rely on exports of primary commodities and minerals for foreign currency earnings but any decline in the prices of these exports would further exacerbate the negative performance in the current account. Figure 2.6 shows the behaviour of exports and imports to exchnage rate movements from 1970-2010.

From Figure 2.5, it is observed that there are significant differences when comparing the country's current account behaviour during the period 1980 to 2010. Prior to 1991, it was a period that can be described as period of peace but characterized by neglect of socio-economic responsibilities in high government places. This argument is supported by the fluctuation in the current account balance as a ratio to GDP, which was negative throughout the period with the exception of 1986 when it attained a substantial surplus.

Major development that occurred during the 1986 was the discovering of diamonds that were of high commercial value, which were exported and the government earned a huge foreign exchange reserve. After wards, all the other years have been characterised by huge current account deficits. Additional problems intensified with the closure of three major mining companies[10] in the country. These companies were the main sources of foreign exchange earning, job creation, payments of taxes (income, corporate) and non-tax revenues (royalties, licenses, community development funds, contribution to education in the form of scholarships especially to dependants of employees), among others.

[9] Total exports and imports as percentage of GDP
[10] The National Diamond Mining Company (NDMC); Sierra Leone Ore Mining Company (SIEROMCO) and the Sierra Rutile Mining Company.

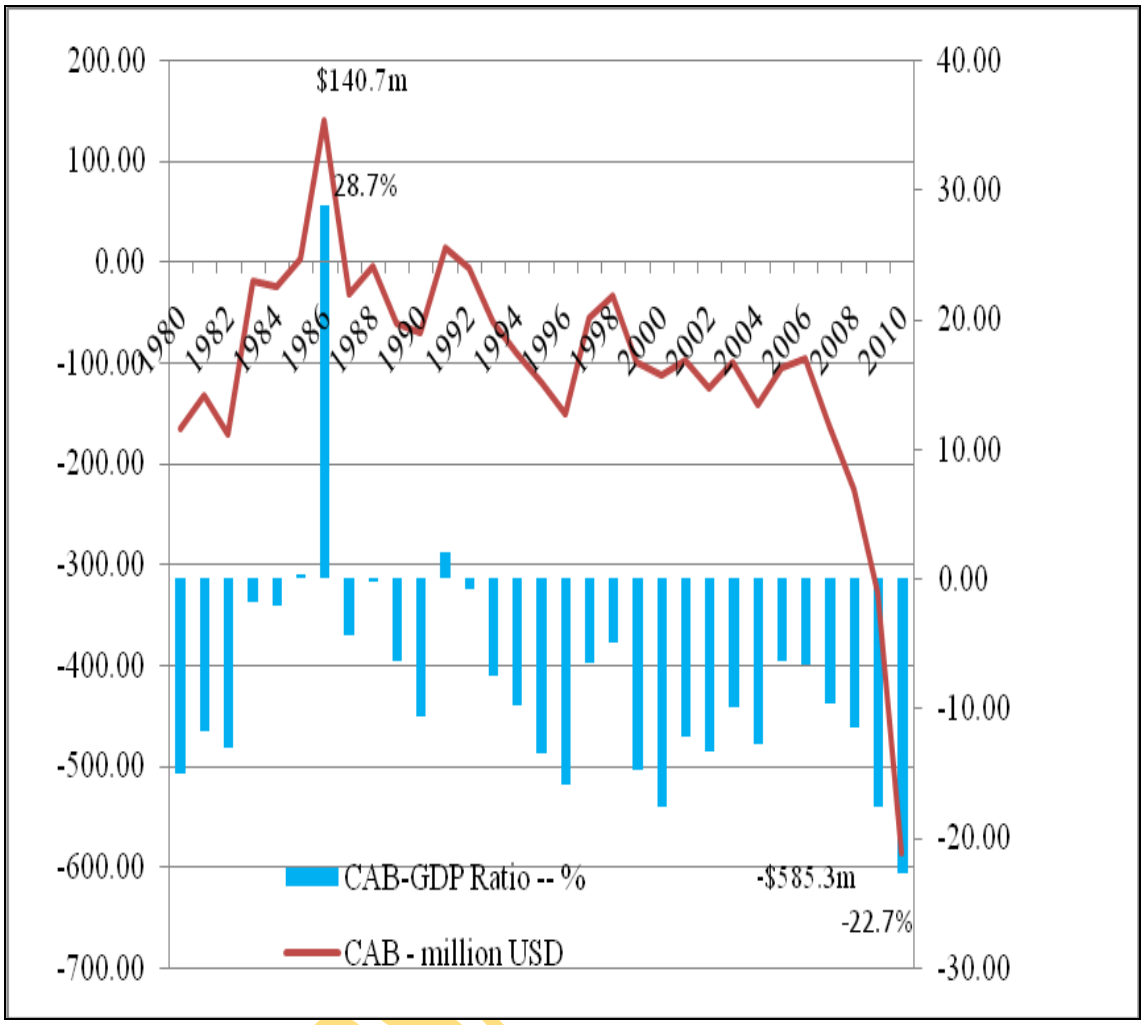

Figure 2.5: Trends in the Current Account Balance

Table 2.3: Main Components of the Current Account Balance

(Amount in US$'million)

Year	Exports	Imports	Trade Balance	Current Account Balance
1980	226.62	385.88	-159.26	-165.16
1981	165.91	282.03	-116.12	-132.09
1982	122.55	260.28	-137.73	-169.87
1983	115.1	132.97	-17.87	-17.61
1984	139.21	149.72	-10.51	-23.03
1985	135.84	141.22	-5.38	2.80
1986	131.72	111.42	20.3	140.74
1987	141.98	114.83	27.15	-30.35
1988	107.9	138.21	-30.31	-2.84
1989	142.03	160.36	-18.33	-59.74
1990	148.52	140.44	8.08	-69.41
1991	149.51	138.55	10.96	15.34
1992	150.38	139.02	11.36	-5.48
1993	118.27	187.11	-68.84	-57.77
1994	115.99	188.74	-72.75	-89.12
1995	41.47	168.13	-126.66	-118.07
1996	46.78	226.5	-179.72	-150.5
1997	15.72	71.94	-56.22	-54.87
1998	31.64	88.8	-57.16	-33.24
1999	6.29	86.8	-80.51	-99.31
2000	12.8	136.92	-124.12	-112.28
2001	29.15	165.13	-135.98	-97.87
2002	59.84	254.94	-195.1	-124.61
2003	110.79	310.7	-199.91	-99.1
2004	154.07	274.32	-120.25	-140.68
2005	183.63	361.67	-178.04	-104.99
2006	261.88	351.19	-89.31	-95.02
2007	288.88	395.45	-106.57	-160.13
2008	273.53	471.21	-197.68	-225.44
2009	267.65	617.5	-349.85	-326.98
2010	360.17	880.75	-520.58	-585.29
Annual Average	**137.28**	**242.99**	**-105.71**	**-102.97**

Source: Computed from Data provided by the IFS/IMF Yearly CD/ROM

The figure depicts that at some point when exchange rate depreciated both the exports and imports improved appreciably but at the same time, there was deficit in the trade balance. The performance was, however, mixed with surpluses attained at certain period. This showed an indication of the J-Curve phenomenon, which postulates that a depreciation or devaluation of the exchange rate would immediately worsen the current account balance before improving.

2.2.2 Exchange Rate and the Financial Account Balance

Unlike the KAB, the relationship between exchange rate and the Financial Account Balance (FAB) does not demonstrate specific trend path. Although net FDI inflows as a percentage of GDP fluctuated during the research period, it remains the key driver of the FAB. Its highest value was US$238.40 million (9.41% of GDP) in 2010, while its lowest value was negative US$140.31 million (-28.62% of GDP) in 1986. Figure 2.7 shows the trends of exchange rate movements and the FAB over the study period.

It can be discerned in the figure that while exchange rate showed a stable upward trend, the FAB, fluatuated but maintained a positive trend for the period 2000-2010. This growth was as a result of the positive net FDI inflows from US$39.00 million in 2000 to US$238.40 million in 2010. The peace building efforts together with favourable investment opportunities after the country's crisis contributed immensely to FDI inflows during the period.

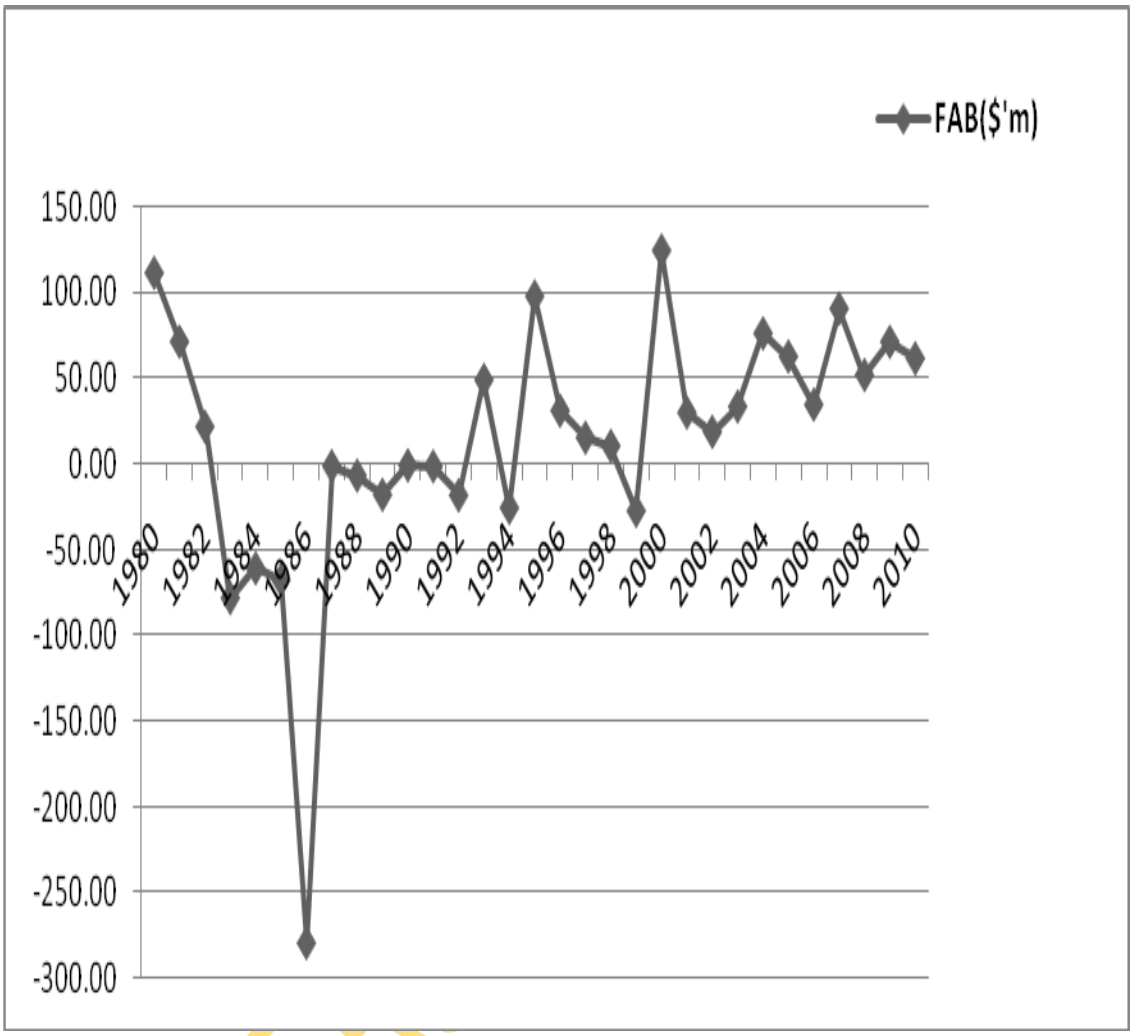

Figure 2.6: Trends in the the Financial Account Balance

2.2.3 Exchange Rate and the Capital Account Balance

Based on the nature of the country's economic activities in the extractive industries of diamonds, bauxite and rutile, the capital account balance (KAB) has continued to be an important component of the country's BoP. Grants to poor countries, war efforts and debt forgiveness became renowned in the KAB during the post-civil strife era. Specifically, the country was slated for debt relief under the heavily indebted poor countries (HIPC) initiative to the amount of over US$918.56 million[11] in 2000, and disbursement commenced with the preparation of the first poverty reduction strategy paper (PRSP-I) in 2005. A graphical representation of the relationship between exchange rate and the KAB is shown as figure 2.3. It is apparent that most of the discussions on this relationship centre on this era as significant changes in the account are manifested during this period. It can be figured out from the graph that exchange rate depreciation became prominent from 1990 and much more after 2000. A significant change in the KAB became noticeable after the delivering of the interim HIPC debt relief by multilateral and bilateral creditors in 2002-2006, which amounted to over US$205.4 million[12].

[11] Sierra Leone: Poverty Reduction Strategy Paper June 2005: IMF Country Report No.05/191 2005.
[12] The total debt relief under the enhanced HIPC Initiative amounted to US$867.2 million (36.18% from Bilateral Creditors)

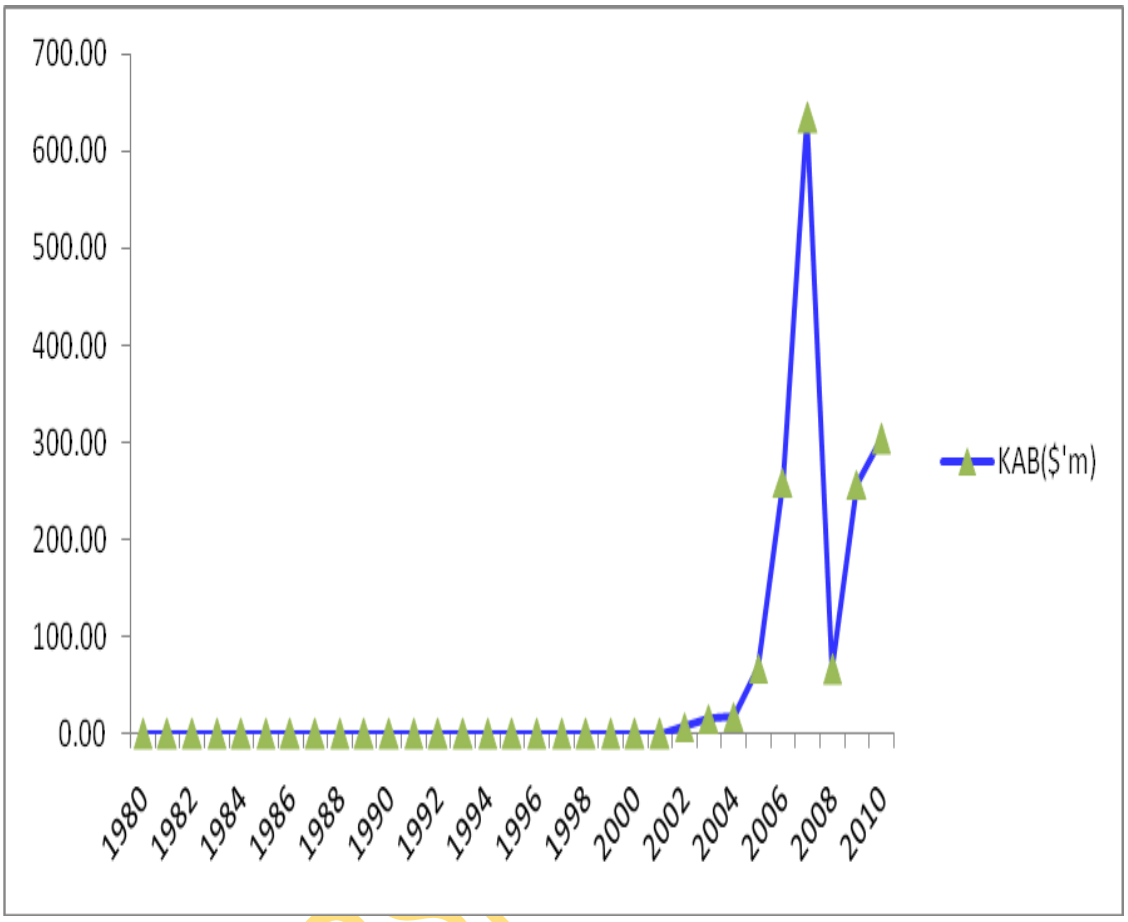

Figure 2.7: Trends in the Capital Account Balance.

2.2.4 Exchange Rate and the Consumer Price Index

Domestically, the consumer price index remains one of the main channels through which exchange rate behaviour influences the BOP position. This implies that Sierra Leone being a net importer of goods and services[13], any change in the international prices of these goods would tend to have an immediate effect on the country's general price level. Figure 2.8 provides trend analysis of the co-movements of exchange rate and the consumer price index in Sierra Leone. This implies that as exchange rate trends upwards so also the general price level.

[13] From the country's persistent trade deficit figures in the study period.

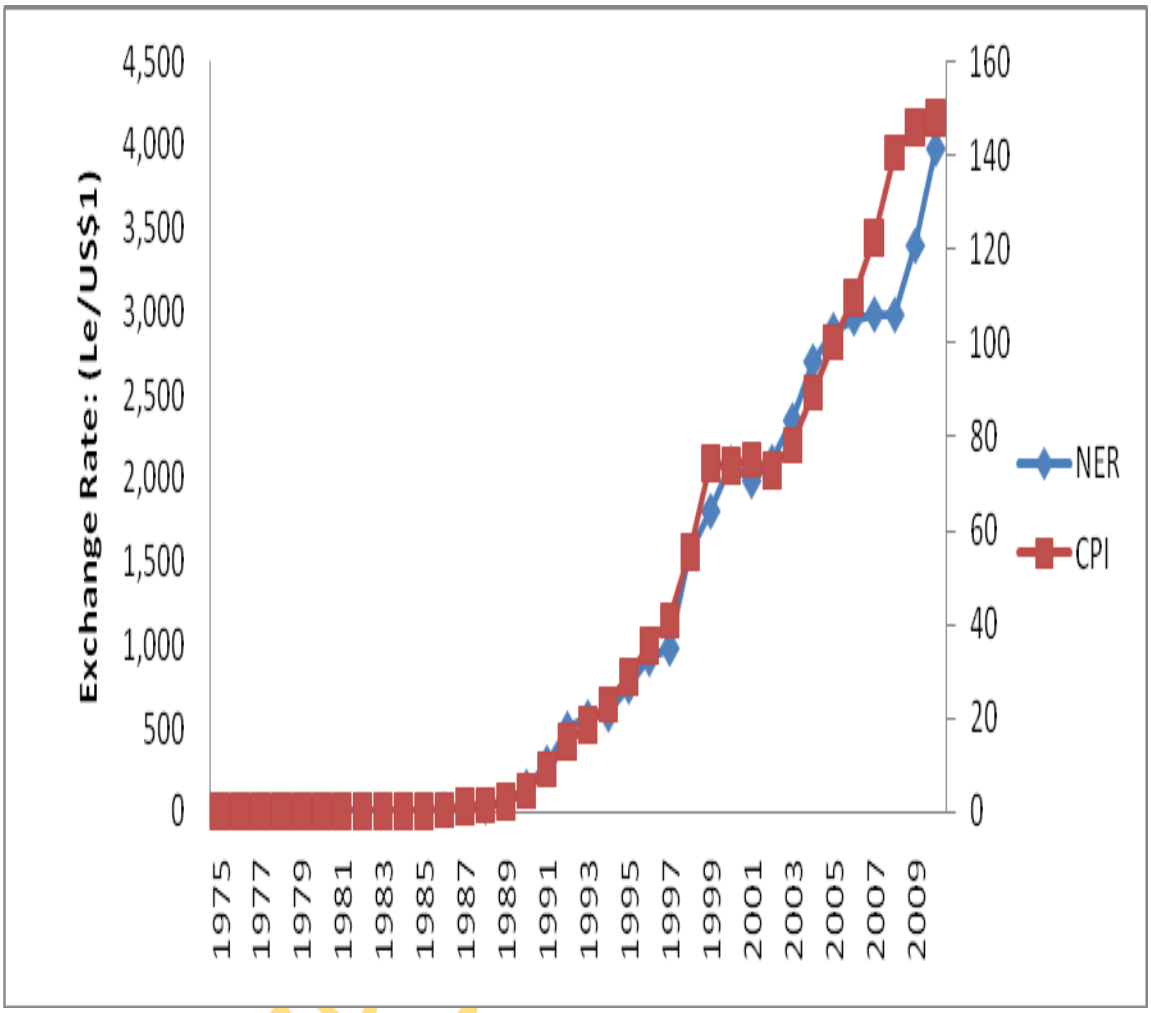

Figure 2.8: Trends in Exchange Rate and the Consumer Price Index

2.2.5 Selected Macroeconomic Indicators for Sierra Leone: 1980-2010

Understanding the interaction between exchange rate and the balance of payments might be more significant when other macroeocnomic policy variables such as the fiscal operations and the general economic performance are also considered. Presented in Table 2.4 are the country's balance of payments figures and selected macroeconomic indicators taken on five yearly intervals for the period 1980-2010. The table shows that while nominal exchange rate depreciated progressively from Le1.05/US$1 in 1980 to Le3,378.09/US$1 in 2010, government revenue as a percentage of GDP ranged between 17.06% and 27.99%. This relationship operated mainly through international trade taxes (import duties and import sales tax). As exchange rate increases so also will the nominal value in local currency of the imported goods on which duties are levied. This makes government revenue to grow almost in proportion with exchange rate depreciation. For government expenditure, it fluctuated between 29.88% and 30.02% (of GDP) during the same period. Conversely, overall deficit financing as percentage of GDP fell reasonably from 12.82% in 1980 to 2.21% in 2010. These were on account of the taking over of some of the government's expenditure items by its development partners during the post-war period.

Table 2.4: Sierra Leone's Balance of Payments and Selected Macroeconomic Indicators: 1980-2010

Year	1980	1985	1990	1995	2000	2005	2010
Nominal Exchange Rate Le/US$)	1.05	5.09	151.45	755.22	2,092.12	2,889.59	3,978.09
Real Effective Exchange Rate	156.16	278.19	88.34	94.72	100.00	70.88	55.57
GDP (in US$'mn)	1,100.69	856.89	649.64	870.77	635.88	1,239.40	1,909.76
Total Foreign Reserves (US$'mn)	30.60	10.82	5.43	34.62	49.21	170.51	265.56
Real GDP Growth Rate	4.62	-5.65	3.24	-8.69	3.29	7.50	4.50
Inflation	12.90	76.58	110.95	25.99	-0.84	12.05	16.50
Domestic Operation: (% of GDP)							
Gov_Revenue	17.06	7.49	5.92	10.26	19.41	22.88	27.99
Gov_Expenditure	29.88	16.09	8.37	16.32	28.74	24.78	30.02
Budget Balance	-12.83	-8.60	-2.45	-6.06	-9.33	-1.91	-2.21
Deficit Financing: Domestic	9.04	7.37	1.96	0.37	0.88	0.46	1.31
Deficit Financing: Foreign	3.78	1.23	0.49	5.69	8.45	1.45	0.90
Balance of Payments: (% of GDP)							
Export	20.28	14.87	21.37	4.58	2.01	13.63	23.48
Import	38.73	18.07	22.94	15.59	23.65	29.67	43.47
Trade Balance	-18.45	-3.20	-1.57	-11.00	-21.64	-16.04	-22.45
Current Account Balance	-15.01	-1.45	-10.68	-13.56	-17.66	-13.77	-27.21

Sources: Computed from the IMF, International Financial Statistics (IFS) yearly books and IMF CD-ROM (2010).

CHAPTER THREE

LITERATURE REVIEW

Studying exchange rate dynamics and the balance of payments is appropriate for many developing economies where, especially trade and foreign investment inflows continue to drive balance of payments account. These interrelationships among exchange rate and the foreign sectors have direct bearing on the domestic economy through consumer price responses. This chapter is a review of related studies in these areas. It is divided into four sub-sections. Sub-section one is a general view on exchange rate movements and the balance of payments, while evidence on the relationship between exchange rate and the current account is contained in sub-section two. Exchange rate and the financial account; and exchange rate pass-through to consumer prices are in sub-sections three and four, respectively.

3.1 Exchange Rates and the Balance of Payments

As expressed in research documents of the International Monetary Fund (IMF), the balance of payments[14] is a statistical statement that systematically summarizes, for a specific time period, the economic transactions of a country with the rest of the world. It categorizes the value of goods and services a particular country has exported and imported, and its level of borrowing from or lending to the rest of the world and also the level of investments. The net of all these transactions is matched by a change in the country's international monetary reserves. Because countries have always been heavily reliant on international trade and capital inflows to fund new investments, the balance of

[14] Source: Balance of Payments Manual, IMF. (see Appendix 1 for classifications of BoP)

payments is, therefore, seen as an important indicator of a country's economic strength. The significance of the BoP position (a deficit or surplus) has changed quite significantly since the advent of the floating exchange rate system following the collapse of the Bretton Woods institution in the 1970s. Thus, exchange rate behaviour has great influence on the BoP position of any economy.

Traditionally, the BoP statistics comprise three components, the current, financial and capital accounts; and there is a considerable body of literature on the relationship between exchange rates and each of these account balances. Some of which have been surveyed in several papers.[15] There is, however, no consensus in the existing literature on the subject of these relationships.

On the theory, Mussa (1976) assessed the fundamental principles of the monetary approach to BoP analysis in a regime of floating exchange rates under a number of assumptions. That exchange rate is the relative price of different national monies, rather than national outputs, and is determined primarily by the demands and supplies of stocks of different national monies. Secondly, exchange rates are strongly influenced by asset holders' expectations of future exchange rates and these expectations are influenced by beliefs concerning the future course of monetary policy. Also, real factors as well as monetary factors are important in determining the behaviour of exchange rates. He developed a model with the assumption that exchange rate is fundamentally an asset price that is proximately determined by the relationship between the willingness to hold domestic money and the stock of domestic money available to be held.

In emerging market economies, it is revealed by Jongwanich *et al.,* (2013) that increases (declines) in capital inflows are associated with real exchange rate appreciation (depreciation). But Edwards (1988, 1989) observed that the direction of the influence of exchange rate appreciation on investment flow has also remained vague. An appreciation of the exchange rate may signal the strength of the domestic economy, which further

[15] Some include, Mussa (1976), Aghevli and Khan (1977), Ajayi (1975), Edwards (1988, 1989), Cottani et al., (1990) for a group of developing countries, Ghura and Grennes (1993) for a panel of sub-Saharan African economies, Mwega (1993) for Kenya, Elbadawi (1994) for Chile, Ghana and India, Amin and Awung (1997) for selected francophone countries, Aron et al. (1997) for South Africa, Egwaikhide (1999) on Nigeria, and Mungule (2004) for Zambia.

increases net financial inflows. The ripple effect is a favourable (surplus) current account balance. Again, an appreciation of the domestic tends to decrease the relative value of financial inflows in domestic currency, while increasing the relative worth of financial outflows in foreign currency.

On trade issues, Cooper (1976) considered devaluation of domestic currency might lead to higher exports and lower imports, which in the long run improves the overall balance of payments position. Supporting Cooper (1976) views, Sodersten (1989) hypothesized that devaluation of a country's currency makes imports more expensive in terms of the domestic currency and if not matched by a corresponding rise in export prices, the terms of trade would deteriorate. Deterioration in the terms of trade represents a loss of real national income and may further exacerbate the balance of payments problem. Furthermore, an appreciation of the exchange rate weakens trade balance as exports become expensive in the international market while imports turn out to be relatively cheaper (Kandil, 2009).

In Africa's situation, Obadan and Nwobike (1991) pointed out that adopting multiple exchange rate systems as an option to devaluation have helped countries to solve their balance of payments problem. This is, however, viewed as too pricey from a political and societal point of view. Thus, a rationalized and proper administered dual exchange rate system can be very helpful to developing countries for ensuring the contentment of basic needs, ensuring fixed and balance of payments viability and general resource mobilization.

The empirical enquiry of Silumbu (1995), with particular reference to the Malawian economy that employed the Monetary Approach to Balance of Payments (MABP), is very illuminating. The researcher's main concern was the effects of the exchange rate, relative prices and domestic credit on the overall BoP within the reserve flow equation (RFE) variant of the MABP. The estimation results, using both quarterly and annual data, showed that the price exerted a significant lagged impact on the overall BoP. The impact of the non-tradeables price on the BoP was stronger from the relative price side than from the money demand side. The results of the Granger-Causality tests for credit and reserves

were diverse. However, unidirectional causality was established from private sector credit to reserves. The conclusion about the long-run causes of balance of payments fluctuations remained uncertain. Therefore, no policy conclusion could be inferred from the study. By applying cointegration and error correction mechanism econometric method using annual data for the period 1981 to 2002, Nwani (2005) asserted that exchange rate movements and inflation greatly influenced Nigeria's balance of payments.

3.2 Exchange Rate and the Current Account Balance

The current account comprises of four components[16] but the aggregation of trade balance has received a good deal of attention in empirical studies than in any of the other components in both developed and developing economies. The influence of exchange rate movements on the current account balance takes place through these components. For instance, exchange rate depreciation is assumed to improve trade balance, which might lead to a surplus in the current account balance; and a current account surplus in any period reduces a country's total net foreign debts and further improves its international investment position.

In this section, a review of exchange rates and trade balance is provided. Even though remittances are not adequately defined in the balance of payments, but this type of inflows now represents a significant component of the balance of payments of the recipient countries especially developing countries where domestic economic shocks, political instability, and civil strife have caused residents to move from their own countries. This is also evident among others, in the inflows of workers' remittances from migrants abroad. Hence, discussion on exchange rate behaviour and remittances are also provided.

[16] The balances of goods, services, investment income and current transfers.

3.3 Exchange Rates and the Trade Balance

There is no apprehensiveness that in both developed and developing economies, trade balance has gained more importance in empirical works than the other three components of the current account. A significant reason for research works being tilted towards trade balance is that exchange rate policies undertaken by monetary authorities are deeply observed in trade behaviour. This clearly paved way to the popular elasticity approach, the concept of the Marshall-Lerner condition and the J-curve phenomenon. These phenomena postulate that, the sum of the elasticities of both imports and exports must be greater than or equal to unity for exchange rate devaluation (or depreciation) to positively influence trade performance and hence the BoP. In the case of the J-curve phenomenon, exchange rate depreciation will first worsen trade performance before taking a gradual improvement.

3.4 Empirical Review of Exchange Rates and Trade Balance

Quite a number of methodologies and techniques have been employed in several studies to empirically explain the relationship between exchange rate movements and the trade balance. Studies such as those by Himarios (1985) on ten countries, Bahmani-Oskooee (1991) on nine countries, Lai and Lowinger (2002) on five South Asian countries, and Narayan (2004) on New Zealand, among others, provide empirical evidence that currency depreciation, in general, improves trade balance.

Ostry (1988) applied an intertemporal optimizing model of a small open economy to analyze how real exchange rates affect trade balance. The results revealed that the relationship between the terms of trade and the current account balance was sensitive to whether the model included nontradable goods, which explained the Harberger-Laursen-Metzler effect. Thus, the real exchange rate was the main significant variable through which terms of trade shocks are passed on to the current account balance.

A reasonable number of empirical works have been carried out to confirm the J-curve phenomenon. An in-depth analysis of the phenomenon has been presented by Petrovic and Gligoric (2010) on Serbia. The Johansen approach alongside the autoregressive

distributed lag (ARDL) approach of Pesaran, Shin, and Smith (2001) were used to analyze monthly frequency data for the period January 2002 to September 2007 for three variables, trade balance (TB), real effective exchange rate (REER) and gross domestic product (GDP). In conformity with the expected econometric behaviour of the presence of unit root and existence of cointegration among the variables, the effect of exchange rate on trade balance was estimated. The short run effects and the related J-curve pattern were obtained by estimating error-correction models corresponding to the examined cointegration relations, and by assessing the impulse response of trade balance to exchange rate shock. The impact of domestic GDP (GDP_d) on trade balance was inconclusive. In certain circumstances, an increase in domestic income might also increase the demand for imports (foreign goods) that cannot be provided by the domestic market. In contrast, an increase in GDP might make fund available for investment in order to produce goods and services that will boost exports and the net effect on the trade balance may either be an improvement or otherwise. It was deduced from the findings that in the long run, depreciation would lead to an improvement in the trade balance. The estimated elasticity: 0.92 and 0.95, shows that a one percent depreciation in real exchange rate invoked almost the same improvement in trade balance. In terms of the J-curve analysis, the results confirmed this phenomenon which, implies that in the short run exchange rate depreciation may first worsen trade balance before subsequently improving it. Another striking finding that emerged from the estimates was that an increase in domestic output improved the trade balance. This implies that the supply side factors have been crucial in driving output growth in Serbia, and as a result attracted exports. Two extensions to the analysis, the Granger-causality tests and the impulse response function (IRF) which tracked the evolution of the trade balance caused by shocks in the exchange rate amplified the relevance of the study.

Early studies by Hernan (1998) for Colombia; Alawattage (2005) using quarterly data (spanning for the period 1978:1 to 2000:4) for Sri Lanka; Mohammed and Hussain (2010) applying the Johansen cointegration test on 30 annual observations for the period 1970 to 2008 for Pakistan on the J-curve scenarios. All the findings reached similar conclusion of trade deterioration in the short-run but improving in the long-run with exchange rate depreciation. Marwah and Klein (1996) investigated the influence of the real bilateral

exchange rate on bilateral trade balance in both the US and Canada with respect to five largest of their trading partners. It was maintained that after depreciation, trade balance, both in the U.S. and Canada, followed an S-curve pattern instead of the J-curve phenomenon that dominates the literature. A concluding remark of such a shape is that after the initial J-curve shape, trade balance tends to worsen again after a certain point or period of the devaluation.

In another empirical work, Yaya and Lu (2012) analyzed the short-run relationship between the real effective exchange rate and the trade balance in China. With the application of the Granger-causality test using monthly data from January 1991 to August 2009, the test statistics suggested that the short-run trade balance granger caused a change in effective exchange rate and not the reverse. The researchers extended the analysis by adopting a transfer function methodology, which demonstrated that a shock in trade balance had a 3-4 month delayed effect on effective exchange rate in the short-run but this delayed effect fritter away in the long run. Also for China, Zhang (1999) had assessed the country's foreign exchange reform and examined the long-run (cointegrating) relationship between real trade balance, exchange rate and domestic income. The results showed a stable linear steady-state relationship among the variables and this was interpreted to mean that the country's economic reform had improved the sensitivity of the economic system and made it responsive to market signals to allow changes in the exchange rate to influence the trade balance in the long-run with no evidence of a J-curve effect observed.

For a considerable period of time, exchange rate policy has been employed to regulate economic activities, especially those of trade but the response to this may be quite different for the case of Africa economies. Using annual data for Ghana, Bhattarai and Armah (2005) investigated whether devaluation of the Ghanaian Cedi improved the country's trade performance. Adopting the standard theoretical[17] propositions in trade and exchange rate, the demand equations for both exports and imports for a small open

[17] The standard analysis of exchange rate changes and the trade balance uses the specification of the domestic demand for imports and the foreign demand for exports are derived from a postulated 2 good-2-country utility maximization framework (Samuelson, 1949; Meade, 1955; Mundell, 1962; Taylor, 1995; and Greenway et al., 2002).

economy were estimated using the vector autoregressive and cointegration techniques. The results confirmed that in deed the devaluation of the Ghanaian Cedi positively impact on the country's trade balance, at least in the long-run. From policy angle, it was suggested that policymakers must adhere to the fundamentals of the foreign exchange rate market to solve the country's perennial problems of deficit by adopting prudent domestic policies; and exchange rate policies based on purchasing power parity. Such a policy is primarily intended to improve the confidence of both consumers and investors in the economy and recover the country's competitiveness in the global market.

Applying the ARDL approach to cointegration analysis, Bahmani-Oskoee and Ardalani (2006) concentrated on the U.S. industrial level and estimated its trade balance by disaggregating import and export functions for 66 industries in the country. The results showed that about 50% (33) of the estimated 66 export functions for the US industries had the expected significant negative coefficient on exchange rate. On the other hand, less than 20% (13 of the industries) of the import functions estimated coefficients on exchange rate had the correct, positive sign. Due to the aggregated data used, it was observed by the authors that the significant coefficients of the exchange rate in some sectors were offset by the insignificant coefficients in other sectors. This may possibly lead to an erroneous conclusion that exchange rate has no impact on trade flows.

Also for Korea, Chang (2005) investigated the impact of the real effective exchange rates on trade balance using a bounds testing approach. The results were that the impacts of the real effective exchange rate on trade balance had changed as the long-run elasticity of the real effective exchange rate decreased, while the short-run elasticity increased. This implies that, in the long-run, the real exchange rates play a less significant role in the determination of trade balance. In an attempt to evaluate the findings of this study, policy recommendation may not infer exchange rate intervention since the real exchange rate variable played a negligible role.

For South Africa, Sekantsi (2010) examined the impact of real exchange rate volatility on exports to the U.S for the period between January 1995 and February 2007. The author used the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model to determine the exchange rate volatility and proceeded to estimate the long-run coefficients

based on the Autoregressive Distributed Lag (ARDL) bounds testing procedure proposed by Pesaran *et al.* (2001). Evidently, the real exchange rate volatility exerted a significant negative impact on the country's exports.

Using a panel data series, Arize (2000) provided a concluding evidence on the long-run convergence between imports and exports in fifty (50) countries[18] worldwide based on quarterly data for the period 1973Q2 to 1998Q1. The analysis was exemplified by four imperative elements. Adopting the ADF and the Johansen unit root tests procedure; secondly, the use of a two-system approach (Johansen, 1995; Stock and Watson, 1988) to test for the presence of cointegration. Also, the study followed other studies (Gregory, 1996; Stock and Watson, 1993) to obtain estimates of the cointegrating relations using three other approaches, the Johansen Full Information Maximum Likelihood (FIML), the Stock and Watson Dynamic Ordinary Least Squares (DOLS); and the Phillips and Hansen (1990) Fully Modified Ordinary Least Squares (FMOLS) approaches. The existence of a long-run relationship between imports and exports was reported for most of the countries. Also, the estimated cointegrating coefficient, which carried the expected negative sign, was significantly different from zero in 30 out of 35 countries. In a similar trend, it appeared that the estimated slope coefficient did not differ significantly from unity in most cases. The suggestion was that the cointegration space was fairly stable over time. The parameter stability was, however, different among the regions. Countries in the Middle East, Europe, and Latin America exhibited higher parameter instability in comparison with Asia, Africa, and the Pacific-USA-Canada regions. It was then concluded that imports and exports are cointegrated, not just in low-income countries but also in middle-income and high-income countries as well. Specific differences were revealed in the number of countries by region that had stable cointegration; while 57% of the low-income countries had stable cointegration, 58% and 75% of the middle-income and high-income countries, respectively had stable cointegration.

[18] Of the 50 countries, 13 were from Asia; 5 from the Middle East (with Egypt as one of the countries), 9 Africa countries; 7 from Europe, 4 from the Pacific, USA, and Canada; and 12 Latin America and the Caribbean countries.

Evaluating this research, the results seem quite impressive due to the descriptive power of the equations in explaining imports and exports of a group of diverse countries. The only reservation is that Egypt being an Africa country was incorporated as a Middle East country. The corollary of this is that the result(s) of the study may not reflect the true picture of the regions considered in the study. The findings for Egypt should, however, be interpreted for Africa instead of for the Middle East, and this may be misleading for further referencing. This argument is deduced from the stability findings for the Middle East in which Egypt was the only outlier among the other countries and thus, shared similar stability results with those of the other Africa countries.

Similarly, exclusively for a group of three African countries (Kenya, Nigeria and South Africa), Arize and Nippani (2010) empirically examined import demand behaviour in three African economies (Kenya, Nigeria and South Africa) using quarterly data over the 1973:2-2005:3 period. The analysis was based on a dynamic error-correction model, which tolerated an explicit parameterized division of effects into long-run influences, short-run adjustment and error-correction term. The finding was that foreign exchange reserves highly influences import demand both in the long and in the short run. Although the impact was statistically significant, its economic impact on import demand was relatively small compared in size to the estimated elasticities for real income and relative prices. Also, the real income was identified as a significant variable in explaining the demand for imports, and that income elasticity was highly elastic in Nigeria and South Africa while inelastic for Kenya. The implications are that, any increase in real income in Nigeria and South Africa might likely worsen their trade balance positions. As documented by the researchers, trade balances of these two countries were mostly negative during the period. The pertinent policy implications advanced were: policies should be adjusted towards export promotion to provide greater access to international markets as well as increase foreign reserves. Exclusively for Kenya, the results indicated that import demand was inelastic with respect to real income (about 0.54), suggesting that growth in income may not lead to the expectation of trade deficits and that the country may still grow without a substantial increase in imports.

Other studies that explored panel data analysis procedure and made similar conclusion, that exchange rate depreciation in deed improved trade performance were those by Elbadawi *et al.*, (2008) for 73 developing countries over 1970-2004 period used the Pooled Mean Group (PMG) estimator proposed by Pesaran *et al.*, (1999); Kandil (2009) analyzed for a sample of 21 developing and 25 developed countries over the period 1971-2000; Thorbecke and Kato's (2012), was on Japanese exports to 17 countries over the period 1988 to 2009. Specific findings were:

(i) Elbadawi *et al.*, (2008) found that trade balance was unresponsive to exchange rate in the short-run but became significantly affected within two periods (that is, after two years as annual data were used in the analysis);

(ii) the striking results from Kandil (2009) were that import decreased as the cost of imports increased in the face of currency depreciation for the developing countries. Also, currency appreciation neither significantly increased exports none imports; and

(iii) Thorbecke and Kato (2012) reported that the elasticities of the exchange rates equaled one, indicating that large swings in the value of the yen over the last decade also caused swings in the volume of the country's exports. The profits of Japanese firms plummeted since the global financial crisis in 2008 making it difficult for them to compete with their counterparts in countries like China and Hong Kong where exchange rates have depreciated quite considerably over the years.

Adopting the Generalized Method of Moments (GMM) estimation procedures, Hall *et al.*, (2010) investigated the effects of real exchange rate volatility on exports of ten (10) Emerging Market Economies (EMEs) and eleven (11) other developing countries not classified as EMEs. A quarterly panel data sets covered 1980Q1 to 2006Q4 for the EMEs[19] and 1980Q1 to 2005Q4 for the other developing countries. Specifically, two estimation methods, namely, the GMM and the time-varying-coefficient (TVC) were used. Although GMM has been a workhorse technique in the empirical literature that takes into account consideration the endogeneity of the explanatory variables, it does not,

[19] EMEs countries included Argentina, Brazil, Hungary, Israel, Korea, the Philippines, Singapore, South Africa, Thailand, and Turkey. The panel of developing countries consisted of Bolivia, Colombia, Costa Rica, Dominican Republic, Ecuador, Guyana, Malawi, Morocco, Pakistan, Paraguay, and Venezuela.

however, remove specification biases from the coefficients. The second estimation technique, TVC, was introduced to correct specific econometric problems, such as, model misspecification, which may take the form of either omission of variables, measurement errors, and or incorrect functional forms that GMM could not accommodate. These problems might produce unstable time-varying estimated coefficients. The TVC technique also tries to identify the causes of coefficient variation by using a set of driving variables or coefficient drivers. The technique involves two steps which are performed simultaneously:

(i) the estimation of a model with coefficients that are allowed to vary due to the fundamental misspecifications in the model; and

(ii) the identification of the specification biases that affect the underlying coefficients and hence removes these biases. Following these procedures successfully, it will reveal the underlying bias-free coefficients stable parameters of interest. In this study, two Africa countries were included, South Africa as an EME and Malawi taken as a developing country. The findings for Malawi therefore, might be used to interpret for other countries in the SSA that share similar economic characteristics.

Several findings are discernible from this monumental research. There exists a negative relationship between exchange rate volatility and export for the eleven non-EME developing countries while the results for the EMEs showed the contrary. The study observed that there existed an open capital markets in the EMEs and this might have caused a fluctuation in the exchange rate. Evaluating the estimation techniques used, it could be considered adequate for the following consideration. The introduction of the TVC to correct problems that may not be contained by the GMM augmented the consistency of the study. For this *raison d'être*, such could be recommended in regional studies.

3.5 Exchange Rates and other sub-Components of the Current Account Balance

Even though remittances are not adequately defined in the balance of payments, it now represents a significant component of the current account balance of the recipient, especially in developing countries. According to Reinke (2007), remittances consist of goods and/or financial instruments transferred by migrants living and working in new economies to residents of the economies in which the migrant resided formally. Theoretically, the impacts of remittances on an economy are two-fold. On the positive side, remittances promote growth by serving as a source of foreign exchange which could be used to finance business investment (Amuedo-Dorantes and Pozo, 2006a; Woodruff and Zenteno, 2007) and the acquisition of human capital through spending on education and health (Edwards and Ureta 2003). Conversely, Freund *et al.*, (2008) presented that substantial and sustained remittances inflow might increase the supply of foreign currency in the foreign exchange market. This may thus perpetrates an appreciation of the local currency in the exchange market. This makes a country to loss its external competiveness.

Hypothetically, the relationship between exchange rate and remittances might commence with the households and the recipients' countries. For many households, especially in developing countries, remittances are main sources of income and also act as major sources of foreign exchange earnings of an economy (Sander and Maimbo, 2003). According to World Bank (Fact-book, 2011), remittances from migrant workers to their families in developing countries have statistically doubled over the last two decades. This is particularly due to the high migration from countries in civil wars, drought and political instability, among others. When compared to other international inflows, remittances are second only to foreign direct investment in size and are far larger in magnitude than other inflows. The accelerated increase of this type of inflows from $33 billion in 1991 to $80 billion in 2002 (Ratha and Shaw 2007; Sander, 2003) illustrates the significance of this source of income particularly for developing countries.

3.5.1 Empirical Evidence of Exchange Rate and other sub-Components of Current Account Balance

This section provides a review on the relationship between exchange rate and remittances. Most of these studies adopted panel, granger causality tests, and dynamic and general equilibrium models, while others are country-specific.

Adopting a panel analysis approach, Fajnzylber and Lopez (2006) showed that in seven of the eight Latin American countries with the highest remittances-to-income ratio, it was possible to observe a real exchange rate appreciation that ran parallel to an increase in the remittances-to-income ratio. Similar conclusion was presented in early study by Amuedo-Dorantes and Pozo (2002), testing the impact of workers' remittances on real exchange rate using a panel of 13 Latin American and Caribbean countries, argue that workers' remittances have the potential to inflict economic costs on receiving economies. Their study revealed that flows in the form of gifts usually cause growth of parallel foreign exchange rate markets, resulting in the appreciation of the real exchange rate. The empirical result states that doubling workers' remittances would result in an appreciation of the real exchange rate by about 22% in the countries considered. In an earlier study, Swanson (1979) also posited that although remitted earnings may prove to be useful in correcting BoP problems, they generally contributed little to economic growth.

Analysing the relationship between exchange rate and remittance, Fainin (1994); and Vargas-Silva and Pozo (2006) suggested that exchange rate and remittances should not be considered only in a unilateral way. This implies that changes in exchange rate may have the tendency to influence remittances. A depreciation of the exchange rate may permit remitters to buy more home currency with a given level of foreign currency. If the remitters care more about their families receiving specific lump-sum amount in the home currency, they will be able to accomplish this goal with smaller remittance outflows of money from the respective foreign countries. This income effect, however, is counteracted by a substitution effect, according to which, depreciation lowers the relative price of goods in the home country, driving remitters to send more in order to take advantage of the difference in relative prices. Therefore, whether the remitters remit

more or less depends on whether the income versus the substitution effect dominates (Catalina *et al.*, 2007).

Using data for Guatemala, Fuentes *et al.,* (2008) observed that remittances increased by more than four times as the share of the country's GDP over the last decade ending 2005. During this same period, an appreciation of the real exchange rate was observed concurrently. The researchers developed fully stochastic, dynamic, general equilibrium model to draw conclusion on this relationship. The findings were that in the short-run, remittances led to an appreciation of the real exchange rate, while the long-run repercussion could not be ascertained for the country.

Even though empirical work on the subject matter in Africa is scarce, the relevance of it in BoP statistics is vast. De Haan and Sturm (2000); and World Bank (2011), provided cases for specific countries. For instance, in Botswana, international remittances covered over 80% of its current account deficit in the 1980s (Da Haan and Sturm 2000). This amount was equivalent to almost three-quarters of the total commodity export earnings and constituted more than half of the foreign exchange rate earnings in Sudan and Lesotho, respectively. Also, remittances of Lesotho migrant in South Africa mines in the 1990s accounted for over 60% of the country's GDP[20] (International Organization for Migration (IOM), 2000); and had one of Africa's highest remittances per capita (US$291) in 2011. Likewise, between the 1990s and 2000, remittances to Ghana averaged over US$30 million per annum and constituted the country's fourth biggest source of foreign exchange after cocoa, gold, and tourism (Schoorl *et al.*, 2000). According to the Central Bank of Ghana (January, 2013), foreign exchange inflows in 2012 amounted to over US$4 billion; and of this amount, about US$1 billion accrued to individuals.

Equally, remittances to Nigeria have been growing steadily since the 1970s and reached US$10 billion in 2011 (World Bank: Emigrants and Remittances Fact book, 2011); and due to the consequences of the civil strife and economic shocks, workers' remittances to Sierra Leone in the last decade stood at US$41.57 million in 2010 from US$7.13 million in 2000. This meant over a fourfold increase in this source of flow in the period. During

[20] A ten year average (1990-1999) of the country's GDP was US$827.74 million.

the same periods, depreciations in the exchange rates of these two countries were also observed.

It can, therefore, be concluded that remittances remain major sources of foreign exchange earnings for developing countries, especially those of Africa and continue to influence the balance of payments statistics in diverse forms. It is, however, hard to capture the actual remittances inflow into any economy including Sierra Leone. Therefore, it effects is hard to single out for further analysis. Hence, excluded from the present study but the literature it provide is relevant for the balance of payments analysis.

3.6 Exchange Rates and the Financial Account Balance

The financial account being one of the components of the balance of payments statistics of an economy consist of mainly direct and portfolio investments[21]. The dichotomy between these two main components lies in their levels of stability when shocks occur in both the domestic and international economies. While direct investment takes at least 10% of the voting capital (or equity) of a company or other enterprises, portfolio investors' influence may be less than 10% equity. Also, direct investments are more stable. This implies that investors can hardly transfer their investments at short notice. Portfolio investments are, however, sensitive to changes in investment climate and other macroeconomic policies both domestically and internationally. The relationship between exchange rate and the financial account balance is mainly observed through these two components. Also, the dichotomy between Financial Account Balance and the Capital Account Balance is rather thin. Therefore, the factors that relate to FAB relate also to KAB. The difference may lie in the speed of response to changes in economic fundamentals.

[21] The other components, reserves assets, which are financial assets that can be bought and sold only by Monetary Authorities (Central Banks) and includes a country's official reserves of foreign exchange and, other investment, which is a residual category that includes trade credits and private holdings of foreign currency.

This relationship is, therefore, reviewed in this section. The other two components (official reserves and other investment) may not be too sensitive to exchange rate movements.

3.6.1 Exchange Rates and Foreign Direct Investment

The existences of a significant relationship between foreign direct investment (FDI) flows and the exchange rate have been summarized by economic theorists Benassy-Quere, Fontagne and Lahreche-Revil (2001). In the first instance, if investors aim at serving a local market where trade or nontrade barriers are market entry impediments, FDI and trade would become substitutes. An appreciation of the local currency in real terms increases consumers' purchasing power and therefore boosts inward FDI. But a potential effect of large capital inflows is exchange rate appreciation. This leads to a loss of a country's competiveness-that could adversely affect the tradable production and export sectors.

Alternatively, if the output from FDI is to be re-exported, trade and FDI may be complementary. This implies that any appreciation of the local currency would lower both the competitiveness (higher labour and capital costs); and the relative wealth of foreign investors. Lowering investors' wealth might impede investment inflows.

The modern literature on the impact of exchange rate changes on FDI begins with the assumption that the capital market is imperfect, such that borrowers face a premium for external borrowing. It is revealed that a depreciation of the host country's currency would increase FDI inflows because the relative wealth of foreign investors would increase and the costs of inputs fall in terms of the foreign country's currency, allowing them to finance more of the investment internally. In particular, if a foreign investor is competing with domestic investors in the acquisition of domestic corporations, with the appreciation of the source country's currency, the foreign investors are then more likely to raise the reservation price and outbid their host country's counterparts. This prediction was evident in the case of US's FDI inflows from 1974 to 1987 when there was a depreciation in the country's currency, the US dollar (Froot and Stein, 1991).

With all these prepositions, the impacts of exchange rate volatility on FDI flows still remain ambiguous. Three strands of the literature have emphasized different views. One strand discussed the effect of risk aversion on foreign investors' desire to postpone investment decisions when there is persistent exchange rate depreciation (Kohlhagen, 1977 and Dixit, 1989). Also, Campa (1993) showed that risk neutral investors could also display comparable behaviour. The author provided evidence that exchange rate volatility caused US's FDI inflows to decline in the early 1980s, especially for industries with huge sunk costs in both physical and intangible assets. Another strand stressed the adjustment costs of investment, especially the difficulty of reversing an investment decision once it is made (Dixit and Pindyck, 1994). Yet another group tried to underscore the differences between vertical and horizontal FDI (Aizenman and Marion, 2004). It states that the fragmentation of production processes across different countries may be discouraged with exchange rate uncertainty; and similar activities undertaken in different locations might respond positively to exchange rate volatility. Earlier findings by Itagaki (1981) and Cushman (1985) concluded that exchange rate volatility actually promoted FDI inflows thereby improved the BoP position of the host economy.

Most of the empirical literature on the relationship between these two macroeconomic fundamentals, exchange rate movements and FDI, has focused on addressing the following two hypotheses: (i) a depreciation or devaluation of the domestic currency encourages FDI inflows; and (ii) greater exchange rate volatility discourages FDI inflows as it makes liabilities in domestic currency unpredictable.

As the relationship between exchange rate volatility and flows of international investments remains a challenge, sectoral FDI seems more comprehensive in analyzing exchange rate behaviour. Taking advantage of this, Xiong (2005) investigated exchange rate uncertainty and FDI flows for multi-national firms in five advanced countries (Australia, Canada, UK, Japan and the U.S). The author estimated the Autoregressive Distributed Lag model using a twenty year annual data set for the period ending 2002. The research reported the following explanations. For Australia, both exchange rate volatility and bilateral exchange rate had negative effects on outward FDI. In Canada, Japan and UK, only the bilateral exchange rate had a significant effect on FDI operations.

The exchange rate depreciation played no significant role in determining FDI flows from the three countries.

A similar work by Masten (2007) showed that exchange rate volatility significantly deterred U.S' foreign direct investment in Latin America during the period. Expanding the scope of the study, conflict and corruption as well as political risk factors were identified as significant forces behind FDI flows.

Asia as a continent has in the last two decades attracted huge FDI movements (both inflows and outflows). Making use of a panel data, Takagi and Shi (2011) estimated the influence exchange rate movements on Japanese's investment flows to nine Asian economies during 1987-2008. The analysis provided a breakdown of the country's outward FDI by destination. The results confirmed a positive relationship between exchange rate volatility and FDI from Japan. This implies that a depreciation of the host country's currency significantly increased Japanese FDI outflows. This finding is consistent with earlier prediction by Itagaki (1981) and Cushman (1985) that exchange rate depreciation in trading partners' economies promotes FDI inflows as substitutes for exports into those countries. Using the Asian financial crisis, the stability strengths of FDI and portfolio flows were tested. Estimates showed that FDI flows, especially those oriented towards the manufacturing sector, were more stable than the portfolio flows.

The swift rebound of capital inflows in emerging economies after the onset of the global financial crisis in 2008 added new thrust to the debate on how to reap the gains from capital inflows, while minimizing any possible economic costs to other economic fundamentals. Using a dynamic panel-data model, Jonwanich *et al.*, (2013) examined the impact of capital flows on real exchange rate in Asian countries during the period 2000-2009. The results revealed that it is the composition of capital flows that matters rather than the overall capital flows in determining the impact of FDI flows on real exchange rates behaviour.

The rapid expansion of capital markets in the emerging markets has been expected to mitigate the severe asset shortages in that region. But this remains a challenge. Quantifying the determinants of such shortages, Chen and Imam (2012) used a system of

GMM to carry out the estimations for these emerging markets for the period 1995 to 2008. It was concluded that asset shortages were not only leading explanatory variables in current account instability but also had negative impact on economic growth in the long-run. The shortage of investible assets might lead to excess liquidity in the system which will drive down interest rates and raise asset prices on equity. The policy recommendation that stemmed from this study was that the capital market needs to be developed in order to encourage the supply of financial assets for investment. Improving efficiency in the capital markets also lowers the cost of financing and improves access to financing for the private sector.

With data from Iran, Sharifi-Renani and Mirfatah (2012) investigated the determinants of inflows of FDI by applying Johansen and Juselius's cointegration system approach (1990) in the form of vector autoregressive (VAR) pattern using quarterly data from 1980Q2 through 2006Q3. The results showed that the GDP, openness and exchange rate variables have positive effect but the volatility[22] of exchange rate and world oil prices did have a significant and negative impact on the flow of inward FDI in Iran. The policy consideration was for the country to implement exchange rate policies that would promote stability of the exchange rate in order to attract FDI inflows, which would promote foreign trade and the country's competitiveness in the global financial market.

The literature for the African region, where development in capital flows has not received much attention, is rather scanty. Early studies have focused mostly on official development assistance (ODA) (for example, Kasekende *et al.;*1996), and on capital flows in general without disaggregating them into private and official flows (Ndung'u and Ngugi, 1999). Others (Bhinda, Griffith-Jones, Leape and Martin, 1999; Ndikumana, 2003; Adam, O'connel and Pattillo, 2004) also have investigated private capital flows to Africa but failed to classify them into foreign direct investments and portfolio flows. These problems are commonly attributed to data difficulty. These have meant that the behaviours of other macroeconomic fundamentals such as exchange rate movements cannot be associated with a specific component of the financial account. These studies, however, reported mixed findings. Ndung'u and Ngugi (1999) found that a unit shock in

[22] In this work moving average standard deviation was used to calculate volatility of exchange rate.

the volatility of Kenya's capital flows led to an initial decline in the real exchange rate followed by a continuous rise, with no signs of the effects decaying. However, volatility in capital flows only accounts for a small incremental percentage of the innovations from the real exchange rate, implying a weak feedback from the real exchange rate movements to the capital flows.

Kodongo *et al.*, (2011) conducted research exclusively on Africa investment flows. In the study, a series of panel-data tests were carried out in order to show the degree of relationship between exchange rate and investments in among the countries after grouping them into three main regions[23]. The Wald test confirmed the existence of unidirectional causality running from real exchange rates to FDI inflows. The interpretations of the coefficient estimates were that, a 1.0% depreciation in real exchange rates resulted in an increased FDI inflows by 0.04% (holding interest rate differential constant). The inclusion of the interest rate differential increased inflows by 0.08% with a 1% deterioration in the value of the currency. Even though the impact of interest rate differential on FDI is not given much consideration in the literature review section, it is, however, worth reporting its relevance for pedagogical purposes. The researchers demonstrated that interest rate differential lagged improved FDI flows in the presence of real exchange rate depreciation. But this effect varied across the grouping. For instance, lagged real exchange rate depreciation, acting mutually with interest rate differentials caused net FDI inflows to decrease by 0.070% and 0.069% (statistically insignificant) in SSA and Northern African regions, respectively. Structural differences may have accounted for these variations. Due to the relatively more stable financial markets and political environments in Africa's middle income economies, depreciations in their currencies may not necessarily reduce FDI inflows but depend on the availability of relatively cheaper assets. Such is not the case in SSA economies. From a theoretical point of view, these results may possibly be explained in the following ways. First, expectations may play a role in influencing the response of FDI flows to real exchange rate changes. In his model, Kohlhgen (1977) verified that a foreign firm expecting domestic currency devaluation would defer direct investment until after the devaluation

[23] Middle-income Africa (Bostwana, Mauritius and South Africa); Northern Africa (Egypt, Morocco and Tunisia); and sub-Saharan Africa (Cote d'lvoire, Kenya and Nigeria).

when it would be more profitable relative to exporting. Likewise, in Cushman's (1985) model, the direct effect of risk-adjusted expected real foreign (domestic) currency appreciation (depreciation) is to raise foreign (domestic) capital cost, thus stimulating direct investment. In a free market economy, where exchange rate is determined by the forces of demand and supply, the withholding of FDI flows by foreign investors in anticipation of domestic currency depreciation might lessen the flow of foreign currency into the domestic market. This would lead to further depreciation of the domestic currency. In a fixed exchange rate economy, a fall in FDI inflows equally puts pressure on the domestic government to devalue its currency, which will then be pursued by an increase in FDI inflows.

Market imperfections also have a significant stake in explaining causality between FDI flows and real exchange rates. For instance, imperfect capital mobility may play a role by altering the relative wealth of firms across countries and regions. In this context, a real depreciation favours foreign purchasers of domestic assets and its associated with an increase in FDI inflows (Froot and Stein, 1991). The role of market imperfections also plays out through relative labour costs. Klein and Rosengren (1994) asserted that FDI represents capital seeking relatively cheap labour so that a depreciation of a country's currency is associated with an increase in its FDI inflows.

Risk attitudes play a major role in informing the investment decisions of individuals and firms and may, as such, explain the findings of Kodongo *et al.,* (2011) that real exchange rate appreciation are generally associated with net FDI inflows. The same conclusion had been reached by Goldberg and Kolstad (1995). Their model however, envisaged no statistical relationship between exchange rate volatility and the allocation of production opportunities between domestic and foreign markets provided investors are risk neutral.

3.7 Exchange Rate and Portfolio Investments[24]

Compared to other continents, Africa had not been able to attract much portfolio investments but due to the financial crisis in the late 2000, and the limited return potential in the developed world, investors have been more willing to invest in emerging markets and sub-Saharan Africa countries. This sudden change in investors' behaviour is that emerging markets give a high yield at a lower risk than what could be obtained through investment in advanced economies (Jeanneret, 2010). Asia as a whole has had the attention of foreign investors because of the high GDP growth rates of the individual economies and therefore potential for high returns, hence, impacting positively on their balance of payments positions than ever before.

Kohlhagen (1977) concluded that the level of portfolio investment inflows was linked to the level of political risk in a country, macroeconomic performance was also considered as a major driving force of portfolio investment inflows. For instance, potential investors might not invest in economy with high instability of GDP growth, exchange rate fluctuations, interest rate and inflation fluctuations, among others. According to Kodongo and Ojah (2011) report, the growth rate of Africa countries' GDP had been quite remarkable in the last two decades. From their analysis, it could be deduced that sub-Saharan Africa countries are much capable of competing with countries in other continent, like the Asian countries in terms of attracting investment flows. Following similar trends, Africa countries are among the world's ten fastest growing economies measured on annual GDP growth in the last decade. This implies that SSA region has a great potential relative to other regions in attracting foreign investments. With these positive developments, other Africa countries are highly motivated to reshape their domestic economic to further propel their growth potentials to take advantage of the new investment opportunities.

[24] According to the IMF, 2010, portfolio investment is defined as cross-border transactions and positions involving debt or equity securities, other than those included in direct investment or reserves asset. Equity investments exceeding 10% ownership of a company is listed under FDI. Thus, portfolio investment is the sum of equity securities, debt securities and money market investment.

3.8 Empirical Evidence of Exchange Rates and Portfolio Investments

The exiting literature on the relationship between exchange rates and portfolio investments is mostly on developed and emerging market economies. Much has not been done for developing economies due to the slow growth in the financial sector and capital markets. Some of the early studies in this field include the following: Eun and Resnick (1998) and Markusen (1998) among others.

According to Markusen (1998), the total earning from holding foreign securities comprised the investment returns (dividends and capital gains) on the securities and the changes in the exchange rate during the holding period. The researcher confirmed that the sharpening of exchange rate fluctuations during the late 1960s spate speculative movements in the 1970s and that increased significantly the uncertainty of foreign investment in the thirteen sampled countries mostly from Europe while South Africa was the only Africa country considered in his study. Eun and Resnick (1998) also confirmed from monthly data for a group of countries, the U.S. and six others that exchange rate fluctuation made foreign investment more risky and, at the same time, aggravated estimation risk which further reduced the gains from international investments diversification in those economies. Markusen (1998) found that firms diverged most of their investments away from portfolio to foreign direct investment in order to avoid foreign exchange rate risk which was considered as the cost of international trade. This provides evidence for the existence of long term investment being directed to developing countries with even high degree of macroeconomic instability such as exchange rate risk.

Exploring the empirical relationship between portfolio investments and real exchange rate volatility, Serven (2003) drew from a large cross-country time series data set on private investment and its determinants comprising sixty-one developing countries and spanning from 1970 to 1995. To measure real exchange rate uncertainty, the researcher used GARCH (1,1) specification and the estimation of a dynamic equation based on GMM estimator proposed by Arellano and Bond (1991). The conclusion was that exchange rate volatility created uncertain ambiance for investors by making investment outcomes difficult to forecast. It was further revealed that the negative effect of real exchange rate

uncertainty on investment was significantly larger in economies that were highly open and those with less developed financial systems. Findings from Solomon and Ruiz (2012) also established negative effects of exchange rate fluctuations on foreign investments. This indicates that rationally high portfolio investment level will occur in countries with stable exchange rate policies than in countries with volatile exchange rate.

Assessing these studies, apart from Serven (2003) who employed the GARCH-based measure of real-exchange rate volatility and the GMM estimator, none was subject to a rigorous econometric analysis. Due to widespread macroeconomic shocks in variables, it would be necessary to subdue such empirical works to sound policy recommendations which would be based on credible econometric analysis and interpretation of results.

The recent available empirical studies that might attract significant discussion is the one by Jongwanich and Kohpaiboon (2013). They based their analysis on nine emerging Asia economies by investigating the impact of capital flows on the real exchange rates in the nine Asian countries using a dynamic panel-data model. The researchers reported that the speed of real exchange rate adjustment associated with the different types of capital flows differed. While an increase in net portfolio capital inflows immediately or simultaneously resulted in real exchange rate appreciation, the effect of foreign direct investments on real exchange rates occurred with time lags. The result illustrated the statistical insignificance of net foreign direct investment flows on real exchange rates in the initial period, but this relationship (between foreign direct investment and exchange rates) became statistically significant in the subsequent periods. This implies that the response of exchange rate to foreign direct investment inflows is not instantaneous.

Specifically, interpretations of the estimated coefficients were as follows: a 1% increase in portfolio investment led to an immediate appreciation of real exchange rates by 0.15%, while the real exchange rate appreciation associated with foreign direct investment occurred with a time lag but it tended to be close to that associated with portfolio investment flows in the following periods. That is, a 1% rise in net FDI inflows resulted in an appreciation of the real exchange rate in the following period by 0.14%. The slow adjustment of the real exchange rates to foreign investment flows could be attributed to two main factors: (i) the decision to undertake foreign direct investment might require a

considerable amount of time to assess both the risky nature of the venture and the returns on it over time; and (ii) foreign direct investments may not respond immediately to certain macroeconomic shocks due to its stable nature of investment whose relocation decision might not be taken instantly.

Much early study by Athukorala and Rajapatirana, (2003) on Asian economies had provided similar results by reporting that the appreciation of real exchange rates associated with portfolio inflows could be more than that associated with any other investment inflows such as foreign direct investment and bank lending inflows.

Analyzing a specific form of portfolio investment, stock prices and exchange rate movements, Ajayi and Mougoue (1996) used a high-frequency statistical relationship to examine both their short-run and long-run relationships in eight advanced economies. The results showed that an increase in stock prices caused the domestic currencies of the sampled economies to depreciate. It can be deduced that growth in stock market might be an indicator of an expanding economy that move simultaneously with higher inflation expectations. However, foreign investors perceive higher inflation negatively to lead to a fall in the demand for the currency. The negative consequence is that higher inflation in the future may stem through exchange rate depreciation, which further makes investors doubtful about the future performance of their investments. In another study (Granger, Huang and Yang; 2000)-during the Asian crisis in 1997- evidence of mixed results were reported. It was found that stock prices responded obscurely to exchange rate movements but Granger-causality results were generally mixed. Those being unidirectional were found to be negative, while the bi-directional exhibited evidence of joint causality.

In their research, Pavlova and Rigobon (2007) assumed a framework in which all stock markets moved in the same direction in response to a supply shock in any of the other countries. A positive output shock led to a positive return on the domestic stock market that was, however, accompanied by a deterioration in the terms of trade. The latter implied that an increase in the relative prices of foreign goods would lead to a rise in the value of the foreign countries' output, thereby boosting the stock markets. In this framework, supply shocks might generate positive co-movement among the stock

markets, and the foreign exchange market may acts as a channel through which shocks are propagated internationally.

A major work on exchange rate and stock pricing that paved the way for Africa but with little econometric analysis was the one by Twerefou and Nimo (2005) in Ghana. The authors tested the stock pricing mechanism of the Ghanaian stocks listed at the Ghana Stock Exchange and found the short-term interest rate and inflation risk being the major macroeconomic risk factors associated with such an investment decision. The researchers observed that rational investors may take macroeconomic risk into high consideration when making decisions with regard to their investments.

Following the findings and policy implications of these researches, not much emphasizes were laid on exchange rate as a determinant of portfolio investment flows but the contrary was highly observed. Factors such as country risk, and other macroeconomic risks (interest rates, inflations) featured with the exception of exchange rate behaviour. The implications for balance of payments position of the relationship between investment inflows and exchange rate appreciation are two-folds:

(i) Since investment inflows are funds directed to an economy; it would leads an increase in the foreign currency held in the foreign reserves of the economy. Investment inflows therefore, lead to a favorable balance of payments position.

(ii) The negative appreciation is that investment inflows might cause an appreciation of the exchange rate. An appreciation of the exchange rate makes imports to become cheaper and exports expensive. This process if not reverted may lead to trade deficit. A deficit in the trade balance tended to correspondingly lead to a deficit in the current account balance. Also, the current account being a key component greatly influences the BoP position.

Therefore, the exchange rate-investment relationship has an ambiguous influence on the country's BoP positions and it is no doubt that this would require empirical findings. As it is part of the main objective of this thesis, this relationship will be empirically analyzed.

Specifically for Sierra Leone, limited studies have been completed on exchange rate matters (see for examples, Korsu (2008), Korsu and Braima (2010) and Daboh (2010)). Among these three studies, the research by Korsu (2008) was the only one that examined the relationship between exchange rate and BoP in Sierra Leone using annual data for the period 1975 to 2005. The researcher concentrated on the absorption approach to BoP and concluded the analysis of trade balance as a proxy to explain BoP for the country. The finding was that exchange rate together with trade openness influenced the BoP in different ways. As observed, the financial account balance that accounts for investment in the BoP statistics was not accorded much attention. Considering the Sierra Leone predicament, investment inflows especially to natural resources, had been one of the major drivers of foreign currency inflows used to correct BoP problems. Ignoring this aspect from the analysis will not be adequate enough in investigating the relationship between exchange rate and the BoP for such an economy. Also, the short-and-long-runs relationships might have been weakly observed due to the low (annual) frequency data used. Such examination requires high frequency data, which will show out how exchange rate movements influence the various components of the BoP.

The other two studies, and Daboh (2010) investigated both short-and –long-runs determinants of real exchange rate using annual data spanning from 1970 to 2005 in an intertemporal optimimzation framework of Edwards (1989). While Korsu and Braima (2010) controlled the effects of price changes and the findings considered trade openness to be one of the major determinants of real exchange rate, Daboh (2010) analyzed the determinants of exchange rate misalignments in four West African Monetary Zone's countries[25]. The researcher incorporated both the monetary and fiscal variables in the determination of such effects. The use of annual data and the ordinary least square (OLS) estimation technique also accounted for the abnormal behaviour of the reported coefficients.

[25] The Gambia, Ghana, Nigeria and Sierra Leone.

3.9 Exchange Rate Pass-through to Domestic Price

Exchange rate pass-through as defined by Goldberg and Knetter (1997) is "the percentage change in local currency import prices resulting from a one percent change in the exchange rate between the exporting and importing countries." What has been most relevant to economic analysts and policymakers in this relationship is whether the pass-through is complete or incomplete. In a complete pass-through, there is a one-to-one response of domestic prices to exchange rate changes, whereas, a less than one-to-one response of domestic prices to exchange rate changes occurs in the incomplete pass-through. The economic implications of these scenarios are enormous.

According to Eckstein and Soffer (2008), the existence of exchange rate pass-through (ERPT) is based on the law of one price (LOOP) and purchasing power parity (PPP). There are two economic issues that may emerge from this theory. A divergence from LOOP may occur when changes in the price of goods in local currency do not follow exchange rate changes. A convergence is supposed to transpire through the market forces of demand and supply in order to bring about the necessary changes in local prices, which will force the foreign and domestic prices back to the same level. The inference is that exchange rate pass-through should be complete or close to 100% in the long run if the economy is sufficiently open.

Exchange rate changes might influence domestic prices through two main channels, the direct and indirect channels. As expressed by Hyde and Shah (2004), exchange rate movements may affect domestic prices directly through changes in the price of imported finished goods and inputs such as raw materials and capital goods. To this, an appreciation of the domestic currency will make import prices of finished goods and inputs to fall. Whereas, a depreciation of the domestic currency will result in higher import prices of both finished goods and inputs. Along the supply chain, increases in import prices of goods are more likely to be passed on to consumer prices. Likewise, an increase in import prices of inputs may result in producers increasing their marginal costs thus leading to higher prices of domestically produced goods. The indirect channel of ERPT as clarified by Hofner and Schroder (2002) as the competitiveness of domestic

goods in the international market. The general perception is that when the domestic currency depreciates, the prices of the domestically produced goods will fall, thereby making them relatively cheaper to foreign consumers. This will induce an increase in aggregate demand and an increase in the volume of exports. As a result, domestic prices increase.

Other factors may also affect exchange rate to influence domestic prices. Akofio-Sowah (2009) argued that the structure of the market, production costs of goods to be exported, pricing behaviour of firms, volatility in the macroeconomic fundamentals (especially inflation and exchange rate), share of imports and the composition of imports, size of the economy, and the degree of trade openness as major determinants of exchange rate movement that would eventually influence domestic prices. Knetter (1994) posited that if the size of the export market for a product is sufficiently large and competitive, then exporting firms may be willing to absorb a proportion of the exchange rate change in order not to lose the market share. On the other hand, if high product differential exists with low competition, then export prices may be rather less responsive to exchange rate changes. In this case, pricing-to-market will be lower and the corresponding pass-through will be higher. Similarly, a pass-through will be higher if exporting firms have a higher market share in the industry as they tend to set prices in their own currency, whereas, when the imports are denominated in the currency of the imported country, pass through is expected to be relatively less (AI-Abri and Goodwin, 2007).

Another contribution of exchange rate pass-through is the Taylor's (2000) hypothesis. It states that the responsiveness of prices to exchange rate movements depends positively on inflation. The theoretical basis is that a positive correlation exists between inflation and pass-through. Accordingly, persistent inflation tends to overshadow exchange rate movements and thus firms might respond via price-adjustments. This hypothesis has been supported in number of studies (see, for example, Devereux *et. al.,* (2004) and, Choudhri and Hakura (2006)). Their conclusion was that the hypothesis is reflected to a greater degree in developing economies that is largely known for higher rates of inflation.

According to Ca'zorzi *et al.,* (2007), the more a country is open the more movements in exchange rates are transmitted via import prices into CPI changes. The implication is that the larger the volume of imports and exports the greater the degree of ERPT. The channel of this pass-through may be direct or indirect or both as the case may be. While barriers to trade such as tariffs and other restrictions like quotas act might lead to low degree of pass-through. This preposition of tariffs leading to low degree of ERPT may, however, be wooly. If a country is a net importer of a particular good like petroleum products or other essential goods like grain with no closed substitute produced domestically, no amount of tariffs will lower the level of exchange rate pass-through. It would rather propound the exchange rate pass-through problem.

3.10 Empirical Review of Exchange Rate Pass-through

Several empirical studies have been concluded in both developed and developing economies on exchange rate pass-through to domestic prices[26]. The general conclusion is that exchange rate pass-through (ERPT) was incomplete for most countries examined.

Using panel data from 1979 to 2000 period for a group of 71 countries, Choudhri and Hakura (2001) tested Taylor's (2000) hypothesis, which propounded that a low inflationary environment leads to a low ERPT to domestic prices. The authors derived a pass-through relation based on new open economy macroeconomic models. A strong evidence of a positive and significant association between the pass-through and the average inflation across countries and periods was found. The inflation rate significantly dominated in the analysis in explaining cross-regime differences in the pass-through.

Examining ERPT from regional point of view, Beirne and Bijsterbosch (2009) assessed the degree of ERPT to consumer prices for nine Central and Eastern European Union member states[27] for the period 1998 to 2008. The researchers incorporated features of a distribution chain pricing framework that controlled for the impact of supply and demand shocks. Due to the lack of monthly import price data, the distribution chain in the model

[26] Among them include Taylor, 2000; Choudhri and Hakura, 2001; Campa and Goldberg, 2005; Frankel et.al, 2005; Marazzi et aI, 2005; Barhoumi, 2006; Mumtaz et aI, 2006; Devereux and Yetman, 2008; and AI-Arbi and Goodwin, 2009.

[27] Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia.

was constructed to reflect producer and consumer prices as a proxy for import prices, and the euro area consumer prices. The model then allowed exchange rate fluctuations to affect consumer prices both directly and indirectly via producer prices. The assumption of a full exchange rate pass-through to import prices was built on the premise that the bulk of the foreign trade was quoted in foreign currencies, which implies that exporting countries' currencies pricing may be more relevant than local currency pricing. In addition to exchange rate fluctuations, inflation at each stage of the chain was assumed to be affected by supply and demand shocks. The supply shocks were represented by oil price in local currency, whereas demand shocks were proxied by industrial production.

The estimation techniques used were a multivariate cointegration approach and impulse responses derived from VECM. The interpretations of the estimates were that a rise in PPI and oil prices was associated with a rise in domestic prices, while a depreciation of the domestic currency was associated with a rise in consumer prices. The sign of the coefficient of the industrial production was, however, inconsistent and also statistically insignificant. The trend term was significant for six out of the nine countries suggested that the Balassa-Samuelson effects have had a significant role on domestic prices for most of the countries. The output of the impulse response function analysis was, however, too low for major discussions. This was mostly attributed to the longer time horizon in the cointegration analysis. On average, the pass-through to price after 48 months was less than 50 percent. The findings indicated a strong link between nominal variables and thus a higher ERPT to consumer prices. It was also reported that the ERPT was higher for countries that had adopted some form of fixed exchange rate regime.

Similarly, for the European Union but employing different estimation techniques, Maria-Dolores (2010) studied the degree of ERPT to domestic prices using monthly data on import unit values (IUVs) for nine different product categories in some New Member States (NMSs) of the European Union[28] from 2000 to 2006. The researcher used a methodological approach proposed by Campa and Gonzalez-Minguez (2006) which estimated the short-and long-run pass-through elasticities, where long-run elasticities are

[28] Cyprus, Hungary, Latvia, Poland, the Czech Republic, Slovakia, Slovenia and Romania) and one candidate country, Turkey.

defined as the sum of the pass-through coefficients for the contemporaneous exchange rate and its first four lags. The author considered potential factors that could have influenced the size of ERPT such as the different exchange rate regimes that existed in the different countries[29] and the date of adoption of inflation targeting in some countries. The estimates showed the following, the hypothesis of LCP (zero pass-through) could not be rejected for all the countries, while the hypothesis of PCP (complete pass-through) was clearly rejected for all the countries, except for Slovenia and Cyprus in the short-run.

Also, examining ERPT but for countries in the Organisation of Economic Cooperation and Development (OECD), Junttila and Korhonen (2012) analyzed exchange rate pass-through (ERPT) into aggregate import prices for nine countries in this group. Their empirical findings based on a nonlinear time series analysis were that, in a low inflation regime the ERPT elasticity was low, while the ERPT was higher in a high inflation regime. Their result is quite similar for both the larger and smaller countries used in the analysis. Contrary to some previous studies, there are no large differences across countries in terms of the pass-through coefficients. The decline of exchange rate pass-through is in close relation to the observed low inflation regimes in industrialized countries after the 1990s. Their findings supported the Taylor (2000) conclusion of low inflation regime inducing lower exchange rate pass-through. Moreover, the results provided support for the role of the degree of price stickiness. In particular, at the aggregate level, exporting firms seem to take the inflationary environment into consideration when they adjust their prices. As a policy recommendation, they advanced that both the degrees of exchange rate pass-through and price stickiness should be considered when designing monetary policy for open economies, because inflation regime seemed to play a role in the exchange rate pass-through.

Exploring data from a group of countries from Asia and other regions with similar economic activities, Takatoshi and Kiyotaka (2007) analyzed the degree of domestic price responses to the exchange rate changes in crisis-hit countries in East Asian and Latin American countries and Turkey. The authors applied the SVAR technique to exam nature of exchange rate pass-through in these countries. The findings from this study were

[29] (Crawling band, manage float, independent float or flexible exchange rate).

hardly statistically different from other studies. Findings indicated exchange rate pass-through was found to be higher in Latin American countries and Turkey than in East Asian countries. In particular, Indonesia, Mexico, Turkey and, to a lesser extent, Argentina showed strong response of CPI to exchange rate shock. More significantly, base money as a monetary variable played an important role in increasing the domestic inflation rate in Indonesia, while such was not evident in the other countries. This, perhaps, exemplifies the relevance of the commitment of monetary Authorities to price stability. Also, shock transmission from import prices or producer price inflation to CPI was quite large in Indonesia, Mexico and Turkey. This showed that the channel of transmission at different stage of the pricing chain may be an additional factor in fueling high domestic inflation.

Reviewing an article from the IMF, Masha and Park (2012) used two estimation techniques to examine the degree of exchange rate pass-through to both producer and consumer prices in Maldives. The authors first estimated ERPT to consumer prices using a nonparametric approach. The methodology developed by Campa and Goldberg (2005) computes the overall static sensitivity of CPI to exchange rate changes. The researcher then proceeded to model both the changes consumer and producer price indices using a recursive VAR technique with quarterly data for 1994-2010. The differences between these two techniques were that the first approach is a static analysis and provided a point estimate of the pass-through coefficient, while the second allowed for proper intuition of the speed of pass-through of exchange rate changes to prices in a longer time frame. The results were as follows: (i) the ERPT to consumer prices was very high, both in absolute terms and relative to other countries; and (ii) the VAR results showed that ERPT had strong impacts on consumer and producer prices even though the pass-through was incomplete, and that shocks on producer and consumer price indices that occurred from changes in the nominal effective exchange rate persisted for most of the time horizons.

Still on the subject matter, quantitative evidence from African countries is not statistically different from those of other regions already reviewed. Choudhri and Hakura (2001) used a panel data estimation technique and found that the level of inflation dominated the volatility of inflation and the exchange rate as an explanation of cross-country differences

in the pass-through. The estimates further indicated zero pass-through to inflation in Ethiopia and incomplete pass-through in other African countries during the period 1997–2000. An earlier study by Canetti and Greene (1992) showed that exchange rate movements and monetary expansion both negatively affected consumer price inflation in sub-Saharan Africa (SSA).

Exclusively for South Africa, Ocran (2010) examined the exchange rate pass-through to import, producer and consumer prices using 113 monthly data covering January, 2000 to May, 2009. Impulse response and variance decomposition techniques were explored within the framework of an unrestricted VAR to examine the degree of pass-through as well as the relative importance of key economic fundamentals in explaining changes in domestic prices. The findings suggested that after a 1.0% shock to nominal effective exchange rate, the level of CPI increased marginally by 0.1%, giving a pass-through elasticity of about 13.0%. The pass-through elasticity of producer price was 20% after 2 years (24 months). This suggests that favourable shocks to producer price inflation may have reasonable effect on CPI inflation.

Other studies on South Africa that provided similar conclusion were those by Aron *et al.*, (2008) and Parsley (2010). Aron *et al.*, (2008) examined how exchange rate influences import prices, inflation and monetary policy from the period 1980 to 2009. After various short-run pass-through estimates, the pass-through on average was incomplete at about 30% in 6 months and 50% within a year. These results were confirmed by the impulse response functions.

Parsley (2010) studied exchange rate pass-through at the most disaggregated level possible using two distinct panels of disaggregated data: (i) data set containing annual prices of 158 individual goods and services at the consumer level from 1990 to 2009; and (ii) panel containing quarterly average import unit-values for twenty-six 8-digit import categories from ten of South Africa's top trading partners covering 1998 Q1 to 2009 Q2. A low pass-through to consumer prices (between 15% and 25% in the two years following an exchange rate change), slow convergence to long run purchasing power parity (for approximately, 6 years and 5 months), and no apparent tendency for pass-

through to have declined during the last twenty years. Relatively high estimates were found for import price pass-through for Brazil and the United States (75%), while Taiwan, Switzerland, India, Great Britain, and Germany were nearer the overall average of 60%. As with final consumer prices, there was little evidence of a decline in pass-through to import prices.

Employing the popular Structural Vector Autoregressive (SVAR) estimation method on quarterly data from 1999 to 2010, Tandryen *et al.,* (2012) investigated the impact of exchange rate movements and external shocks on import prices, domestic producer and consumer prices for the small island economy of Mauritius that is highly vulnerable to external economic shocks. The authors applied a model of pricing along production, distribution chain and consumers adopted from McCarthy (2000). The model was used to track the pass-through from exchange rate fluctuations at each stage of the distribution chain. The result showed that exchange rate pass-through to consumer prices was much higher, followed by producer prices, while that to import prices was the lowest. Our findings also revealed the existence of bidirectional causality only for the case of nominal effective exchange rate and producer prices. Further, the variance decomposition results indicated that the variance of import and producer prices was explained mainly by oil price shocks while the variance of consumer prices was largely accounted by import price shocks. This study showed that monetary policy had a role to play in stabilizing prices in the economy.

Using annual data from 1980 to 2008, Oyinlola and Egwaikhide (2011) applied a Vector error correction model (VECM) to examine the exchange rate pass-through to different measures of domestic price in Nigeria. Apart from the exchange rate and consumer price index variables, the authors also considered other variables, such as money supply, world export price, income and tariff rate. The main finding was that a long run relationship existed between exchange rate and domestic price level, while the short run impact was not quite obvious. This implies that short run variations in exchange rate might have been anticipated which made the impact not to be clearly observed in the analysis. The policy outcome was that the government should refrain from adopting devaluation to

address domestic price in the short term, however, such a policy might prove useful in the long term.

Frimpong and Adam (2010) examined the effect of exchange rate changes on consumer prices in Ghana using vector autoregressive (VAR) models. Using a data set covering the period 1990M01 to 2009M02, It was found that exchange rate pass-through to inflation was 'incomplete' and decreasing.

From all the analyses, there has been an extensive application of the Johansen's VAR estimation techniques including the impulse response function and the variance decomposition analysis which yielded similar results for countries with similar economic strength. This indicates that other estimation methods such as the Autoregressive Distributed Lag (ARDL) and GMM for panel data analysis have not been given adequate attention in empirical work, especially for Sierra Leone. This study therefore employs the ARDL estimation procedure to determine ERPT in Sierra Leone. The findings might be significant for policymakers and the country's development partners.

CHAPTER FOUR

THEORETICAL FRAMEWORK AND RESEARCH METHODOLOGY

Theoretically, the relationship between exchange rate and balance of payments is explained by series of theories such as the Keynesian theories (elasticities and the absorption theories), monetary theories and the portfolio balance or asset market theory. In this chapter, distinction between these theoretical foundations is presented. Also, the research methodology; specification of the model; and the estimation techniques employed are explained.

4.1 Theoretical Framework

The theoretical foundation of this study rests on the theories that explain the instruments for correcting balance of payments (BoP) problem. Such theories have been in existence since 1752 in the work on balance of trade by Hume David. The central issue focused on how an automatic equilibrating mechanism provided by inflows and outflows of money stock influenced adjustments in the BoP position. A more comprehensive analysis of the theory of policy instruments used to correct BoP equilibrium is documented in the work of Meade (1952). The suggestion presented was that a country may offset adverse trends in its BoP through adjustments in the exchange rate policy. The implication here depends on economic activities that directly alter exchange rate behaviour, which may have fundamental effects on the BoP position of a country.

The interactions among macroeconomic variables are distinguished in the approaches used in analyzing BoP. These approaches, which include the elasticity, the absorption, the monetary and the portfolio balance are discussed in the subsequent sub-sections of the

study. Exchange rate being a price that influences mainly international prices, affects consumer price index and it is an indirect way of showing how exchange rate alters trade competitiveness.

4.1.1 Elasticity Approach to Balance of Payments

The elasticity approach analyses show how devaluations of exchange rates and the price level affect trade balance. The focal point is how exchange rate devaluation or depreciation influences net exports, which in turn, affects the overall current account balance. The answer rests on the elasticities of demand of both exports and imports. The Marshall-Lerner condition, which has been greatly considered as the building block of the elasticity approach to balance of payments reveals that the sum of elasticity of demand for a country's export and its demand for imports has to be greater than unity $[(\varepsilon_x + \varepsilon_m) > 1]$ for a devaluation to have a positive effect on a country's balance of payments position. This condition has been documented as a necessary and sufficient condition for devaluation or depreciation to improve trade performance[30]. This relationship between exchange rate and the current account balance postulated in the Marshall-Lerner condition has also been considered as the J-Curve hypothesis.

Alternatively, if the total of these elasticities is less than one, then the country can instead improve its trade performance by revaluing its domestic currency. This exposition is expressed algebraically in equation (4.1):

$$\Delta TB = DXf\,(\varepsilon_{1m} + \varepsilon_{2m}) \qquad (4.1)$$

Where ΔTB = change in the trade balance

D = The devaluation in percentage

Xf = The value of exports expressed in foreign currency

ε_{1m} = The first (devaluing) country's demand elasticity for imports

ε_{2m} = The second country's demand elasticity for exports from the devaluing country

[30] Krugman and Obstfeld (1997) also support that if the sum of the absolute value of the two demand elasticities does not satisfy the Marshall-Lerner condition, then devaluation would increase current account deficit or reduce surplus.

Thus, $\varepsilon_{1m} + \varepsilon_{2m} > 1$ for Marshall Learner condition to be satisfied.

This approach essentially identifies the condition under which changes in exchange rate would restore balance of payments equilibrium. Its main focus is on the current account, which requires that the demand elasticity be computed. According to Crockett (1977), the approach is the most efficient mechanism of balance of payments adjustments and suggests the analysis of demand elasticity as the analytical tool by which policies in the exchange rate can be chosen so as to form equilibrium. The issue that has continued to pose constraints is that most developing countries especially those of the sub-Saharan Africa are exporters of mainly raw materials or primary products, and importers of finished products. As a policy caution, adopting devaluation as a means of correcting balance of payments disequilibrium might not be successful due to the low values of the elasticity of demand for their exports.

Presented in Figure 4.1 is a framework showing how exchange rate behaviour influences a country's external trade competitiveness, which in turn, flows to adjust the BoP position. To improve the BoP performances through external competitiveness, the nominal exchange rate must depreciate. Trade competitiveness is generally measured using the behaviour of the real exchange rate (RER) in terms of bi-lateral trade or real effective exchange rate (REER) in multi-lateral trade. The most commonly used methodology is the purchasing power parity (PPP) based RER formula, $R = E\frac{P^*}{P}$ where, E is nominal exchange rate, P^* and P are respectively, the foreign and domestic price levels. Domestic price level has substantial influence in determining RER. An increase in domestic price level at a rate relatively higher than that of the foreign price levels directly affects the RER in terms of appreciation of the domestic currency. In real terms, this will erode the external competitiveness of the domestic economy. Nominal devaluation in turn leads to an increase in the domestic price level. This happens through the following channel. A depreciation of the local currency increases the import prices as more of the local currency must be offered to acquire the foreign currency required to import the goods. The high import prices will make importers to increase the domestic price of the imported goods (since their motive is to make profits). This might lead to

expenditure-switching from imports toward domestic substitutes, thereby improving trade performance by raising the volume of exports.

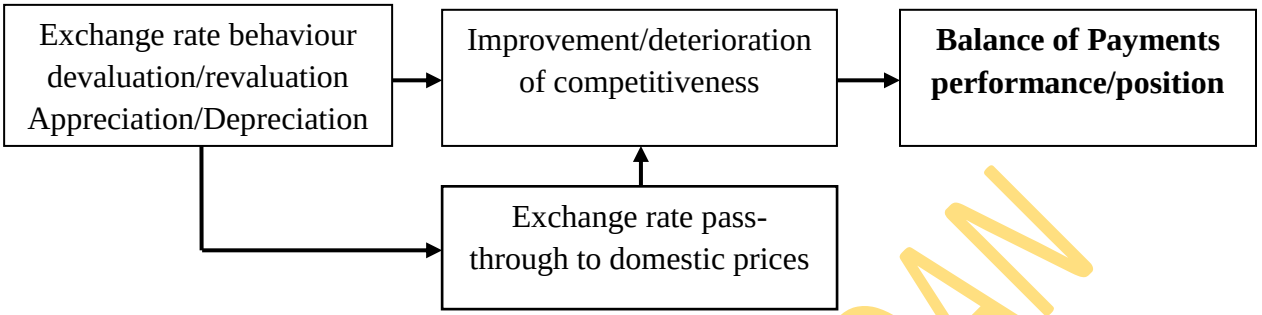

Figure 4.1: Conceptual relationship between exchange rate, price level and the balance of payments

Source: Adopted from Alawattage (2005).

4.1.2 Absorption Approach to Balance of Payments

This approach postulates that devaluation would only have positive effects on the balance of trade if the propensity to absorb is lower than the rate at which devaluation would induce increases in the national output of goods and services. It, therefore, supports the need to achieve deliberate reduction of absorption capacity to accompany currency devaluation. The basic tenet of this approach is that a favourable computation of price elasticity may not be sufficient to produce a balance of payments effect resulting from devaluation, if devaluation does not succeed in reducing domestic expenditure.

The identity of this approach follows from the Keynesian national income identity as specified in equation (4.2):

$$Y = C + I + G + (X - M) \tag{4.2}$$

and

$$Y - A = X - M \tag{4.3}$$

Where $A = C + I + G$, X=Exports, M=Imports and Y=total income.

From equation (4.3), an economy experiences trade deficit if absorption is greater than output. More specifically, income is derived from production. Therefore, if consumption is greater than domestic production, the difference must be made up for by imports. Machlup (1960) formalized this possibility in his article[31], which states that if devaluation raises domestic absorption relative to domestic income then the current account would deteriorate. In order to solve this dilemma in the current account balance, the expenditure-output gap must be reduced or eliminated through a reduction in absorption, an increase in output (income) or a combination of both.

Therefore, for a devaluation to be successful, adjustments are required in either or both of these two variables. As a consequence, the current account improves when devaluation raises domestic income relative to domestic spending.

[31] Balance of payments and the dollar shortage

4.1.3 Monetary Approach to Balance of Payments

An alternative approach to the balance of payments emerged as the monetary or global monetarist approach through many works (see for instance, Polak (1957); Pearce, (1961); Mundell (1968, 1971) and; Frenkel and Johnson, 1977). In their opinion, BoP behaviour is analyzed from the point of view of the supply of and demand for money. The central issue claim by this approach is that BoP is essentially a monetary phenomenon. That is, under this approach, any excess demand for goods, services and assets, resulting in a deficit of the balance of payments (BoP), reflects an excess supply or demand of the stock of money. A formal identity of this approach to BoP is provided as equation (4.4):

$$CA + KA = \Delta F \qquad (4.4)$$

Where, *CA* is the current account, *KA* is the capital account, and ΔF is the change in a country's foreign reserves, denominated in foreign currency.[32] This identity indicates that surpluses in the current and capital accounts, respectively represent excess flow supplies of goods and of securities, and a surplus in the money account and (ΔF) reflects an excess domestic flow demand for money. Consequently, in analyzing the money account, the monetary approach focuses on the determinants of the excess domestic flow demand for or supply of money. The fundamental implications of this claim is that to analyze what happens in the (overall) BoP, one should concentrate on the analysis of what happens with the Central Bank's balance of foreign reserves.

As with the absorption approach, the monetary approach can be defined in terms of basic identities; in the current case, in terms of the central bank's balance sheet[33] as:

$$D + FDC = MB = R + C \qquad (4.5)$$

Where, on the left-hand side are the sources of the monetary base, MB, or *high powered money*, and the right-hand side are the uses of it. The variable D is the domestic credit (or the domestic asset component of MB), FDC is the stock of foreign reserves (or the

[32] Note that this identity holds only in a fixed exchange rate regime.
[33] This discussion follows Whiteman (1975) exposition (with some slight changes in notation and presentation) of the Mundell's (1968) explanation of the equivalence of the elasticity, absorption, and monetary approaches.

foreign-backed component) in domestic currency, R is the reserve money and C the currency in circulation. Now, let M be the domestic money supply.

Simplifying, let $M = MB$ (the money multiplier is implicitly assumed constant and equal one). Then,

$$D + FDC = M \tag{4.6}$$

This identity implies that residents of an open economy "can have an influence on the total quantity of money via their ability to convert domestic money into foreign goods and securities or conversely turn domestic goods and securities into domestic money backed by foreign exchange reserves" (Hallwood and MacDonald, 1994). Now, taking the first difference of equation (4.6) leads to equation (4.7):

$$\Delta FDC = \Delta M - \Delta D \tag{4.7}$$

In this approach, ΔM is the flow demand of money balances or hoarding. It follows that if the BoP identity in equation (4.4) holds, the following equality must also hold:

$$CADC + KADC = \Delta FDC = \Delta M - \Delta D \tag{4.8}$$

Where, *CADC* and *KADC* are *CA* and *KA* in domestic currency, respectively. This states that, if a country has a deficit in both the current and the capital account, then the country has to be losing foreign reserves. The right-hand side says that a country loses reserves when domestic credit exceeds hoarding.

In comparison with the elasticity and absorption approaches (assume *KADC=0* and consider *CADC=TBDC*), the following identity must also hold.

$$XDC - MDC = Y - A = TBDC = \Delta FDC = \Delta M - \Delta D \tag{4.9}$$

This is the fundamental identity that positions together the elasticity, absorption, and monetary approaches to the BoP. Therefore, if one considers all variables in this identity in an *ex post* sense, the three approaches are equivalent (Mundell, 1968).

What makes the monetary approach differs from the other approaches is that unlike the elasticity and absorption approaches, the monetary approach provides little discussion about the underlying behavioral relationships; the effects of exchange rate changes; with the transmission mechanisms of those relationships. The role of the exchange rate is reduced to its temporary effects on the money supply. The reason is that MABP assumes "a change in the exchange rate will not systematically alter relative prices of domestic and foreign goods and it will have only a transitory effect on the BoP" (Whitman, 1975).

The 'transitory' (or short run dynamic) effect of devaluation under this approach is that, in the short run, this approach predicts that an increase in prices (for instance, caused by a nominal devaluation) may reduce the real money stock, and then improve the trade balance. The mechanism is that devaluation increases (proportionally) the domestic prices, which then causes people to reduce their spending or absorption relative to income in order to restore their real money balances and holding of other financial assets. This effect may, however, be temporary. Once people have restored their desired financial holdings-real money balances, expenditures may rise again and (any) new surplus (in the stock of money caused by the trade balance surplus) may be eliminated (Cooper, 1971).

4.1.4 Portfolio Balance or Asset Market Approach

Another prominent approach used to access balance of payments is the portfolio or asset market approach. It is evident that the monetary approach gives much consideration to factors that influence the demand for money, while less attention is accorded to other financial assets. On the contrary, the portfolio balance approach specifies not only that influence demand for money but also other forms of financial assets. It attempts to provide explanation that links current account, fiscal operations and exchange rate movements.

The general framework of this approach is based on the two countries (home and foreign), two currencies (domestic and foreign), and two non-money securities, classified as bonds (domestic and foreign) assumptions. The two bonds, domestic and foreign yield interest return as i_d and i_f, respectively. In the model, movement of especially capital

across countries is assumed to be high. Thus, interest rates play significant roles in BoP determination. The existence of an imperfect substitution assumption between domestic and foreign assets implies that each asset is priced in relation to its exposure to fundamental sources of macroeconomic risk. A risk premium term (RP) is, therefore, included in the determination of interest rate on domestic bond in equation (4.10):

$$i_d = i_f + \Delta x - RP \tag{4.10}$$

Where, Δx is the expected percentage change in the value of the foreign currency. A positive Δx is an expected depreciation of the home currency, while a negative Δx is an expected appreciation of the home currency. Specification of Δx is defined as equation (4.11):

$$\Delta x = \frac{E(e) - e}{e} = \frac{E(e)}{e} - 1 \tag{4.11}$$

Therefore, equilibrium in the BoP position is attained when the forces of demand and supply functions of these assets are equilibrated. These functions are defined as, the home currency (money), home bond and foreign bond designated as L, B_d and B_f in that order. It is taken that any of the three assets can be held by any national of the two economies. A vector representation of these functions is defined as equation (4.12):

$$Z_i = f\left(i_d, i_f, \Delta x, Y_d P_d, W_d\right) \tag{4.12}$$

Where,

Z_i = could be demand or supply of any of the three assets discussed above,

Y_d = Domestic GDP,

P_d = Consumer price index,

W_d = Domestic real wealth

Δx = is the expected percentage change in the value of the foreign currency, and the other variables are as defined above.

The bonds and the domestic money supply define the wealth of the domestic economy (W_d) in terms of its own currency as:

$$W_d = M_s + B_h + eB_o \qquad (4.13)$$

Where, M_s is the money supply of the home country, B_h is the stock of home bonds held by domestic investors, and B_o is the stock of foreign bonds held by domestic investors.

In the domestic bond market, a rise in domestic interest rate (i_d) will induce a huge capital inflow into the domestic economy. The effects of capital inflow may lead to an appreciation of exchange rate through high demand for the local currency. While an increase in foreign interest rate (i_f) and changes in exchange rate (Δx) make the demand for holding domestic bonds to fall in favour of foreign bonds. Similarly, growth in domestic income (Y_d) and increases in domestic price (P_d) in total leads to a fall in demand for both domestic and foreign bonds. This may be due to transactions demand for money, which implies that a rise in income causes an increase in the transaction demand for money. While a rise in total domestic wealth (W_d) will lead to an increase in the demand for both bonds since there would be available resources to invest in the two bond markets.

For money demand function, a rise in any of the variables i_d, i_f and Δx makes demand for money to fall as investors would want to invest in both bonds due to an increase in their returns. Growth in income, general price level and wealth will cause an increase in demand for money in order to finance additional transactions.

Two other policy issues are considered in this approach. Under the BoP accounting, a current account deficit is associated with a capital account surplus; that is, with a current account deficit, the home country borrows from foreign countries due to the net outflow of foreign exchange on the current account. This will lead to a depreciation of the domestic currency.

The existence of fiscal deficit also plays a role in the bond market. According to Rivera-Batiz, et al., (1994), if the government deficit is financed by domestic bonds, then the supply of domestic bonds must increase. This increase would require a reduction in their price in order to attract foreign investors. Such a reduction in price that might attract foreign investors is accomplished by an increase in the exchange rate, which is a depreciation of the local currency.

The portfolio balance model generally suggests that the existence of a BoP surplus or deficit, or of a domestic currency appreciation or depreciation, is only temporary. It only occurs when the adjustment process to the new equilibrium portfolios is in the process. Once the new desired portfolios have been attained, there is no longer any net flow of bonds, and the BoP imbalance or the exchange rate becomes stable.

4.2 Methodology

The analysis in section 4.1 indicates that all the four (elasticity, absorption, monetary and the asset market) approaches must be incorporated into a model in order to attain a favourable balance of payments position. The model for this study is therefore, drawn from these approaches. The estimation techniques and the definition of the variables are outlined in this section.

4.2.1 Model Specification

The model adopted in this study is seen as an extension of the model used by Hernan (1998) and Alawattage (2005). Both, respectively analyzed exchange rate and trade balance for Colombia; and exchange rate and balance of payments for Sri Lanka. The approaches discussed in the theoretical framework section are netted together into the specific components of BoP identity, which are classified in this study as the current account balance, financial account balance and the capital account balance.

For an extensive analysis of exchange rate behaviour on the BoP, the current account balance is disaggregated into trade balance, which in turn, is further disaggregated into exports and imports in order to determine the effects of exchange rate on each of them. Also, foreign direct investment inflow is given much consideration. Major consideration is given to these sub-components for some reasons: In the literature, substantial evidence of exchange behaviour on the current account balance is provided through trade balance disaggregated into exports and imports (Rawlins and Praveen, 1993; Hernan, 1998; Petrovic and Gligoric, 2010; Sekantsi, 2010). Similarly, exchange rate behaviour on the financial account balance has greatly featured through investment flows (Kohlhagen, 1977; Kodongo, et al., 2011). These sub-components may significantly be used to determine the BoP performance of any economy.

4.2.1.1 Export and Import Equations

Theoretically, the real effective exchange rate plays a significant role in influencing a country's exports and imports positions mainly because, it is an important economic indicator that shows the strength of an economy's international competitiveness, and therefore, has a strong influence on a country's balance of payments development.

To be consistent with data, the real exchange rate between two countries is taken to be the ratio of consumer price levels expressed in a common currency.

The model further deduced that the demand for imports *(M)* depends on domestic income *(Y)* and the relative price of imported goods to the domestically produced goods (P_m) and both measured in home currency terms. The equation showing these relationships is specified as,

$$M = f(Y_d, P_m) \quad (4.14)$$

$$M^* = f(Y_f, P_m^*) \quad (4.15)$$

Where M and M^* are the quantity of imports by home and foreign country, respectively and * signifies the foreign component of the analogous relative price of imports (P_m^*) and foreign income (Y_f). Equations (4.14) and (4.15), respectively represent the domestic and foreign demand functions for goods and services. They predict income and relative price elasticities to be respectively positive and negative in signs with respect to demand for imports.

The supply of exports in each country depends positively on relative price of exports and; this proposition postulates a perfect competitive situation.

$$X = f(P_x) \quad (4.16)$$

$$X^* = f(P^*) \quad (4.17)$$

Where, X and X^* are the home country and foreign country's supply of exports, respectively. P_x is the home country's relative price of exportable, defined as ratio of the

domestic currency price of exportable to the domestic price level *(P)*. Similarly, P_x* is the foreign component which, is the foreign currency price of exportable (P_m^*) divided by foreign price level, P*.

The domestic relative price of imports in equations (4.14) and (4.15) can further be expressed as:

$$P_m = \left(E\frac{P^*}{P}\right).\left(\frac{P_m^*}{P^*}\right) = RER.P_x^* \qquad (4.18)$$

Where, E is the nominal exchange rate, defined as the domestic currency's value of foreign exchange following direct method and RER is the real exchange rate defined as $RER = e.P^*/P$ following the Purchasing Power Parity (PPP)-based real exchange rate. Thus, an increase in value of E and RER indicates a devaluation or depreciation of the domestic currency. The foreign country's relative price of imports is defined analogously as equation (4.19).

$$P_m^* = \frac{P_x}{P} \qquad (4.19)$$

The quantities of transactions and relative prices of exports in equilibrium condition are:

$$D_m = F_x \ \ and \ \ F_m = D_x \qquad (4.20)$$

Where, the variables D_m and F_m are domestic and foreign imports; and D_x *and* F_x domestic and foreign exports, respectively. Equation 4.20 shows that the aggregate domestic demand for imports (D_m) is equal to the aggregate exports of foreign countries to the domestic economy. Similarly, the aggregate imports of foreign economies equal the total exports from the domestic economy to those countries.

The value of domestic country Trade Balance (TB) becomes,

$$TB = P_x.D_x = RER.P_x^*D_x \qquad (4.21)$$

The trade balance in real terms can be represented as value of net exports in domestic currency divided by domestic price level (P). From the law of demand, the higher the income of an economy the more quantity of goods and services that citizens will be willing to purchase. Trade balance is, therefore, further influenced by both the domestic and foreign GDPs of trading partners. Equation 4.21 is expanded to yield the trade balance equation (equation 4.22).

$$TB = f\left(RER, GDP^{d}, GDP^{f} .....\right) \quad (4.22)$$

In estimating the equations the real effective exchange rate (*REER*) will replace the real exchange rate (*RER*) in order to account for the effect of multilateral trade, rather than using the real exchange rate, which is more efficient for bilateral trade. It is expected that exchange rate depreciation and real foreign income to be positively related to trade balance and domestic income negatively related to trade balance.

The monetary variable, money supply, plays a role in trade. Its effect is similar to the influence income has on trade. The more money consumers hold the higher the quantity of goods and services they may demand (*ceteris paribus)*. Hence, an increase in money supply, whether for investments or otherwise, will encourage importation of more goods thereby negatively affecting the trade balance. Contrarily, the portfolio balance variable, interest rate may have positive effects on trade balance. A high interest rate encourages individuals to save thus postpone consumption to a later date. This will discourage imports, which will lead to exports or trade surplus. Due to the destructive effect of war and political unrest on an economy, the effect of the civil strife is hypothetically expected to have a negative influence on the country's economic performance, especially the mining and the agricultural sectors, which are the country's export base. During this period the country greatly relied on aid and loans to finance major economic activities.

The trade balance is, therefore, expressed as a function of the following variables: real effective exchange rate, domestic GDP, foreign GDP, consumer prices index, money supply, domestic interest rate, and the effect of the war. Disaggregating the trade balance into exports and imports equation (4.22) becomes equations (4.23) and (4.24), respectively. Taking the logarithmic form after incorporating monetary variables, money

supply (*MS)*, domestic interest rate (*IR*) yields the following two components of the trade balance equations. The first component being exports is given as:

$$Ln EX_t = \alpha_0 + \alpha_1 LnREER_t + \alpha_2 LnGDP_t^d + \alpha_3 LnGDP_t^f + \alpha_4 LnCPI_t^f + \alpha_5 LnMS_t + \alpha_6 LnIR_t + \alpha_7 D_t + \varepsilon_t \quad (4.23)$$

The, aprior expectations are: $\alpha_1 > 0$, $\alpha_2 < 0$, $\alpha_3 > 0$, $\alpha_4 < 0$, $\alpha_5 < 0$, $\alpha_6 > 0$ and $\alpha_7 < 0$.

The second component of the trade balance equation, the imports equation is given as:

$$Ln IM_t = \beta_0 + \beta_1 LnREER_t + \beta_2 LnGDP_t^d + \beta_3 LnGDP_t^f + \beta_4 LnCPI_t^f + \beta_5 LnMS_t + \beta_6 LnIR_t + \beta_7 D_t + \varepsilon_t \quad (4.24)$$

$\beta_1 < 0$, $\beta_2 > 0$, $\beta_3 < 0$, $\beta_4 > 0$, $\beta_5 > 0$, $\beta_6 < 0$ and $\beta_7 > 0$.

Where:

$LnEX_t$ = Exports

$LnIM_t$ = Imports

$REER$ = Real effective exchange rate

$LnGDP_t^d$ = Domestic GDP

$LnGDP_t^f$ = Foreign GDP, the European Union's (EU) GDP is used as proxy for foreign income due to its influence on the global economic activities, and also being one of the country's major trading partners.[34]

$LnCPI_t^f$ = EU's CPI is used as it provides better representation of tradeable goods of trading partners,

$LnMS_t$ = Domestic money supply representing M_2

$LnIR_t$ = Domestic interest rate (Treasury bill rate is used as proxy),

D_t = Dummy variable to capture the effects of the civil strife on the country's trade performance from quarter one, 1991 to quarter four, 2000 is assigned 1 and 0 for the rest of the period without war.

[34] Accounting for over 60% of the country's trading goods (both exports and imports).

According the Pesaran and Shin (1991); and Jalil, Ma and Naveed (2008), the problems of serial correlation and endogeneity are addressed when the appropriate number of lags is used in the Autoregressive Distributed Lags (ARDL) estimation technique. The estimations of equations 4.23 and 4.24, and all the subsequent equations estimated follow the aforementioned procedure.

4.2.1.2 The Investment Equation

The component of the financial account balance specified is the foreign direct investment mainly due to the country's high desire for growth through investment. As discussed, there exists a direct relationship between exchange rate movement and foreign direct investment inflows. Similarly, the literature also provides that high variability in exchange rate depicts unpredictability of macroeconomic performance, and since portfolio investment inflows depend greatly on the level of the macroeconomic stability, it can, therefore, be concluded that exchange rate movements influence portfolio investment flows. However, due to the huge missing figures in the available official data for portfolio investment, only empirical analysis on foreign direct investment is provided.

Hence, following the views of Kohlhagen (1977) and Stevens (1993), a weaker currency of a host country significantly attracts investments inflows due to relatively low cost of labour and raw materials, and other cost advantages with domestic competitors, exchange rate movements is considered to play a centre role in the analysis. Also, the size of an economy (used as proxy for market size) and the growth rate of that economy (purchasing power and consumption of the nationals) also influence investments flows. Similarly, a stable and a predictable rate of inflation attract foreign investment flows as it strengthens foreign investors' confidence by creating certainty for profit expectations. But high inflation rates are market signals for domestic currency devaluation in the future, which may cause foreign investors to suspend their investments as further devaluation will reduce the real value of earnings in local currency. The degree of openness of a country to international investors as well plays an important role in determining FDI inflow.

The FDI flow equation is specified in equation (4.25):

$$LnFDI_t = \phi_0 + \phi_1 LnNER_t + \phi_2 LnEX_t + \phi_3 GGDP_t + \phi_4 LnCPI_t + \phi_5 LnIR_t + \phi_6 Open_t + \phi_7 D_t + \varepsilon_t \quad (4.25)$$

$$\phi_1 > 0,\ \phi_2 > 0, \phi_3 > 0,\ \phi_4 < 0,\ \phi_5 < 0, \phi_6 > 0 \text{ and } \phi_7 < 0,$$

Where,

$LnFDI_t$ = Foreign direct investment to the country

$LnNER_t$ = Nominal exchange rate against the US dollar

$LnEX_t$ = Exports to other countries

$GGDP_t$ = Annual GDP growth

$LnCPI_t$ = consumer price index is used to account for inflation

$LnIR_t$ = Domestic Interest rate (Treasury bill rate used as proxy for domestic interest rate)

$LnOpen_t$ = the ratio FDI inflow to Domestic GDP.

D_t = Dummy variable to capture the effects of the civil strife during the period. One (1) is allocated to the period during the war and zero (0) elsewhere.

4.2.1.3 Exchange Rate Pass-Through Equation

From the conceptual framework presented (Figure 4.1), the response of trade to exchange rate behaviour could be channeled indirectly through the domestic prices. According to literature, ERPT to domestic prices may be either complete or incomplete. A 1.0% depreciation of the exchange rate is expected to increase the domestic price by the same 1.0% magnitude can be considered to be complete, while an incomplete pass-through indicates a less than 1.0% increase in prices from a 1.0% depreciation in the local currency.

As indicated in the theoretical observation, the conventional specification of testing Exchange Rate Pass-through (ERPT) may be derived from the Purchasing Power Parity (PPP) as shown in equation (4.26).

$$P = e.P^* \quad (4.26)$$

This relationship can be transformed into a natural logarithmic form and incorporating the monetary variables such as money supply and domestic credit.

$$LnCPI_t = \gamma_0 + \gamma_1 LnNER_t + \gamma_2 LnGDP_t^d + \gamma_3 LnGDP_t^f + \gamma_4 LnWPI_t + \gamma_5 LnMS_t + \gamma_6 D_t + \varepsilon_t \quad (4.27)$$

$$\gamma_1 > 0,\ \gamma_2 < 0,\ \gamma_3 < 0,\ \gamma_4 > 0,\ \gamma_5 > 0, \text{and } \gamma_6 > 0,$$

Where,

$Ln CPI_t$ = Log of the consumer price index

$Ln NER_t$ = Nominal Leone/US$ exchange rate

$Ln GDP_t^d$ = domestic income, representing GDP

$Ln GDP_t^f$ = Foreign GDP, the EU's GDP is used as proxy for foreign income.

$Ln WPI_t$ = the EU Whole sale price index

Two sets of Autoregressive Distributed Lags (ARDL) model equations are specified. As shown in appendices 2-5, a set of specified dynamic model of the estimated equations and the error correction representations of the ARDL equations.

4.3 Estimation Procedure

In estimating the dynamic relationship between exchange rate and balance of payments, a correct specification of the model that captures the short-run deviations that may possibly occur in the process of modeling the long-run cointegrating equation has to be considered. The Autoregressive Distributed Lag (ARDL) bounds testing modelling approach developed by Pesaran et al., (2001) which examines long run dynamic relationship between macroeconomic variables is employed.

This procedure recommends estimating equations specified in appendices 1 and 2 by the Ordinary Least Square (OLS) method. This one-step estimation yields all the necessary statistical results that are required to assess the short-and-long-runs effects of all the independent variables on the dependent variable.

The choice of this approach is influenced by the following: Unlike most other conventional multivariate cointegration procedures such as the Engle-Granger Two-Step (1987) approach and, the Johansen and Juselius (1990) maximum likelihood Vector Autoregressive (VAR) model that are valid mainly for large sample size analysis, the bound test is suitable for analyzing either small or large sample size. Given that the annual sample period of 25 years, from 1975 to 2010 after losing some observations to stationarity test, the intervals become relatively short, hence, its sample size. This approach is, however, much suitable for this study.

Secondly, unlike the Johansen (1991), maximum likelihood Vector Autoregressive Model procedure, the bounds testing procedure does not impose restrictive assumptions among which is that all the variables under consideration should be integrated of the same order before further cointegration analyses are carried out. The main testing tool for cointegration of the ARDL model is the F-test statistics. This statistics determines whether the variables included in the ARDL model are integrated of order zero, I(0) or integrated of order one, I(1).

Also, the problem of serial correlation and endogeneity is addressed when the appropriate numbers of lags are used in the ARDL procedure (Pesaran and Shin, 1999; and Jalil *et al.*, 2008). Furthermore, the ARDL estimation procedure is quite flexible as it allows all the

variables to be endogenous and the long-and short-runs parameters of the model are estimated simultaneously (Khan *et al.*, 2005). Finally, the ARDL estimation technique generally provides unbiased estimates of the long-run model and valid t-statistics even when some of the regressors are endogenous (Constant and Yue, 2010).

The initial step is to determine the dynamic lag length of the variables in the model. In this respect, the Akaike Information Criterion (AIC), Schwartz Information Criterion (SIC), Hannan Quin (HQ) test, Likelihood Ratio tests (L-R) and Final Prediction Error (FPE) test are employed for this purpose.

The next stage is to trace the presence of cointegration from the OLS regression outputs by conducting an F-test for the joint significance of the coefficients of the lagged levels of the variables. This testing procedure is a test of a null hypothesis of no cointegration long-run relationship; ($H_0 : \beta_1 = \beta_2 = ... = 0,$) against an alternative hypothesis of ($H_1 : \beta_1 \neq \beta_2 \neq ..... \neq 0$), implying the existence of cointegration among the variables (Pesaran *et al.*, 2001). Two set of critical values generated by Pesaran *et al.*, (2001) are normally considered, the upper and the lower bound statistics for decision making. If the reported test statistic is above an upper critical value, then the null hypothesis of no long-run relationship is rejected regardless of the orders of integration of the underlying variables. On the other hand, if the test statistic is below the lower bound, then the null hypothesis cannot be rejected.

Finally, if the test statistics falls between the lower and the upper bound, the decision then becomes indecisive. However, according to Canetti and Greene (1991), the most efficient way of dealing with such an inconclusive case is to establish cointegration by applying an ECM version of the ARDL model. But if a unique long run relationship exists among the variables of interest, a conditional ARDL long-run model is estimated based on the equations provided in appendices 1 and 2 and the models are re-specified and each of it tries to capture the error correction mechanism.

According to Alogoskoufis and Smith (1991), and Antzoulalos (1996), economic decision suggests that the ECM may arise from a forward-looking behaviour, it may also reflect expectations about future events. That is, the error correction mechanism (ECM) of a

model comprises a short-run transitory effect and a long-run relationship. It describes how the long run solution is achieved via error correction feedback. There are two rules of thumb to consider when dealing with an error correction mechanism. Firstly, the coefficient should be negative and, and secondly, it must be maintained within a certain band. If not, under the assumption that the ECM is positively correlated with the future economic activities would be unstable and such an economy may be considered operating an inconsistent system. Table 4.1 shows seven possible coefficients of ECM that may be obtained empirically and their interpretations. The most ideal of them all is the third coefficient, $-1<\alpha<0$. It indicates that a stable process of incremental adjustment is attainable which enables the economy to reach equilibrium within a specified time period.

Table 4.1: Expected Coefficients of Error Correction Mechanism (ECM)

S/No.	Coefficient	Interpretation
i	$\alpha > 0$	The model is explosive
ii	$\alpha = 0$	The model does not adjust
iii	$-1 < \alpha < 0$	Stable process of adjustment
iv	$\alpha = -1$	The model is too perfect and adjusts in one period
v	$-2 < \alpha < -1$	Overshooting adjustment
vi	$\alpha = -2$	The model continuously oscillates
vii	$\alpha < -2$	The model is explosive

Source: Compiled from the works of Alogoskoufis and Smith (1991), and Antzoulalous (1996).

4.4 Definition of the data

This research used time series data spanning from 1975 to 2010. This has been the period in which most economies had control over the management of their exchange rate policies following the collapsed of the Bretton Wood system in 1973.

The analyses utilized both quarterly and annual data series based on the availability of the time series data from the official sources. The quarterly data are used in the estimation of three equations. (i) The imports equation; (ii) the exports equations, and (iii) the exchange rate pass-through equation. While annual data is used in the estimation of the FDI equation as the data series of the main variables (FDI, GGDP and Openness) are only available on annual basis. The value of FDI is expressed in US Dollars as provided by WDI. The variables considered in the analysis and their descriptions are presented in Table 4.3.

4.5 Data Sources

The data are obtained mainly from the *International Financial Statistics* of the International Monetary Fund (IFS/IMF) CD ROM. Data from the following institutions were also obtained; the World Development Indicators (WDI), the Central Bank of Sierra Leone, and the Statistics Sierra Leone various bulletins and annual reports augmented to fill gaps in the data from the IMF. This, in no way affected the statistical analysis of the series. The definition and descriptions of the variables are presented in Table 4.2.

Table 4.2: Definition of Variables

S/No.	Variable	Symbol	Description
1	Balance of Payments	BoP	The country's overall Balance of Payments (CAB+FAB+KAB)
2	Current Account Balance	CAB	Includes: Goods and services trade, (Investment) income and current transfer.
3	Financial Account Balance	FAB	Includes direct investment, portfolio investment and other asset investment.
4	Capital Account Balance	KAB	Mostly records aid inflows and other flows to government other than investment.
5	Exports	EX	Total exports of Goods and Services
6	Imports	IM	Total imports of Goods and Services
7	Foreign Direct Investment inflows	FDI	Total Foreign Direct Investment inflows (in USD'Millions)
8	Real Exchange Rate	RER	$RER = NER\left(CPI^{*}/CPI\right)$
9	Real Effective Exchange Rate	REER	the total trade-weighted index of bilateral real exchange rates of major trading partners. (Period averages)
10	Nominal Exchange Rate	NER	Leone per Unit of US$ (Le/US$)
11	Consumer Price Index	CPI	The Country's CPI
12	Real GDP (Domestic)	GDP^{d}	Domestic GDP at Constant Prices
13	Real GDP (Foreign)	GDP^{f}	Foreign GDP at Constant Prices
14	World Price Index	WPI	World Price Index
15	Growth GDP	GGDP	Growth Rate of GDP
16	Money Supply	MS	Total of narrow and quasi money = Broad Money Supply (End period value)
17	Domestic Credit	DC	Claims on the Private Sector (End period value).
18	Interest Rate	IR	Treasury Bill Rate (percent per annum)
19	Openness	Open	Ratio of total FDI to nominal GDP

Source: From the IFS/IMF CD-ROM, 2012.

CHAPTER FIVE
MODEL ESTIMATION AND INTERPRETATION OF RESULTS

The prima facia of this chapter is to provide the analysis of the model and interpretation of results. Distinctively, the statistical properties of the time series data that justify the adequacy of the estimation techniques are provided in this chapter. This is followed by the results of the behavioural equations that empirically show both the long run and short run relationship between exchange rate and balance of payments generally, and each of the components of the balance of payments in Sierra Leone. Also provided are the diagnostic tests to validate the estimated equations.

5.1 Statistical Properties of the Variables

This section provides the statistical properties of the time series data. Specifically, the descriptive statistics and unit roots condition of the variables are considered.

5.1.1 Descriptive Statistics of the Variables

The descriptive statistics, which describes the basic features of the variables in the study, are shown in Table 5.1. The characteristics of the time series data indicate that the variables are relatively evenly distributed. The skewness and standard deviation statistics show that the disparity is not wide and the Jarque-Bera statistics of the variables indicate none rejection of the null hypothesis of a normal distribution at relatively one percent and five percent levels of significant as specified by the high probability values.

Comparison of the statistical properties of some of the variables presents interesting discussions. Even though the mean values of imports exceeded that of exports by relatively some margin of

US$ 0.30bn, this is however, a significant amount considering the size of the Sierra Leonean economy being small. The maximum and minimum statistics depict that on the average imports had been higher than exports. This implies that the country persistently experienced trade deficits during the period.

Table 5.1: Descriptive Analysis of Variables

S/No.	Variable	Mean	Median	Max.	Min.	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Prob.
1	LRER	7.68	7.71	8.68	7.11	0.27	0.92	6.42	22.56	0.14
2	LREER	5.15	5.02	6.12	4.59	0.44	0.59	2.10	3.29	0.19
3	LBOP	4.95	5.00	5.56	3.56	0.40	-1.19	5.09	15.05	0.20
4	LCAB	5.06	5.30	6.09	-1.02	1.16	-4.27	22.67	9.71	0.31
5	LFAB	5.71	5.80	6.05	3.03	0.49	-4.83	27.27	23.91	0.22
6	LKAB	1.05	0.06	5.48	0.00	1.86	1.47	3.49	13.27	0.15
7	LX	4.67	4.96	5.83	1.84	0.91	-1.54	4.80	19.03	0.11
8	LM	6.26	6.43	6.59	3.40	0.54	-4.37	23.59	50.46	0.32
9	LY^d	6.85	6.84	7.58	6.19	0.34	0.50	2.80	1.55	0.46
10	LY^f	9.24	9.24	9.59	8.82	0.24	-0.06	1.74	2.40	0.30
11	LCPI	1.26	2.81	5.00	-4.61	3.45	-0.47	1.58	4.36	0.11
12	LMS	8.33	9.19	14.18	1.92	3.47	-0.35	2.00	2.27	0.32
13	TBR	19.21	15.32	78.63	5.50	14.61	2.33	9.26	1.32	0.45
14	LWPI	4.96	5.77	5.86	2.18	1.26	-1.09	2.53	7.44	0.22
15	LFDI	5.04	5.06	5.51	2.27	0.51	-4.67	26.49	8.77	0.20
16	LOPEN	2.80	2.86	3.39	0.68	0.45	-2.86	14.87	60.23	0.12
17	GGDP	2.16	3.04	27.46	-19.01	8.18	0.09	5.53	9.66	0.11

Source: Author's Computation, 2014.

Testing for the presence of unit root in variables has become one of the pre-requisite in time series econometrics analysis (Philips and Perron, 1988). However, previous to such tests, a closed assessment of the series in graphical form would be essential. The graphs of the variables are therefore provided in Figure 5.1. As it can be observed from the figures, the trending of the variables in levels are mixed. While some are trending progressively upwards, others are trending downwards and quite a lot are lopsidedly trending. For that reason, it provides the need to carry out unit root tests.

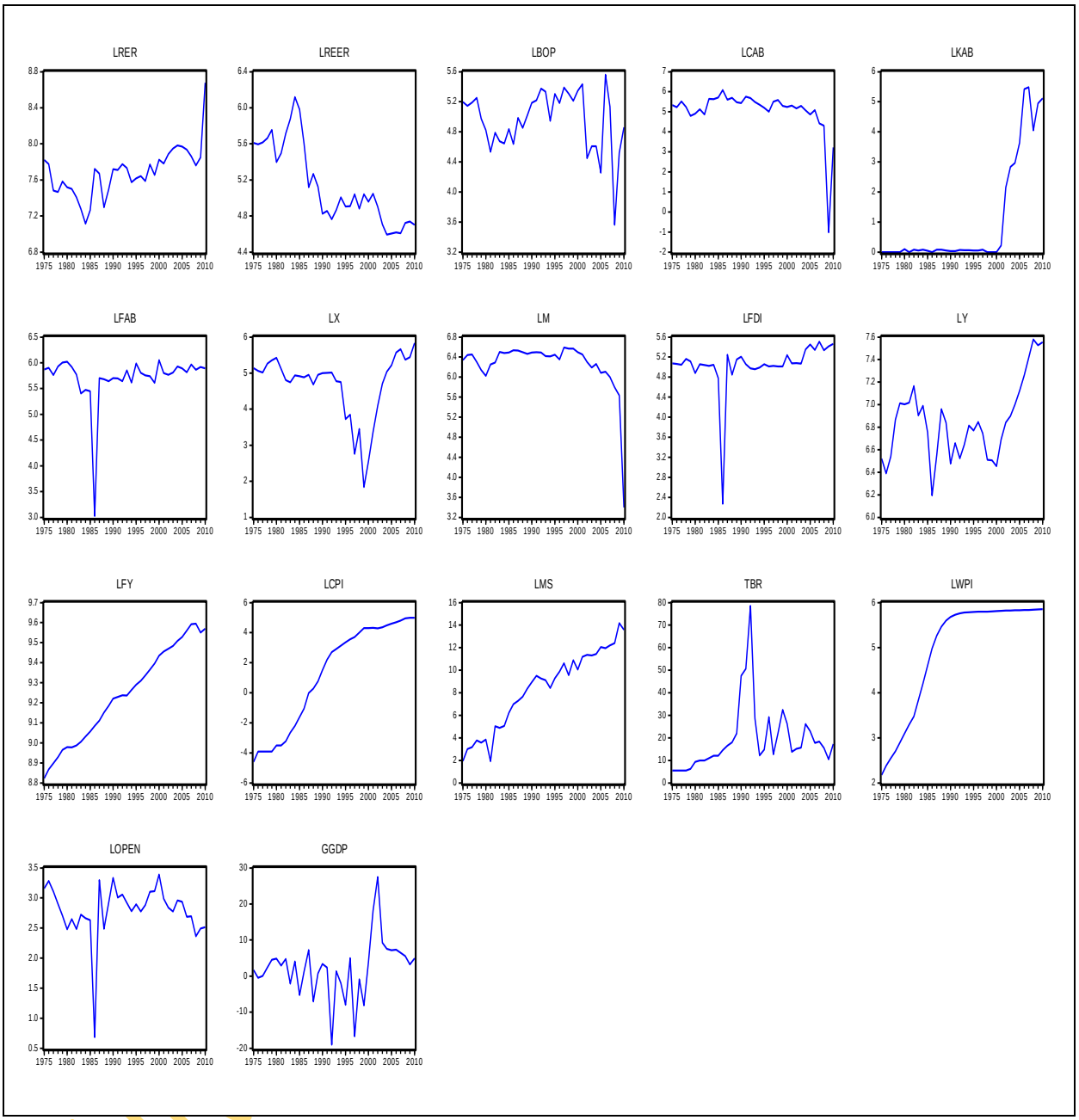

Figure 5.1: **Graphs of Variables in their Logarithm Forms**

5.1.2 Unit Root Tests

Even though unit root test is not imperative for ARDL approach to cointegration analysis but according to Jalil et al., (2008), it would, however, be indispensable to verify the order of integration of the series in order to avoid spurious estimation outputs. Also, to investigate whether there exists stable linear steady-state relationship between the interested variables, unit root and cointegration tests are applied to each variable. The unit-root tests show if a time series variable is stationary. Cointegration analysis determine the long-run (cointegrating) relationship between the variables that are found to be non-stationary. The Augmented Dicky-Fuller (ADF) unit root test procedure is used and the results are reported in Table 5.2. The result shows that most of the series are integrated of order one (I(1)), while two of the endogenous variables, the growth rate of GDP and the degree of openness are stationary in their levels. This would have justified the application of the Johansen (1996) maximum likelihood estimation technique to cointegration analysis but due to the small sample properties of the series, especially analyses that for which annual data are applied. The application of the ARDL approach might, therefore, provide convincing results over that of the Johansen's approach.

Table 5.2: Augmented Dickey Fuller (ADF) Unit Root Test

S/No.	Variable	ADF (in Level)		ADF (Δ in Level)		Inference
		Intercept	Trend & Intercept	Intercept	Trend & Intercept	
1	LRER	-0.2589	-2.6014	-4.6867**	-4.9712**	I(1)
2	LREER	-1.1687	-2.1814	-5.0792**	-4.9996**	I(1)
3	LBOP	-2.1901	-1.9275	-1.9361	-4.0579*	I(1)
4	LCAB	1.8638	1.4130	-1.2612	-5.4587**	I(1)
5	LFAB	-3.3701	-2.7891	-6.7265**	-6.6359**	I(1)
6	LKAB	-2.2368	-2.7952	-3.07467*	-3.3585*	I(1)
7	LEX	-2.4998	-2.7859	-6.6496**	-6.5541**	I(1)
8	LIM	-1.5413	-2.1347	-6.5493**	-6.4940**	I(1)
9	$LGDP^{d}$	-1.3348	-1.7453	-5.2178**	-5.2322**	I(1)
10	$LGDP^{f}$	-1.8384	-3.3702	-3.9440*	-4.0106*	I(1)
11	LCPI	-2.3082	0.4745	-3.2880*	-3.4825*	I(1)
12	LMS	-1.0440	-1.7949	-3.1584*	-3.2531*	I(1)
13	TBR	-2.8034	-2.7570	-6.3454**	-6.2809**	I(1)
14	LWPI	-2.4888	-2.3102	-1.3348	-3.9603*	I(1)
15	LFDI	-2.1061	-2.4478	-5.2091**	-5.5777**	I(1)
16	GGDP	-4.1272**	-4.2857**	-9.4978**	-9.3483**	I(0)
17	LOPEN	-5.2922**	-5.2143**	-6.4137**	-6.3083**	I(0)

Notes: (i) Critical values for ADF with Intercept at 1% and 5% are -3.6329 and -2.9484.

(ii) Critical values for ADF with Intercept and Trend at 1% and 5% are -4.2436 and -3.5443.

(iii) ** and (*) implies significant at 1% and (5%) level.

(iv) Δ represents difference operator.

5.2 Empirical Analysis and Interpretation of Results

In this section, the estimation results of the Unrestricted Error Correction Model (UECM) of the ADRL approach for each of the behavioural equations is presented. The bounds test based on the UECM is applied. A series of diagnostic tests that checked the performance of each of the estimated UECM equations is provided.

5.2.1 The Unrestricted Error Correction Model for the Components of Balance of Payments

One of the important steps in examining long run relationship using the ARDL approach is the estimation of a specified ARDL equation using the Unrestricted Error Correction Model (UECM). As the specification presupposes that the disturbances are serially uncorrelated, the choice of appropriate lag length is relevant. According to Akinboade *et al.* (2008), an introduction of a maximum lag order for the differenced variables is appropriate and then, following the procedure introduced by Hendry *et al.* (1984), which suggested that variables that are non-significant are systematically dropped from the estimation until an appropriate estimation outcomes is obtained. A battery of diagnosis test can then be used to check the performance of the UECM. The procedure suggested by Hendry et al. (1984) and used by Akinboade et al. (2008) and Sultan (2010) is, therefore, followed. The estimated results, residual tests and model stability tests of each equation are provided in Appendices 5-20.

As provided, the UECM gives appreciable R-bar squared between 0.35 and 0.94. The test statistics of skewness and kurtosis of residuals showed by the Jarque-Bera test confirm that the residuals are fairly normally distributed.

Furthermore, each of the estimated models passes the Ramsey's Regression Specification Test (RESET) using the square of the fitted values for the functional form and the Breusch-Godfrey Lagrange Multiplier test of serial correlation. The White's test statistics also indicate that there was no serious problem of Heteroscedasticity (of the variation in the variance of the errors in the series). Detailed of the UECM of the estimates are presented in Appendices 5-20.

5.3 Decision of the Cointegration Tests

From the unit roots tests results which show mixed order of integration of the series, a cointegration test then becomes a major fundamental issue in the analysis. The selection of the optimal lag length of the series and testing for the existence of long-run relationship among the variables are carried out.

5.3.1 Bounds Cointegration Test Results

The analysis using ARDL[35] bounds testing approach of cointegration by Pesaran et, al. (2001) is reported in Table 5.3. The Table provides the results of the F-statistics and the critical values of the standard significant levels as provided by Pesaran and Pesaran (2001). These values support the existence of cointegration or long-run relationship between variables in each of the equations except that of financial account balance whose F-statistics falls within the bound (lower and upper bound), which confirms the indecisiveness of the existence of cointgration even at the 10 percent level of significant. Another salient feature of the analysis is that exchange rate turned out to be statistically significant in the entire cointegration test. This indicates that exchange rate has a significant role in determining the balance of payments and its components in both the short and long runs.

[35] ARDL methodology was introduced by Pesaran and Shin (1996); Pesaran and Pesaran (1997); Pesaran and Smith (1997).

Table 5.3: Cointegration Properties

S/No.	Dependent Variable	F-Statistics	Critical Bounds		Decision Rule	Decision
			Lower	Upper		
1	*DLBoP*	9.519	3.74	5.06	1%	Cointegrated
2	*DLCAB*	12.292	3.74	5.06	1%	Cointegrated
3	*DLKAB*	5.115	3.69	4.89	5%	Cointegrated
4	*DLFAB*	2.682	3.41	4.68	5%	No Cointegrated
5	*DLEX*	5.845	3.74	5.06	1%	Cointegrated
6	*DLIM*	12.564	4.29	5.61	1%	Cointegrated
7	*DLFDI*	6.965	2.45	3.61	5%	Cointegrated
8	*DLCPI*	11.246	3.41	4.68	1%	Cointegrated

Source: Computed by Author, critical bounds are obtained from Pesaran et al., (2001)

Before proceeding to the analysis of the ARDL error correction mechanism (ECM) of the equations (see Appendices 2-5), the optimal ARDL order is obtained. The analysis in obtaining the maximum lag length is provided in sub-section 5.3.1.

5.3.2 Optimal Lag Length Selection Criteria

The first step to the ARDL approach is to determine the optimal lag length of the series[36]. The optimal lag length for each of the equations are obtained using the five main criteria, the Akaike Information Criterion (AIC) and Schwartz Information Criterion (SC), Hannan Quin Test (HQ), Likelihood Ratio Tests (LR) and Final Prediction Error (FPE). Even though a preferred lag length is appropriate if more of the five criteria provide support for it, but according the Pesaran et al., (1997), both AIC and SC criteria selection have similar small sample performance but the ARDL Schwartz Information Criterion (ARDL-SC) performs slightly better than the other. Therefore, the SC is considered consistent in model selection criterion while AIC is not. In the specification, the optimal lags as decided upon by the SC are provided in the specified ARDL model of each estimated equation.

5.4 The Long Run and Short Run Solutions of the Model

The solutions of the model are presented in this section. The long run static solution is presented in sub section 5.4.1, while the error correction models are provided in sub section 5.4.2.

[36] The rationale for this is that the method paves the way for estimating an ARDL model and having a suitable lag length is fundamental to the robustness of the results.

5.4.1 The Long Run Static Solutions

This sub-section provides the long run solution of the model. These estimates present the solution to the error correction term for estimating the dynamic short run solution to the model. The results of long-run representations of the analysis are presented in Table 5.4.

The results in Table 5.4 show that in the long-run, exchange rate and other macroeconomic variables such as growth in GDP, money supply have significant effects on the Balance of Payments and its components. It is generally expected that, in the long run, the overall BoP and its components, CAB, KAB and the FAB would have a negative relationship with real effective exchange rate. This implies that an increase in real exchange rate, a real appreciation, decreases a country's competitiveness. These relationships are stronger in the overall BoP and the CAB than with the KAB and the FAB.

The results show that exchange rate has a coefficient of 0.343 in the BoP equation. This connotes that the relationship between exchange rate and the overall balance of payments is inelastic. The finding depicts that the overall BoP responds much lower to every percentage increases in the real effective exchange rate. A further discussion of the result demonstrates that in the long run a 10.0 percent appreciation in the real exchange rate would translate into a 3.43 percent deterioration in the balance of payments position. Similarly, coefficients of the financial account balance and the capital account balance show similar response like that of the overall balance of payments but both coefficients were, however, negligible for any policy precision for the long run. In contrast, the current account balance's reaction to exchange rate behaviour indicates that as exchange rate appreciates the overall current account balance worsens and its response is elastic. This implies that for every percentage appreciation of the exchange rate, the current account balance position worsens by over 1.33 percent. This shows that there is no one to one response in the behaviour of the two macroeconomic variables.

Gross domestic income was, however, expected to have a negative relationship with the overall BoP. The economic implication is that when income increases, consumers may have the desire to demand more foreign goods especially in a situation where the

domestic firms are incapable to produce the required goods even for domestic consumption. This action if not contained will lead to an increase in imports in the long run. On the other hand, growth in foreign GDP statistically increases demand for the country's export thereby improving the BoP position. The net effect is that an improvement in both domestic and foreign GDPs will lead to an improvement in the overall BoP. These findings support the conventional theory of consumption, which says in part, consumption increases as income and other noneconomic factors increase. These findings are consistent with the findings by Baharumshah *et. al*.,2004 and Kandil, 2009; that growth in foreign economic activities will spill over to economies with whom they are in economic agreements. This is confirmed for the case of Sierra Leone and the EU markets with long standing economic relationships.

In the analysis, dummy variable as a proxy for the effect of the war on the economy was used. It was expected that the war would have had an instantaneous negative effects on the country's economy in terms of its outputs, exports, imports and investment inflows in general. But, from the results, the effects of the war on the country's balance of payments, and its components were negligible at least in the short run. The long run results also depict insignificant effects. Major reason attributed to this was that the war started in areas that were naturally not endowed with resources that the government so depended upon for major economic management. Also, resources tapped from those areas could not be immediately used to finance the war. Due to the poor border management, these areas were used as a gateway to access the country. While the war was being pursued, sectors in other parts of the countries where war had not reached were actively productive. Hence the economy continued to register favourable economic outlooks. The economy started experiencing economic downturn when the war engulfed all the mining and agricultural areas, which was almost five years into the civil strife.

It is observed from the analysis that the effect of the war should not be analysed in isolation. Its effects may not work directly on the economy but work through other economic agents to affect the overall economy after considerable time period.

Table 5.4: Long Run Elasticities Estimates

S/N	Dependent Variables	Variables	Coefficient	Standard Error
1	*LBoP*	*Constant*	12.353	3.734***
		LREER	0.343	0.516**
		$LGDP^{d}$	0.235	0.099**
		$LGDP^{f}$	0.619	0.191***
2	*LCAB*	*Constant*	5.508	4.035
		LREER	1.334	0.649**
		LMS	0.575	0.122***
		LWPI	1.222	0.286***
3	*LFAB*	*Constant*	5.172	0.831***
		LREER	0.069	0.032**
		TBR	0.012	0.004**
		GGDP	0.001	0.007
		LOPEN	0.858	0.113***
4	*LKAB*	*Constant*	14.627	1.827***
		LREER	0.047	0.017***
		TBR	0.018	0.009*
		GGDP	0.012	0.015
		LOPEN	0.323	0.251

Source: Computed by the Author, 2014.

The long run relationships between exchange rate and the sub-components of the BoP as reported in Table 5.4 depict that appreciation in the real exchange rate has its expected signs on each of the selected sub-components (exports, imports and foreign direct investment). The interpretations are that any devaluation in the REER will encourage both exports and foreign direct investment inflows, while imports will deteriorate in the long run. The influence of exchange rate depreciation on the trade balance depends on the elasticities obtained for exports and imports to real exchange rate depreciation as reported in Table 5.5.

Table 5.5: Long Run Elasticities Estimates of the sub-components of BoP

S/N	Dependent Variable	Variables	Coefficient	Standard Error
5	*LEX*	*Cons tan t*	-11.713	2.591***
		LREER	0.780	0.225***
		$LGDP^d$	3.195	0.343***
		LMS	0.608	0.049***
		LWPI	0.217	0.108**
6	*LIM*	*Cons tan t*	-41.024	9.027***
		LREER	-0.541	0.181***
		$LGDP^d$	0.849	0.415**
		$LGDP^f$	0.863	0.175***
		LMS	0.444	0.098***
7	*LFDI*	*Cons tan t*	4.224	1.027***
		LREER	0.422	0.128**
		LOPENESS	1.169	0.116***
		TBR	-0.014	-0.004***

Note: ***, ** and * means significant at the 1%, 5% and 10%, respectively.

Source: Computed by the Author, 2014.

The estimated long-run results in Table 5.4 show that in the long run exchange rate and other macroeconomic variables such as growth in GDP, money supply have significant effect on the balance of payments and its components. Specifically, due to the nature of the country's economy which is largely import dependent and as such the influence of exchange rate on the balance of payments in generally and on each of its components, vary quite significantly.

The influence exchange rate has on the overall balance of payments may be both direct and or indirect. The coefficient, 0.343 of exchange rate connotes that the relationship between exchange rate and that of balance of payments is inelastic. The implication is that the country's balance of payments tends to respond less to every 1 percentage deterioration in the local currency. This demonstrates that a 1 percent depreciation in the real exchange rate would lead to a 0.34 percentage improvement in the balance of payments. Growths in both domestic and foreign gross domestic incomes (GDPs) also surmise positive and significant effects on the balance of payments in Sierra Leone in the long-run. As it could be observed from the results, foreign GDP tends to exert a greater influence on the country's balance of payments than that of domestic GDP.

Similarly, on the current account balance, exchange rate, money supply and the world price index are the major determinants. As Table 5.4 depicts, the coefficient of exchange of 1.33 indicates an elastic response of the current account balance to exchange rate depreciation. Exchange rate as a policy variable continues to influence the current account balance through the trade balance which constitutes a greater proportion of the current account balance. Equally, an increase in world price index makes the country's exports relatively cheaper in the international market, provided the domestic price does not increase immediately due to the world price increase. This, therefore, induces an increase in foreign demand for the country's exports. The influence of domestic money supply on the current account balance is ambiguous as it tends to have positive relationship in the long-run.

As evidenced from the balance of payments identity, both the current account balance and the financial account balance offset each other. This implies that a surplus in one account would approximately be the same amount indicating a deficit in the other account

balance. The impact of exchange rate on the financial account is, still, not explicit in the long-run. This is indicative of the elasticity that is relatively low than that of the relationship with the current account balance. Nevertheless, other macroeconomic fundamentals such as trade openness and the growth rate of the country's gross domestic income have both positively influenced the financial account balance. This manipulation takes place mostly through investment inflows. A depreciation of the domestic currency attracts foreign inflows of capital in the form of investment. It makes among others, the cost of hiring labour in domestic currency cheaper relative to their counterparts in other economies; and also, raw materials would become economically cheaper to acquire with foreign currency. This makes investment profitable for foreign investors in terms of the local currency than their domestic competitors. Foreign investors may have the tendency to outperform their domestic counterparts in the acquisition of domestic investments.

The issue of exchange rate behaviour on the current account balance is evidenced more in the trade balance. From the long-run exchange rate elasticities of 0.78 and 0.54, respectively on exports and imports, imply that real exchange rate movements influence the country's exports more than imports in the long-run. This is, however, not what is reported in the studies by Bhattari and Armah (2005) for Ghana and Bahamain-oskooee and Satawatananon (2010) for Thailand. The results of the analysis showed that other variables such as domestic and foreign incomes collaborated with exchange rate in influencing both exports and imports. Growth in foreign income influences imports more than that of exports.

5.4.2 Short Run Dynamic Solutions

This sub-section provides the short run solutions of the model. These estimates provide solutions to the error correction mechanism to the model. The error correction representations for the ARDL model are reported for each of the estimated equations in the respective sub section.

5.4.2.1 Dynamic Solution to the Balance of Payments

An examination of the estimated result of the balance of payments equation shown in Table 5.6 indicates that the overall fit is satisfactory at the value of adjusted R-square of 0.748. This point out that the independent variables used in the model jointly accounted for over 70 percent of the total variation in balance of payments position in Sierra Leone. Apart from both current domestic and foreign GDPs, all the other variables including one period lag of foreign GDP, lag of BoP, previous period's exchange rate behaviour have their expected signs of the coefficients and statistically significant in explaining the overall BoP position. The elasticity shows that BoP improves by less than 5 percent (about 2%) for every 10 percent depreciation of the exchange rate.

The coefficient of the error correction model (ECM) is negative as expected and statistically significant, showing that the model has an adequate self adjusting mechanism to adjust the short-run dynamics of the variables with their long-run values. A highly significant error correction term indicates an existence of a stable long run relationship. This, therefore, confirms with an error correction coefficient of -0.701, about 70 percent of the deviation in BoP from equilibrium will be corrected in the following period. The finding is also supported by the work of Kodongo and Ojah (2011) for selected African countries that exchange rate depreciation is significant for improving balance of payments position.

Table 5.6: Short Run Dynamic Solutions to the Balance of Payments

Variables	Coefficient	Standard Error
$Cons\tan t$	-0.529	0.138***
$DLBoP_{t-1}$	0.688	0.165***
$DLREER_{t-1}$	0.202	0.070**
$DLGDP^{d}_{t-1}$	0.382	0.283
$LGDP^{f}_{t}$	4.403	3.180
$DLGDP^{f}_{t-1}$	0.601	0.235**
Dum	0.452	0.107***
Ecm_{t-1}	-0.701	0.000***
R-bar Squared		0.748
F-statistic		12.88

Note: ***, ** and * means significant at the 1%, 5% and 10%, respectively.

Source: Complied by the Author, 2014.

5.4.2.2 Dynamics Solution to the Current Account Balance

Following the solution provided for overall balance of payments in section 5.4.2.1,
The analysis of the current account balance provides that the overall fit is statistically valid for the determinants to explain the variation in the current account balance. Specifically, in the short-run, variability in the exchange rate has both current and lag effects on the current account balance in Sierra Leone. The coefficients are statistically significant at 5 percent and 1 percent, respectively. Even though the elasticities are less than 1 in each case, it can, however, be inferred that exchange rate remains a major determinant of current account balance.

In line with the balance of payments, the current account balance continues to be influenced also by both domestic and foreign GDPs, money supply though only significant with a lag, and foreign pricing system. In terms of domestic GDP, current account balance improves by over 2.3 percent for every 1 percent growth in GDP. Foreign GDP on the other hand, maintains a relatively small elasticity of 0.35. This indicates a 1 percent expansion in foreign GDP, preferably, EU's GDP will improve the country's GDP by less than 0.5 percent in the short-run.

The world price index with a coefficient of 0.136 indicates that the current account balance improves with every unit increase in foreign prices. The implication is that when foreign prices are high without an instantaneous increase in domestic prices, the country's exports will be in high demand and there by encourages exports and discourages imports as prices tend to be high even without depreciation of the exchange rate.

The coefficient of the error correction model (ECM) is negative and statistically significant at the 5 percent level. The self speed of adjustment to equilibrium of over 80 percent is, thus, considered appreciable adjusting the deviation from equilibrium in the subsequent period.

Table 5.7: Short Run Dynamic Solutions to the Current Account Balance

Variable	Coefficient	Standard Error
$Cons\tan t$	-1.356	0.377***
$DLCAB_{t-1}$	1.441	0.486***
$DLREER_t$	0.556	0.711**
$DLREER_{t-1}$	0.336	1.394***
$DLGDP^d_{t-1}$	2.335	0.943**
$DLGDP^f_t$	0.351	7.513***
$DLGDP^f_{t-1}$	0.079	11.291
$DLMS_t$	-0.247	0.151
$DLMS_{t-1}$	0.383	0.155**
$DLWPI_t$	0.136	3.591**
ECM_{t-1}	-0.894	0.151***
R-bar Squared		0.779
F-statistic		12.289[0.000]

Note: ***, ** and * means significant at the 1%, 5% and 10%, respectively.

Source: Compiled by the Author, 2014.

5.4.2.3 Dynamics Solution to the Capital Account Balance

The analysis indicates that the capital account balance is not as volatile when compared with current account balance. The capital account in all is highly influenced by changes in exchange rate with a lag, and interest rate in the short-run

The results in Table 5.8 indicate that all the variables of concern to the capital account balance are statistically significant at 5 percent minimum. The coefficient of determination depicts that over 90 percent of the variation in capital account balance is caused by variation in the variables discussed. The result explains that an appreciation of the exchange rate enhances a domestic corporation's bidding power to purchase assets in another country. Similarly, a depreciation of the exchange rate attracts foreign investors to flow into the economy. The finding is in consonance with the findings of Froot and Stein (1991) and Klein *et al*, (2002).

However, the speed adjustment is relatively low as only 50 percent of the variation from equilibrium will be corrected during the next period. It will be difficult for this model to achieve adequate equilibrium in the long run.

Table 5.8: Short Run Dynamic Solutions to the Capital Account Balance

Variable	Coefficient	Standard Error
$Cons\tan t$	0.009	0.035
$DLKAB_{t-1}$	-0.236	0.056***
$DLREER_{t-1}$	0.654	0.217***
$DTBR_t$	0.008	0.003***
$DTBR_{t-1}$	0.006	0.003**
ECM_{t-1}	-0.568	0.212**
R-bar Squared		0.927
F-statistic		55.149[0.000]

Note: ***, ** and * means significant at the 1%, 5% and 10%, respectively.

Source: Compiled by the Author, 2014.

5.4.2.4 Dynamics Solutions to Exports

The coefficient of the lagged residual in the ECM model reported in Table 5.9 shows that the speed of Adjustment towards equilibrium following a shock to the system for exports. The coefficient has the right sign (-0.635). Signifying that around 64 percent of the export adjustment to equilibrium occurs after one period. This is also relatively slower than that of the overall current account balance with 89 percent speed of adjustment to equilibrium in the long run.

The short-run and long-run elasticities of exports are respectively 0.235 and 0.680. This implies that export responds to exchange rate much higher in the long-run than in the short-run. Other variables such as domestic GDP and world price index significantly influence exports. The economic intuition is that when income increases, people may have the tendency to invest while at the same time consuming more than ever before.

Table 5.9: Short Run Dynamic Solutions to Exports in Sierra Leone

Variables	Coefficient	Standard Error
$Cons\tan t$	0.043	0.056
$DLEX_{t-1}$	-0.154	0.080*
$DLREER_t$	0.236	0.072***
$DLGDP^d_{t-1}$	2.886	1.354**
$DLCPI^d_{t-2}$	0.173	0.421
$DLWPI_{t-1}$	1.206	0.693*
ECM_{t-1}	-0.635	0.075***
R-bar Squared		0.525
F-statistic		9.55[0.000]

Note: ***, ** and * means significant at the 1%, 5% and 10%, respectively.

Source: Compiled by the Author, 2014.

5.4.2.5 Dynamics Solutions to Imports in Sierra Leone

The short-run dynamics of imports model indicates that the elasticity of imports to exchange rate depreciation is lower than that in the long run. This implies that when exchange rate depreciates, import is expected to fall. But the percentage fall in imports is not as much as the percentage increases in export. This in turn leads to deterioration in the trade balance shortly following the depreciation. The implication is that, consumers may maintain the importation of foreign goods and cannot easily switch over their consumptions especially to locally produced goods. It is, therefore apparent that imports will tend to fall but not as much as export would increase in order to have a positive trade balance following a depreciation of the exchange rate. This will lead to verify for Sierra Leone the Marshall-Lerner condition of the sum of elasticities of imports and exports to be greater than one for exchange rate depreciation to have a significant impact on balance of payments. If the elasticity of real imports is smaller than real exports, the increase in the nominal value of imports exceeds the increase in the nominal value of exports and exchange rate depreciation worsens the trade balance. Equally, if the economy is heavily dependent on imports for major economic activities will produce a lower elasticity of imports. This effect may produce a curve known as J-Curve effect of changes in exchange rate on trade balance and eventually the current account balance. Previous studies by Kouri (1976), Al-bri and Goodwin (2007), Kandil (2009), Petrovic and Mirjana (2009) also showed that exchange rate depreciation improves trade balance in the long-run, while given rise to a J-curve effect in the short-run.

Table 5.10: Short Run Dynamic Solutions to Imports in Sierra Leone

Variable	Coefficient	Standard Error
$Cons\tan t$	0.168	0.057***
$DLIM_{t-1}$	0.175	0.074**
$DLIM_{t-2}$	-0.109	0.080
$DLREER_t$	-1.096	0.210***
$DLREER_{t-1}$	-0.372	0.235
$DLGDP^{d}_{t-2}$	1.658	0.977*
$DLMS_{t-1}$	0.655	0.603***
ECM_{t-1}	-0.531	0.083***
R-bar Squared		0.407
F-statistic		14.727[0.000]

Note: ***, ** and * means significant at the 1%, 5% and 10%, respectively.

Source: Compiled by the Author, 2014.

5.4.2.6 Dynamics Solutions to Investment Equation

The short-run dynamic results presented in Table 5.10 indicate that exchange rate and openness of the economy play significant role in affecting foreign direct investment in Sierra Leone.

As Kandil (2009) put it, higher openness of one country, compared to its competitors, is likely to increase foreign direct investment and financial inflows. Combes et al., (2011) supported this finding from forty-two developing countries that exchange rate depreciation attracts portfolio investment

In Sierra Leone, openness is relatively higher than all other variables. A 10 percent increase in trade openness will increase foreign direct investment by over 8.8 percent.

Table 5.11: Short Run Dynamic Solutions to Investment

Variable	Coefficient	Standard Error
$Cons\tan t$	3.311	2.978
$DLREER_t$	0.314	11.803**
$LOPENESS_t$	0.876	98.572***
$DTBR_t$	0.209	1.270
ECM_{t-1}	-0.344	-11.929**
R-bar Squared		0.841
F-statistic		6.014[0.000]

Note: ***, ** and * means significant at the 1%, 5% and 10%, respectively.

Source: Compiled by the Author, 2014.

5.5 The Long Run and Short Run Solutions of Exchange Rate Pass-Through

As exchange rate continues to dominate international trades, so also, it continues to influence domestic consumer price level of developing countries. In a free market economy, a depreciation of domestic currency makes the acquisition of foreign currency expensive. The influence of exchange rate depreciation on imports of foreign goods and services is direct. It makes imports more costly even when there is no significant change in the prices of foreign goods.

In Sierra Leone, the impact of exchange rate movement on the consumer price index (CPI) is eminent. As shown in Panels A and B of Table 5.11, in both the long-run and short-run, the responses of domestic price level to changes in exchange rate are statistically the same in magnitude. According to the results, the long-run effect of the exchange rate depreciation on domestic price changes is 0.841 (84.1%), while that for the short-run is 0.847 (84.7%). Like with many studies completed for both developed and developing countries Razafimahefa (2012); others for individual countries, McCarthy (2000) for selected industrialized countries, Mwase (2006) for Tanzania, the exchange rate pass-through is incomplete but high. The estimate shows that over 80% of every depreciation of the exchange rate is transmitted to domestic consumers through hiking of consumer price index in both the long-run and short-run. This implies that producers and sellers have the tendency to pass on significant proportion of the high prices caused by exchange rate depreciation to consumers in Sierra Leone.

Table 5.12: Panels of Exchange Rate Pass-Through Results

Panel A: Long Run Exchange Rate Pass-Through Result		
Variable	**Coefficient**	**Standard Error**
Cons tan *t*	22.463	5.417***
LNER	0.841	0.052***
$LGDP^{d}$	-0.276	0.125**
$LGDP^{f}$	-4.440	0.794***
LMS	0.262	0.094***
Note: ***, ** and * means significant at the 1%, 5% and 10%, respectively.		
Panel B: Short Run Dynamic Solution of Exchange Rate Pass-Through Result		
Variable	**Coefficient**	**Standard Error**
Cons tan *t*	-0.016	0.018
$DLCPI^{d}_{t-2}$	0.166	0.071**
$DLNER_{t}$	0.247	0.049***
$DLGDP^{d}_{t-1}$	0.201	0.229**
$DLGDP^{f}_{t-4}$	3.361	1.765**
$DLCPI^{f}_{t-4}$	0.966	0.657*
$DLMS_{t-1}$	0.345	0.148**
ECM_{t-1}	-0.453	0.057***
R-bar Squared		0.338
DW-Statistic		1.67
F-statistic		9.737[0.000]

Note: ***, ** and * means significant at the 1%, 5% and 10%, respectively.

Source: Compiled by the Author, 2014.

5.6 Diagnostic Test of the Models

As reported in sub-section 5.2.1, the unrestricted error correction model of balance of payments and its components together with the diagnostic tests are presented in Appendices 5-20. The following test results are reported:

- The correlogram of squared residuals is used to check for autoregressive conditional heteroskedasticity (ARCH) in the residual. The condition here is that if there is no ARCH in the residual, the autocorrelations and partial autocorrelations should be zero at all lags and the Q-statistics should not be statistically significant.

- The other tests that considered were the Jarque-Bera Statistics, Serial correction LM test and the white Heteroskedasticity test

- The Cumulative Sum (CUSUM) and CUSUM squares of the recursive residuals were used to determine the stability and reliability of the parameter estimates. The CUSUM test is based on the cumulative sum of the recursive residuals. The option plots the cumulative sum together with the 5 percent critical lines. The test finds parameter instability if the cumulative sum goes outside the area between the two critical lines.

- The recursive residuals show a plot of the recursive residuals about the zero line, plus and minus two standard errors and also shown at each point. Residual outside the standard error bands suggeste instabilityin the parameters of the equation.

Table 5.13: Summary of Selected Findings

Author	Coverage	Methodology	Major Findings
Pentti J.K. Kouri (1976)		Dynamic model of exchange rate in the short-run and long-run.	In the long-run there is symmetry between the regime of fixed and flexible exchange rates[37]. The link between monetary policy and the inflow or outflow of capital goes through the effect of monetary policy on aggregate demand and output and thereby on the current account, which thus determines the capital account.
Magda Kandil (2009)	Developing and Developed Countries: 1971-2000	Rational-expectation model	Currency depreciation did not increase exports or imports in many developing countries Across the sampled countries, currency appreciation did not yield significant results on current account balance. While the effects of currency fluctuations appeared to be mixed on foreign direct investments flows. Currency depreciation increases net financial flows to industrial countries. A deterioration in the current account balance correlated with an increase in net foreign direct investment flows and the financial account balance across developing countries.

[37] Under fixed exchange rates, the exchange rate is exogenous and money supply endogenous. The contrary holds under flexible exchange ratesregimes.

Table 5.13: Summary of Selected Findings (cont.)

Author	Coverage	Methodology	Major Findings
Baharumshah, A.Z. et al,. (2004)	Singapore and Malaysia Economies:1976-1999	Standard Monetary Model, Johansen-Juselius Cointegration Technique: Vector Error-Correction Model (VECM)	A strong cointegration relationship between exchange rate, money supply, GDP, and the current account balance. That exchange rate adjusted to changes in current account balance. High foreign capital inflows was found to have cause structural changes in the early 1990s.
Keshab R. Bhattarai and Mark K. Armah (2005)	Analysis of the Ghanaian Trade Balance: 1970-2000	Vector Autoregressive (VAR) and Error Correction Model (ECM) Analysis.	Study confirmed a stable long-run relationship between exports, imports and the real exchange rate. The short-run elasticities of exports and imports indicated contractionary effects of devaluation in terms of the Marshall-Lerner-Robinson condition in the long-run.

Table 5.13: Summary of Selected Findings (cont.)

Author	Coverage	Methodology	Major Findings
Frimpong and Adam (2010)	Ghana, 1990-2009	VAR Models	Exchange rate pass-through to inflation is incomplete and gradually decreases. The short run influence is highly significant.
Al-Abri, A. S. and Goodwin B.K. (2007)	5 out of 16 OECD countries: 1975-2002	Threshold Cointegration Model.	A significant threshold cointegrating relationship between the effective nominal exchange rate and import prices. Import prices respond faster (exceeding the 50% average documented) and to a larger extent to nominal exchange rate changes.
McCarthy (2000)	Selected Industrialised Economies, 1976-1998	VAR Model	External factors are found to have a unpretentious effect on domestic price inflation. The pass-through is high and stronger in countries with large import share.
Mwase (2006)	Tanzania, 1990-2005	VAR Model	Incomplete pass-through and declined in the 1990s despite depreciation of the exchange rate. Rise in imports were also experienced and acted as a major indicator of the high pass-through in the short-run.

Table 5.13: Summary of Selected Findings (cont.)

Author	Coverage	Methodology	Major Findings
Bwire, et al., (2013)	Uganda, 1999-2012	SVAR Model	Statistically significant relationship between exchange rate movements and inflation. The pass-through was incomplete but persistent.
Bangura, et al., (2012)	Sierra Leone, 1998-2011	SVAR Model	Incomplete pass-through. Exchange rate behaviour featured as one of the possible sources of inflation.
Petrovic, P and Gligoric, M (2009)	Serbia, 2002-2007	Johansen's and Autoregressive Distributed Lag (ARDL) approaches	Exchange rate depreciation improved trade balance in the long-run, while giving rise to a J-curve effect in the short-run.
Hernan Rincon (1998)	Colombia: The role of exchange rate in trade behaviour for Colombia:1979:1-1995:4	Multivariate Cointegration approach	Exchange rates do play a role in determining the short-and-long run equilibrium behaviour of the Colombian trade balance. The data also supported the Bickerdike-Robinson-Metzler (BRM) or Marshall-Lerner (ML) conditions.

Table 5.13: Summary of Selected Findings (cont.)

Author	Coverage	Methodology	Major Findings
Ali, S. Z and Anwar, S. (2011)	Least Developed Countries	Small Open Economy Model with Firm Microeconomic Foundations.	Exchange rate affects net exports through changes in relative competitiveness. Exchange rate affects interest rate parity that in turn affects the aggregate demand for goods and services through a change in real interest rate. On the supply side, exchange rate depreciation had negative effect as domestic firm adjusted their prices in response to changes in the effective prices of foreign firms. Depreciation of the nominal exchange rate results in depreciation of the real exchange rate. The channel reaction was that exchange rate depreciation, along with the real interest rate effect, contributed to a fall in output and an increase in prices. The Marshall-Lerner Condition and the form of exchange rate expectation played significant role.

Table 5.13: Summary of Selected Findings (cont.)

Author	Coverage	Methodology	Major Findings
Combes et al., (2011)	42 Developing countries (of which, 19 are Africa)	Dynamic panel cointegration techniques.	A contrary conclusion was reached, that real exchange rate appreciation stemmed from capital inflows. Of this, portfolio investment commanded the highest effect which exceeded that of foreign direct investment by over 7 times.
Kodongo and Ojah (2011)	Selected African Countries, 1993-2009	Panel VAR techniques	Depreciation of exchange rate is significant in improving the balance of payments position especially in the short run.
Peter Rowland (2004)	Colombia, 1983-2002	Unrestricted VAR Model	The pass-through is incomplete. Import prices is found to respond speedily to exchange rate changes with greater percentages passed onto prices of imports within a year.
Bleaney and Greenaway (1998)	Sub-Saharan Africa, 1980-1995	Panel Data Analysis	Real exchange rate instability negatively affects investment, hence the financial account balance. Improvement occurs when over valuation of currencies are eradicated.

Table 5.13: Summary of Selected Findings (cont.)

Author	Coverage	Methodology	Major Findings
Bolling, et al., (2007)	USA 1983-2002	Log-Log regression model	Exchange rate fluctuations discourage U.S. FDI in certain industries.
Gust, et al., (2009)	U.S.A. 2000-2008	Open-economy DSGE Model	An incomplete exchange rate pass-through to trade prices.
Cuyvers, et al., (2009)	Cambodia, 1995-2005	Panel Data	The main determinants that statistically impact inward FDI include domestic GDP, bilateral trade, and the exchange rate depreciation.
Xing and Zhao (2006)	Japanese Economy, 1994-2005	Structural time series analysis	Appreciation of the Yen encouraged outflows of investment to neighbouring countries.
Halil Fidan (2006)	Turkey, 1970-2004	VAR Model	The short-run- and-long-run effects of exchange rate on exports and imports are at variant.
Qureshi et al., (2011)	SSA, 1972-2006	Augumented Gravity Model	Direct pegs controlled exchange rate volatility, thus, positively impact trade.

Table 5.13: Summary of Selected Findings (cont.)

Author	Coverage	Methodology	Major Findings
Sekansti (2010)	South Africa, 1995-2007	ARDL	A negative impact of exchange rate volatility is evidenced on exports.
Masha et al., (2012)	Maldives, 1994-2010	VAR	Even though the exchange rate pass-through is high but incomplete as theoretically expected.
Razafimahefa (2012)	SSA, 1985-2008	Panel Data Analysis	The pass-through is incomplete and is highly preceded by depreciation than appreciation of the various local currencies. The average elasticities is estimated to be less than 0.5 and common among countries with flexible exchange rate regimes and high income.
Arize and Nippani (2010)	Selected SSA, 1973-2005	Dynamic ECM	While mixed elasticities are obtained, real income and prices are statistically significant in influencing demands for imports. Marshall-Lerner Condition is satisfied.
Thorbecke (2011)	China, 1993-2006	DOLS	Appreciation of exchange rate across East Asia negatively affects exports. While the effects of appreciation in China is negligible.

CHAPTER SIX

SUMMARY AND CONCLUSION

The conclusion of the research is organized into three sub sections. Summary of findings are presented in subsection one, lessons for policy in sub section two. While limitation of the research and area for future research are discussed in sub section three.

6.1 Summary of Findings

Following the end of the Bretton Woods era, exchange rate policies have been challenging for most countries, especially in sub-Sahara Africa. Specifically, exchange rate continues to be a fundamental policy tool that concurrently influences both the internal and external sectors of an economy. The IMF on its part has exchange rate devaluation as a main policy instrument in addressing difficulties in the external sector of most economies. This policy has, however, continued to exacerbate problems of these countries, which range from huge debt burden to export price variability with an immediate spillover to domestic prices. Several attempts have been made by previous studies to examine the effect of exchange rate movements on the balance of payments through concentrating on either the trade balance or the current account balance. From the literature review, financial account balance and the capital account balance are complements to the current account balance of the balance of payments. If changes in exchange rate behaviour have been justified to influence the position of current account balance and its sub components, it is, therefore, permissible to conclude that both the financial account balance and the capital account balance also respond to changes in exchange rate behaviour. Nevertheless, the level of these responses has not been given much consideration in determining the relationship between exchange rate and the balance of payments, in general.

It is against this background that this study has focused on exchange rate behaviour on each of the components of the balance of payments in Sierra Leone.

The analysis presented evidence on the behaviour of exchange rate changes on the overall balance of payments, the overall current account balance and its components-trade balance (exports and imports), the financial account balance and the capital account balance for the period 1970-2010. The study also examined the impacts of key macroeconomic variables such as domestic GDP, foreign GDP, money supply, consumer price index, treasury bearer bonds' rates, trade openness and world price index, amongst others on the performance of the balance of payments over these years.

Also, considering exchange rate being a price that influences largely international trades and consumer price index, also being a price but manipulates essentially both domestic trade and consumption, it could be well thought-out that both prices share some levels of relationship. The study was, therefore, extended to assess the response of consumer price index to exchange rate depreciation, which literature had referred to as the pass-through effect.

In an attempt to finding answers to these interactions, a structural macroeconomic model, derived from the elasticity, absorption and monetary theoretical frameworks to BoP determination, was estimated. The model was disaggregated into Current Account Balance (CAB), Financial Account Balance (FAB), Capital Account Balance (KAB) and the consumer price index.

The study employed an autoregressive distributed lag bounds testing approach to cointegration using both quarterly and annual data to determine the dynamic (the short-run and long-run measured by elasticities) effects of exchange rate on the key variables. These elasticities were then used to determine the time path of the changes in the CAB and BoP, as postulated by the J-curve experience and the Marshall-Lerner condition. The data used for the estimations were mainly collected from the *International Financial Statistics* of the IMF.

Prior to the econometric analysis, the following were completed:

i) analysis of the country's exchange rate policies and development in the balance of payments. Trend analyses of the relationship between exchange rate and each of the components of the balance of payments were critically considered. Further examinations on exchange rate and the sub components (trade balance-exports and imports) of the current account balance were also considered in the analysis.

ii) in order to have an in-depth knowledge of the research, review of the accessible literature that relate to exchange rate and the balance of payments were segregated by components of the balance of payments. From the review, exchange rate behaviour influences all the three components of the balance of payments but at varying degree with the current account being highly receptive to exchange rate movements, while financial and capital account balances responses are relatively stumpy. In addition to exchange rate depreciation, growth or increases in macroeconomic fundamentals such as gross domestic GDP, and foreign countries' GDP, world price index, among others have a tendency to positively influence the positions of the balance of payments and its components. Also reviewed, was exchange rate pass-through to domestic price, which was found to be incomplete but exceedingly higher than 70.0 percent for economies that are greatly import dependent in nature, of which developing countries dominated the list.

The key findings from the empirical analyses conducted showed that:

From the estimated coefficients, exchange rate had both short-run and long-run effects on the overall balance of payments. The effects of exchange rate on the components of the balance of payments, however, differed considerably from each other. While the response of current account balance to exchange rate depreciation in both the short-run and long-run demonstrated evidence of the J-curve phenomenon and the Marshall-Lerner condition, the financial account balance and the capital account balance showed no such responses. Exchange rate movements have a stake in determining the outcomes of the country's current account balance. This finding is supported by other studies completed for both developing and developed economies (Baharumshad et al., 2004; Kandil, 2009; Bahmain-Oskooee and Satawatananon, 2011; Ali and Anwar, 2011).

Fluctuations in exchange rate are a significant determinant of the financial account balance. Variability in exchange rate signals instability of a country's macroeconomic fundamentals, resulting in a reduction in financial inflows in the form of investment. This fluctuation has the tendency of increasing financial outflows, which may further worsen the country's financial account balance. The results, however, showed that, as exchange rate depreciated, the country experienced a positive net financial inflow. Reasons for such outcomes are: most of the domestic investments during the period were in the areas of mining, agriculture and construction where labour cost and acquisition of locally produced raw materials are cheap for foreign investors relatively to their home companies located abroad, other than in Africa. Any depreciation of the local currency could leave foreign investors with adequate amount of local currency for almost the same amount of foreign currency to meet their expenditures. Also, the civil war could be used to explain the inflow of more foreign investment during the period. The artisanal[38] diamond mining continued to attract foreign investment. Due to the war, it was difficult for the central government to monitor the registration and activities of investment in this sector. Hence, the proceeds were not adequately accounted for during the period. Similarly, there was no significant relationship between exchange rate depreciation and capital account movements. This could be attributed to the followings during the period: the capital account was mostly driven by aid from other countries[39] in the form of logistics for government's operations, training of military and police personnel, medical aid, food aid, educational materials, financing of programmes and projects proposed in the Poverty Reduction Strategy Papers (PRSP: 1 and 2), and the financing of HIPC initiative projects. Funds for the financing of all these capital projects greatly depended on policies other than exchange rate movements.

On the part of exchange rate pass-through to consumer prices, even though the degree of pass-through was found to be incomplete with a coefficient of 0.80 for Sierra Leone, it was significantly higher than those found for other developing countries, whose coefficients are around 0.70 or less (McCarthy, 2000; Frimpong and Adam, 2010; Bwire,

[38] Surface and easy to mining diamond rather than the Kimberley mining, using less expensive tools such as shovels, pick axes, and cutlasses, among others.
[39] Such as Britain, USA, France, China, UN (WFP, UNICEF, WHO), DFID, among others.

et al., 2013). This result means that about 80.0 percent of depreciation in the exchange rate is swiftly passed onto consumer prices. The implication is that disproportionate pass-through is inflationary and has the tendency to exacerbate the general living condition if not curbed with the right policy instrument(s).

6.2 Lessons for Policy

Exchange rate is a price that wholly influences an economy's trading activities. Its devaluation or depreciation affects the country's competitiveness with the rest of the world. Therefore, understanding its behaviour and impacts on an economy by policy makers and practitioners is indispensable.

Thus, the research findings discover some lessons for exchange rate policy considerations. As the current account balance responds greatly to any changes in exchange rate behaviour, the authorities should design policies that would encourage and broaden domestic production and further promote the export sectors of the economy. In the absence of this, the country would still be depending on imports for domestic consumption and this will exacerbate the balance of payments position. Depreciation as a policy tool is to increase the value of imports thereby causing it to be expensive in the domestic market. This would encourage the consumption of locally produced goods.

Policy makers should also embark on balancing the effects of macroeconomic fundamentals such as money supply, interest rate and domestic GDP in particular. For instance, an excessive growth of money supply will be used to finance consumption, thereby, inducing imports of goods that may not be produced domestically, which is detrimental to balance of payments position. On the other hand, if growth in money supply is used to finance investment, then it will have a positive effect on domestic output. The management of interest rate policy is also important. From the point of view of the Portfolio balance model, high yield of domestic interest attracts foreign investment but at the same time increases cost of domestic investment. The growth of the European Union's GDP, which is used as proxy for foreign GDP must always be considered in the economy's policy framework. Justification for this is twofold. The EU

has greatly influenced the country's total trade in the last decade. Subsequently, any significant occurrence in EU economy would tend to affect the country's overall balance of payments.

The government through other channels like reduction of fiscal deficits, encouraging private investments, proper management of aid fund in order to put the economy on the path of sustainable growth will reduce the balance of payments problems. Also of relevance, is for the authorities of monetary policy to continue to be prudent in both policy formulation and implementation geared towards maintaining stable exchange rate. Persistent fluctuations of the local currency have the tendency of eroding public confidence in the policy-makers.

6.2 Limitations of the Research and Area for Future Research

Even though this research was able to analyze the relationship between exchange rate and the balance of payments, using various techniques, there are, however, a number of possible areas for future research. First, access to a more comprehensive and highly disaggregated data would be relevant to investigate further all the sub components of the three main components of the BoP that have significant bearing on exchange rate behaviour. Second, other estimation techniques can be utilized other than the routine Vector Autoregressive model, Vector Error Correction Mechanism, and Autoregressive Distributed lag models. Finally, such a study may be extended to other countries in the region, especially those planning towards integrating their economies.

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APPENDICES

Appendix 1: The Autoregressive Distributed Lags (ARDL) Model of the Main Components of the Balance of Payments

The Overall Balance of Payments Equation

$$Ln BoP_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} LnBoP_{t-i} + \sum_{i=0}^{k} \alpha_{2i} LnREER_{t-i} \sum_{i=0}^{k} \alpha_{3i} LnGDP^{d}_{t-i} +$$
$$+ \sum_{i=0}^{k} \alpha_{4i} LnGDP^{f}_{t-i} + \sum_{i=0}^{k} \alpha_{6i} LnMS_{t-i} + \sum_{i=0}^{k} \alpha_{7i} IR_{t-i} + \alpha_8 D_i + \varepsilon_i$$

The Current Account Balance

$$Ln CAB_t = \beta_0 + \sum_{i=1}^{k} \beta_{1i} LnCAB_{t-i} + \sum_{i=0}^{k} \beta_{2i} LnREER_{t-i} \sum_{i=0}^{k} \beta_{3i} LnGDP^{d}_{t-i} +$$
$$+ \sum_{i=0}^{k} \beta_{4i} LnGDP^{f}_{t-i} + \sum_{i=0}^{k} \beta_{5i} LnWPI_{t-i} + \sum_{i=0}^{k} \beta_{6i} LnMS_{t-i} + \sum_{i=0}^{k} \beta_{7i} IR_{t-i} + \beta_8 D_i + \varepsilon_i$$

The Financial Account Balance

$$Ln FAB_t = \lambda_0 + \sum_{i=1}^{k} \lambda_{1i} LnFAB_{t-i} + \sum_{i=0}^{k} \lambda_{2i} LnREER_{t-i} \sum_{i=0}^{k} \lambda_{3i} LnGDP^{d}_{t-i} +$$
$$+ \sum_{i=0}^{k} \lambda_{4i} LnGDP^{f}_{t-i} + \sum_{i=0}^{k} \lambda_{5i} LnWPI_{t-i} + \sum_{i=0}^{k} \lambda_{6i} LnMS_{t-i} + \sum_{i=0}^{k} \lambda_{7i} IR_{t-i} + \lambda_8 D_i + \varepsilon_i$$

The Capital Account Balance

$$Ln KAB_t = \phi_0 + \sum_{i=1}^{k} \phi_{1i} LnKAB_{t-i} + \sum_{i=0}^{k} \phi_{2i} LnREER_{t-i} \sum_{i=0}^{k} \phi_{3i} LnGDP^{d}_{t-i} +$$
$$+ \sum_{i=0}^{k} \phi_{4i} LnGDP^{f}_{t-i} + \sum_{i=0}^{k} \phi_{5i} LnWPI_{t-i} + \sum_{i=0}^{k} \phi_{6i} LnMS_{t-i} + \sum_{i=0}^{k} \phi_{7i} IR_{t-i} + \phi_8 D_i + \varepsilon_i$$

Identities

$$BoP = CAB + FAB + KAB$$
$$CAB = EX - IM + \sum_{i=1}^{n} R_i$$
$$FAB^{*} = FDI + PI + Res$$

Where

$\sum_{i=1}^{n} R_i$ includes dividends and interest payments, balance on current transfers such as remittances.

Appendix 2: The Autoregressive Distributed Lags (ARDL) Model of the sub-components of the Balance of Payments and the ERPT

Exports Equation

$$Ln EX_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} LnEX_{t-i} + \sum_{i=0}^{k} \alpha_{2i} LnREER_{t-i} \sum_{i=0}^{k} \alpha_{3i} LnGDP^{d}_{t-i} +$$
$$+ \sum_{i=0}^{k} \alpha_{4i} LnGDP^{f}_{t-i} + \sum_{i=0}^{k} \alpha_{5i} LnWPI_{t-i} + \sum_{i=0}^{k} \alpha_{6i} LnMS_{t-i} + \sum_{i=0}^{k} \alpha_{7i} IR_{t-i} + \alpha_8 D_i + \varepsilon_i$$

Imports Equation

$$Ln EX_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} LnEX_{t-i} + \sum_{i=0}^{k} \alpha_{2i} LnREER_{t-i} \sum_{i=0}^{k} \alpha_{3i} LnGDP^{d}_{t-i} +$$
$$+ \sum_{i=0}^{k} \alpha_{4i} LnGDP^{f}_{t-i} + \sum_{i=0}^{k} \alpha_{5i} LnWPI_{t-i} + \sum_{i=0}^{k} \alpha_{6i} LnMS_{t-i} + \sum_{i=0}^{k} \alpha_{7i} IR_{t-i} + \alpha_8 D_i + \varepsilon_i$$

Foreign Direct Investment Equation

$$Ln FDI_t = \phi_0 + \sum_{i=1}^{k} \phi_{1i} LnFDI_{t-i} + \sum_{i=1}^{k} \phi_{2i} LnNER_{t-i} + \sum_{i=0}^{k} \phi_{3i} LnCPI_{t-i} + \sum_{i=0}^{k} \phi_{4i} GGDP_{t-i}$$
$$+ \sum_{i=0}^{k} \phi_{5i} LnX_{t-i} + \sum_{i=0}^{k} \phi_{6i} LnOpen_{t-i} + \sum_{i=0}^{k} \phi_{7i} TBR_{t-i} + \phi_{8i} D_i + \varepsilon_i$$

Exchange Rate Pass-through Equation

$$LnP_t = \gamma_0 + \sum_{i=1}^{k} \gamma_{1i} LnP_{t-i} + \sum_{i=0}^{k} \gamma_{2i} LnER_{t-i} + \sum_{i=0}^{k} \gamma_{3i} LnGDP^{d}_{t-i} +$$
$$+ \sum_{i=0}^{k} \gamma_{4i} LnWPI_{t-i} + \sum_{i=0}^{k} \gamma_{5i} LnMS_{t-i} + \gamma_7 D_i + \varepsilon_i$$

Appendix 3: The Error Correction Representations of the ARDL Model of the Components of the Balance of Payments

The Overall Balance of Payments Equations

$$\Delta Ln\, BoP_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} \Delta LnBoP_{t-i} + \sum_{i=0}^{k} \alpha_{2i} \Delta LnREER_{t-i} \sum_{i=0}^{k} \alpha_{3i} \Delta LnGDP^{d}_{t-i} + \sum_{i=0}^{k} \alpha_{4i} \Delta LnGDP^{f}_{t-i} +$$

$$+ \sum_{i=0}^{k} \alpha_{6i} \Delta LnMS_{t-i} + \sum_{i=0}^{k} \alpha_{7i} \Delta IR_{t-i} + \alpha_8 D_i + \lambda_1 LnBoP_{t-1} + \lambda_2 LnREER_{t-1} + \lambda_3 LnGDP^{d}_{t-1} + \lambda_4 LnGDP^{f}_{t-1} + \varepsilon_i$$

The Current Account Balance

$$\Delta Ln\, CAB_t = \beta_0 + \sum_{i=1}^{k} \beta_{1i} \Delta LnCAB_{t-i} + \sum_{i=0}^{k} \beta_{2i} \Delta LnREER_{t-i} + \sum_{i=0}^{k} \beta_{3i} \Delta LnGDP^{d}_{t-i} + \sum_{i=0}^{k} \beta_{4i} \Delta LnGDP^{f}_{t-i} + \sum_{i=0}^{k} \beta_{5i} \Delta LnWPI_{t-i} + \sum_{i=0}^{k} \beta_{6i} \Delta LnMS_{t-i} + + \sum_{i=0}^{k} \beta_{7i} \Delta IR_{t-i} + \beta_8 D_i +$$

$$\delta_1 LnCAB_{t-1} + \delta_2 LnREER_{t-1} + \delta_3 LnGDP^{d}_{t-1} + \delta_4 LnGDP^{f}_{t-i} + \delta_5 LnWPI_{t-i} + \delta_6 LnMS_{t-1} + \varepsilon_i$$

The Financial Account Balance

$$\Delta Ln\, FAB_t = \lambda_0 + \sum_{i=1}^{k} \lambda_{1i} \Delta LnFAB_{t-i} + \sum_{i=0}^{k} \lambda_{2i} \Delta LnREER_{t-i} + \sum_{i=0}^{k} \lambda_{3i} \Delta LnGDP^{d}_{t-i} + \sum_{i=0}^{k} \lambda_{4i} \Delta LnGDP^{f}_{t-i} + \sum_{i=0}^{k} \lambda_{5i} \Delta LnWPI_{t-i} + \sum_{i=0}^{k} \lambda_{6i} \Delta LnMS_{t-i} + \sum_{i=0}^{k} \lambda_{7i} \Delta IR_{t-i} + \lambda_8 D_i +$$

$$+ \gamma_1 LnFAB_{t-1} + \gamma_2 LnREER_{t-1} + \gamma_3 LnGDP^{d}_{t-1} + \gamma_4 LnGDP^{f}_{t-i} + \gamma_5 LnWPI_{t-i} + \gamma_6 LnMS_{t-1} + \varepsilon_i$$

The Capital Account Balance

$$\Delta Ln\, KAB_t = \phi_0 + \sum_{i=1}^{k} \phi_{1i} \Delta LnKAB_{t-i} + \sum_{i=0}^{k} \phi_{2i} \Delta LnREER_{t-i} + \sum_{i=0}^{k} \phi_{3i} \Delta LnGDP^{d}_{t-i} + \sum_{i=0}^{k} \phi_{4i} \Delta LnGDP^{f}_{t-i} + \sum_{i=0}^{k} \phi_{5i} \Delta LnWPI_{t-i} +$$

$$+ \sum_{i=0}^{k} \phi_{6i} \Delta LnMS_{t-i} + \sum_{i=0}^{k} \phi_{7i} \Delta IR_{t-i} + \phi_8 D_i + \varphi_1 LnKAB_{t-1} + \varphi_2 LnREER_{t-1} + \varphi_3 LnGDP^{d}_{t-1} + \varphi_4 LnGDP^{f}_{t-1} + \varphi_5 LnWPI_{t-1} + \varphi_6 LnMS_{t-1} + \varepsilon_i$$

Appendix 4: The Error Correction Representations of the ARDL Model of the sub-Components of the Balance of Payments

Exports Equation

$$\Delta LnEX_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} \Delta LnEX_{t-i} + \sum_{i=0}^{k} \alpha_{2i} \Delta LnREER_{t-i} + \sum_{i=0}^{k} \alpha_{3i} \Delta LnGDP^d_{t-i} + \sum_{i=0}^{k} \alpha_{4i} \Delta LnGDP^f_{t-i}$$
$$+ \sum_{i=0}^{k} \alpha_{5i} \Delta LnWPI_{t-i} + \sum_{i=0}^{k} \alpha_{6i} \Delta LnMS_{t-i} + \sum_{i=0}^{k} \alpha_{7i} \Delta LnIR_{t-i} + \alpha_8 D_i +$$
$$+ \lambda_1 LnEX_{t-1} + \lambda_2 LnREER_{t-1} + \lambda_3 LnGDP^d_{t-1} + \lambda_4 LnGDP^f_{t-1} + \lambda_5 LnWPI_{t-1} + \varepsilon_i$$

Imports Equation

$$\Delta LnIM_t = \beta_0 + \sum_{i=1}^{k} \beta_{1i} \Delta LnIM_{t-i} + \sum_{i=0}^{k} \beta_{2i} \Delta LnREER_{t-i} \sum_{i=0}^{k} \beta_{3i} \Delta LnGDP^d_{t-i} +$$
$$+ \sum_{i=0}^{k} \beta_{4i} \Delta LnGDP^f_{t-i} + \sum_{i=0}^{k} \beta_{5i} \Delta LnWPI_{t-i} + \sum_{i=0}^{k} \beta_{6i} \Delta LnMS_{t-i} + \sum_{i=0}^{k} \beta_{7i} \Delta IR_{t-i} + \beta_8 D_i +$$
$$+ \delta_1 LnM_{t-1} + \delta_2 LnREER_{t-1} + \delta_3 LnGDP^d_{t-1} + \delta_4 LnGDP^f_{t-1} + \delta_5 LnWPI_{t-1} + \varepsilon_i$$

Foreign Direct Investment Equation

$$Ln \Delta FDI_t = \phi_0 + \sum_{i=1}^{k} \phi_{1i} Ln \Delta FDI_{t-i} + \sum_{i=1}^{k} \phi_{2i} Ln \Delta NER_{t-i} + \sum_{i=0}^{k} \phi_{3i} \Delta LnCPI_{t-i} + \sum_{i=0}^{k} \phi_{4i} LnGGDP_{t-i}$$
$$+ \sum_{i=0}^{k} \phi_{5i} \Delta LnX_{t-i} + \sum_{i=0}^{k} \phi_{6i} \Delta LnOpen_{t-i} + \sum_{i=0}^{k} \phi_{7i} \Delta TBR_{t-i} + \phi_{8i} D_i$$
$$+ \upsilon_1 LnFDI_{t-1} + \upsilon_2 LnNER_{t-1} + \upsilon_3 LnCPI_{t-1} + \upsilon_4 X_{t-1} + \upsilon_5 GGDP_{t-1} + \mu_i$$

Exchange Rate Pass-through Equation

$$\Delta LnCPI_t = \gamma_0 + \sum_{i=1}^{k} \gamma_{1i} \Delta LnCPI_{t-i} + \sum_{i=0}^{k} \gamma_{2i} \Delta LnNER_{t-i} + \sum_{i=0}^{k} \gamma_{3i} \Delta LnGDP^d_{t-i} +$$
$$+ \sum_{i=0}^{k} \gamma_{4i} \Delta LnWPI_{t-i} + \sum_{i=0}^{k} \gamma_{5i} \Delta LnMS_{t-i} + \sum_{i=0}^{k} \gamma_{6i} \Delta LnDC_{t-i} + \gamma_7 D_i +$$
$$+ \theta_1 LnCPI_{t-1} + \theta_2 LnNER_{t-1} + \theta_3 LnGDP^d_{t-1} + \theta_4 LnWPI_{t-1} + \theta_5 LnMS_{t-1} + \varepsilon_i$$

Appendix 5: Unrestricted Error Correction Model for Balance of Payments Equation

Dependent Variable: DLBOP
Method: Least Squares
Sample (adjusted): 1977 2010
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Cons tan t	28.20648	7.092705	3.976830	0.0005
$DlBoP_{t-1}$	0.285308	0.200777	1.421017	0.1677
DLREER(-1)	1.301309	0.417594	3.116209	0.0046
$DLGDP^{d}(-1)$	-0.243092	0.356492	-0.681899	0.5016
$DLGDP^{f}$	4.787614	5.186402	0.923109	0.3648
LBOP(-1)	-1.414727	0.241186	-5.865711	0.0000
LREER(-1)	-0.850899	0.299714	-2.839033	0.0089
$LGDP^{d}(-1)$	-0.892580	0.341739	-2.611877	0.0150
$LGDP^{f}(-1)$	-1.166535	0.573172	-2.035226	0.0526

R-squared	0.658263	Mean dependent var	-0.008402
Adjusted R-squared	0.548908	S.D. dependent var	0.476417
S.E. of regression	0.319978	Akaike info criterion	0.780799
Sum squared resid	2.559650	Schwarz criterion	1.184835
Log likelihood	-4.273579	F-statistic	6.019468
Durbin-Watson stat	2.196759	Prob(F-statistic)	0.000240

Appendix 6: Diagnostic Analysis for the specified Parsimonious Error Correction Model of the Balance of Payments

A. Residual Tests

A1: Correlogram-Q-Statistics

Sample: 1977 2010
Included observations: 34

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. |**. |	. |**. |	1	0.281	0.281	2.9246	0.087
. |* . |	. | . |	2	0.099	0.022	3.3004	0.192
. |* . |	. |* . |	3	0.127	0.102	3.9393	0.268
. |* . |	. |* . |	4	0.169	0.117	5.1100	0.276
. | . |	. *| . |	5	-0.026	-0.122	5.1390	0.399
. | . |	. | . |	6	-0.005	0.014	5.1400	0.526
. |* . |	. |* . |	7	0.100	0.090	5.5945	0.588
. | . |	. | . |	8	0.062	0.004	5.7741	0.673
. | . |	. | . |	9	0.046	0.051	5.8774	0.752
. |* . |	. | . |	10	0.087	0.049	6.2621	0.793
. | . |	. | . |	11	0.040	-0.039	6.3456	0.849
. | . |	. | . |	12	0.026	0.022	6.3826	0.896
. | . |	. | . |	13	0.028	0.005	6.4271	0.929
. | . |	. | . |	14	0.028	-0.004	6.4766	0.953
. | . |	. | . |	15	0.005	0.006	6.4785	0.971

A2: Jarque-Bera Statistic

F-statistic	3.134	Probability	0.209

A3: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.522699	Probability	0.239312
Obs*R-squared	3.975502	Probability	0.137003

A4: ARCH Test:

F-statistic	2.610806	Probability	0.116271
Obs*R-squared	2.563360	Probability	0.109366

A.5: White Heteroskedasticity Test:

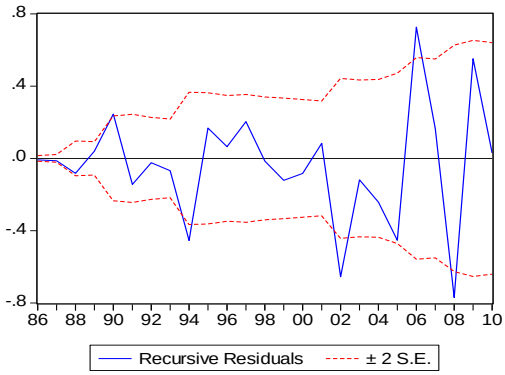
F-statistic	2.240896	Probability	0.054370
Obs*R-squared	23.06429	Probability	0.112027

B: Stability Tests

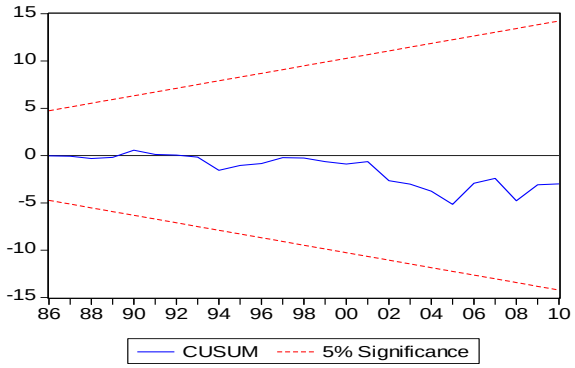
B1: Ramsey RESET Test:

F-statistic	13.49802	Probability	0.000132
Log likelihood ratio	26.39928	Probability	0.000002

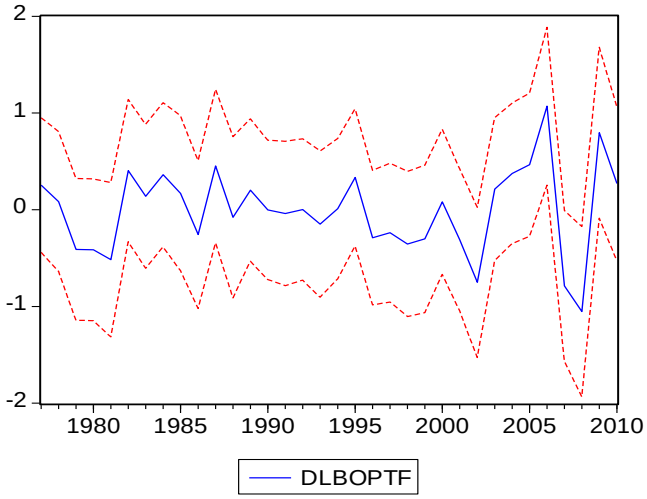
B2: Recursive Residuals



B3: CUSUM Test



Forecast of Balance of Payments



Forecast: DLBOPTF
Actual: DLBOPT
Forecast sample: 1975 2010
Adjusted sample: 1977 2010
Included observations: 34

Root Mean Squared Error	0.273507
Mean Absolute Error	0.212960
Mean Abs. Percent Error	628.6361
Theil Inequality Coefficient	0.301857
Bias Proportion	0.000009
Variance Proportion	0.014361
Covariance Proportion	0.985630

Appendix 7: Unrestricted Error Correction Model for Current Account Balance Equation

Dependent Variable: DLCAB
Method: Least Squares
Sample (adjusted): 1978 2010
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.953133	4.744370	1.676331	0.1092
DLCABT(-2)	0.842378	0.489265	1.721719	0.1006
DREER	-1.398677	1.078752	-1.296570	0.2095
DREER(-2)	-0.881933	0.964471	-0.914422	0.3714
$DLGDP^{d}(-1)$	-0.740677	0.744197	-0.995270	0.3315
$DLGDP^{t}$	34.95267	9.011529	3.878662	0.0009
DLMS2	-0.473844	0.160819	-2.946450	0.0080
DLMS2(-2)	0.307239	0.218170	1.408255	0.1744
DLWPI	10.64689	5.349619	1.990214	0.0604
LCABT(-1)	-0.957412	0.147763	-6.479382	0.0000
LREER(-1)	-0.902312	0.754755	-1.195504	0.2459
LMS2(-1)	-0.543305	0.175869	-3.089259	0.0058
LWPI(-1)	1.081049	0.405483	2.666074	0.0148

R-squared	0.810870	Mean dependent var	-0.069495
Adjusted R-squared	0.697392	S.D. dependent var	1.237466
S.E. of regression	0.680728	Akaike info criterion	2.355796
Sum squared resid	9.267818	Schwarz criterion	2.945330
Log likelihood	-25.87064	F-statistic	7.145610
Durbin-Watson stat	2.174522	Prob(F-statistic)	0.000069

Appendix 8: Diagnostic Test from the Parsimonious Current Account Balance Equation

A: Residual Tests

A1: Correlogram-Q-Statistics

Sample: 1978 2010
Included observations: 33

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. *| . |	. *| . |	1	-0.092	-0.092	0.3066	0.580
. *| . |	. *| . |	2	-0.091	-0.101	0.6178	0.734
. *| . |	.**| . |	3	-0.186	-0.208	1.9430	0.584
. | . |	. | . |	4	0.021	-0.034	1.9611	0.743
. |* . |	. |* . |	5	0.112	0.073	2.4764	0.780
. | . |	. | . |	6	0.001	-0.017	2.4764	0.871
. *| . |	. *| . |	7	-0.151	-0.144	3.4922	0.836
. *| . |	. *| . |	8	-0.088	-0.097	3.8472	0.871
. | . |	. *| . |	9	-0.055	-0.120	3.9939	0.912
. |* . |	. | . |	10	0.117	0.013	4.6839	0.911
. |* . |	. |* . |	11	0.103	0.076	5.2374	0.919
. *| . |	. | . |	12	-0.058	-0.033	5.4216	0.942
. *| . |	. | . |	13	-0.084	-0.054	5.8244	0.952
. | . |	. | . |	14	-0.016	-0.026	5.8408	0.970
. |* . |	. | . |	15	0.073	0.001	6.1871	0.976

A2: Jarque-Bera Statistic

F-statistic	0.936349	Probability	0.6261

A3: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.379122	Probability	0.689800
Obs*R-squared	1.333923	Probability	0.513266

A4: ARCH Test:

F-statistic	0.172937	Probability	0.680475
Obs*R-squared	0.183408	Probability	0.668460

A5: White Heteroskedasticity Test:

F-statistic	3.869138	Probability	0.026559
Obs*R-squared	30.38249	Probability	0.172396

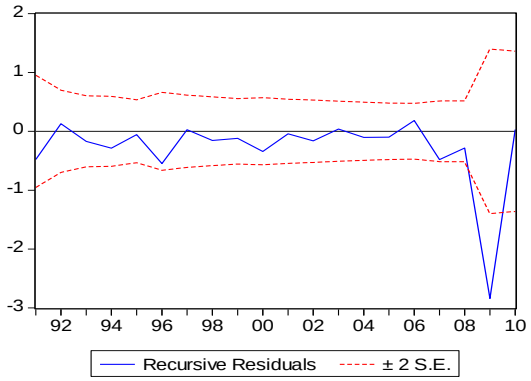
B: Stability Tests

B1: Ramsey RESET Test:

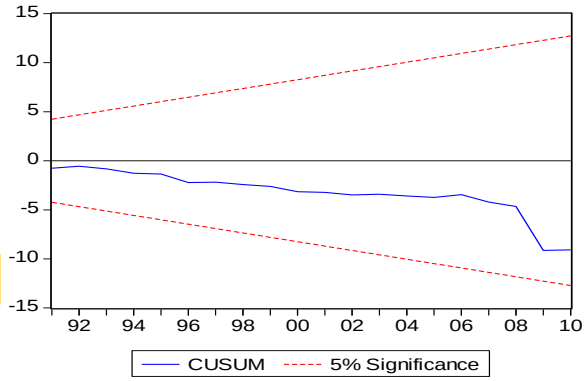
F-statistic	38.12258	Probability	0.000006
Log likelihood ratio	36.32510	Probability	0.000000

B2: Recursive Estimates

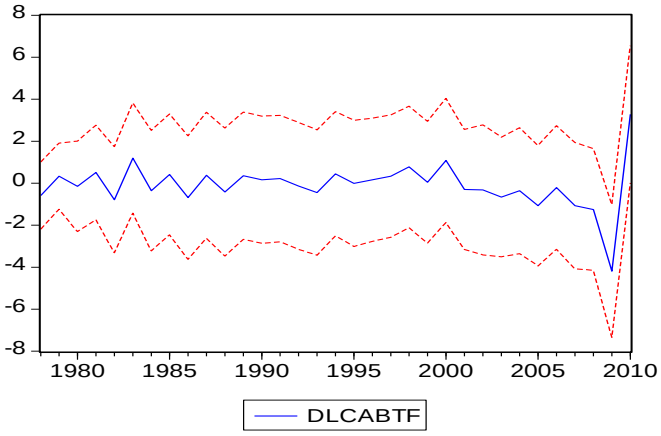
Recursive Residuals



CUSUM Test



Forecasting of Current Account Balance



Forecast: DLCABTF
Actual: DLCABT
Forecast sample: 1975 2012
Adjusted sample: 1978 2010
Included observations: 33

Root Mean Squared Error	0.603284
Mean Absolute Error	0.506253
Mean Abs. Percent Error	346.5479
Theil Inequality Coefficient	0.260896
Bias Proportion	0.002309
Variance Proportion	0.047313
Covariance Proportion	0.950378

Appendix 9: Unrestricted Error Correction Model for Financial Account Balance Equation

Dependent Variable: DLFAB
Method: Least Squares
Sample (adjusted): 1978 2010
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.086659	0.539345	0.160674	0.8737
DLFABT(-2)	-0.228653	0.057750	-3.959386	0.0006
DREER(-2)	-0.604824	0.217266	-2.783797	0.0103
DTBR	-0.006485	0.002687	-2.413140	0.0238
DTBR(-2)	-0.007460	0.002858	-2.610720	0.0153
GGDP	0.007336	0.004102	1.788423	0.0863
DOPEN	1.040492	0.083133	12.51604	0.0000
LFABT(-1)	-0.170572	0.120853	-1.411409	0.1710
LOPENESS(-1)	0.316286	0.136585	2.315681	0.0294

R-squared	0.935931	Mean dependent var	0.003965
Adjusted R-squared	0.914574	S.D. dependent var	0.658168
S.E. of regression	0.192367	Akaike info criterion	-0.231818
Sum squared resid	0.888126	Schwarz criterion	0.176320
Log likelihood	12.82500	F-statistic	43.82420
Durbin-Watson stat	1.409587	Prob(F-statistic)	0.000000

Appendix 10: Diagnostic Test from the Parsimonious Model for Financial Account Balance

A: Residual Tests

A1: Correlogram-Q-Statistics

Sample: 1978 2010
Included observations: 33

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. |**. |	. |**. |	1	0.243	0.243	2.1320	0.144
. | . |	. | . |	2	0.041	-0.020	2.1936	0.334
. *| . |	. *| . |	3	-0.146	-0.160	3.0089	0.390
. | . |	. | . |	4	-0.035	0.042	3.0582	0.548
. *| . |	. *| . |	5	-0.064	-0.061	3.2279	0.665
. | . |	. | . |	6	-0.016	-0.012	3.2382	0.778
. |* . |	. |* . |	7	0.135	0.161	4.0459	0.774
. | . |	. *| . |	8	-0.034	-0.138	4.0996	0.848
. *| . |	. *| . |	9	-0.092	-0.075	4.5026	0.875
. *| . |	. | . |	10	-0.111	-0.016	5.1177	0.883
. | . |	. | . |	11	0.045	0.057	5.2220	0.920
. | . |	. | . |	12	0.027	-0.002	5.2616	0.949
. |* . |	. |* . |	13	0.111	0.096	5.9776	0.947
. | . |	. | . |	14	0.037	-0.038	6.0600	0.965
. | . |	. | . |	15	0.015	0.012	6.0747	0.978

A2: Normality Test - Jarque-Bera Statistic:

F-statistic	0.2870	Probability	0.8663

A3: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.115775	Probability	0.345507
Obs*R-squared	3.039060	Probability	0.218815

A4: ARCH Test:

F-statistic	0.247151	Probability	0.622712
Obs*R-squared	0.261474	Probability	0.609109

A5: White Heteroskedasticity Test:

F-statistic	0.246769	Probability	0.996039
Obs*R-squared	6.531574	Probability	0.981270

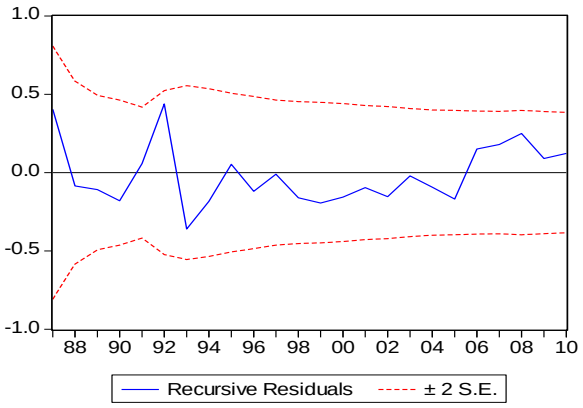
B: Stability Tests

B1: Ramsey RESET Test:

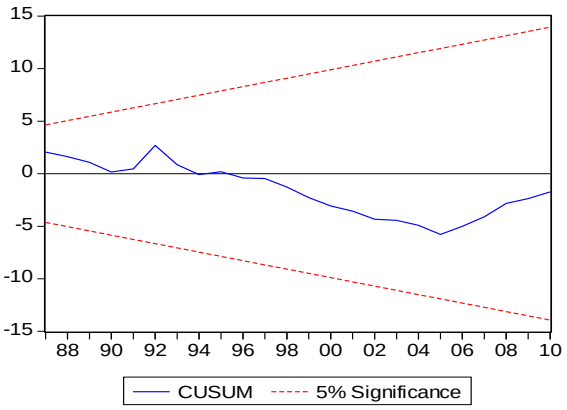
F-statistic	2.311527	Probability	0.142047
Log likelihood ratio	3.160267	Probability	0.075451

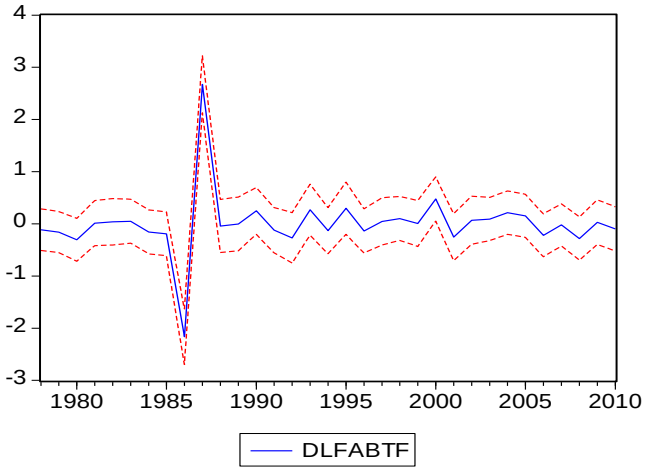
B2: Recursive Estimates

Recursive Residuals



CUSUM Test





Forecast: DLFABTF
Actual: DLFABT
Forecast sample: 1975 2012
Adjusted sample: 1978 2010
Included observations: 33

Root Mean Squared Error	0.166715
Mean Absolute Error	0.135977
Mean Abs. Percent Error	428.2772
Theil Inequality Coefficient	0.130902
Bias Proportion	0.000011
Variance Proportion	0.018491
Covariance Proportion	0.981498

Appendix 11: UECM of the Capital Account Balance Equation

Dependent Variable: DLKAB
Method: Least Squares
Sample (adjusted): 1978 2010
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.433111	1.472827	3.688899	0.0010
DLKAB(-2)	-0.473815	0.156492	-3.027737	0.0054
DREER(-1)	0.620645	0.363448	1.707658	0.0992
LKAB(-1)	-0.269202	0.105399	-2.554125	0.0166
LREER(-1)	-0.847018	0.231352	-3.661166	0.0011
DU	-0.639239	0.186689	-3.424096	0.0020

R-squared	0.459471	Mean dependent var	0.086704
Adjusted R-squared	0.359373	S.D. dependent var	0.413847
S.E. of regression	0.331240	Akaike info criterion	0.791018
Sum squared resid	2.962436	Schwarz criterion	1.063110
Log likelihood	-7.051795	F-statistic	4.590210
Durbin-Watson stat	1.847673	Prob(F-statistic)	0.003694

Appendix 12: Diagnostic Test for the Capital Account Balance

A: Residual Tests

A1: Correlogram-Q-Statistics

Sample: 1978 2010
Included observations: 33

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. | . |	. | . |	1	0.024	0.024	0.0212	0.884
. *| . |	. *| . |	2	-0.133	-0.133	0.6772	0.713
. | . |	. | . |	3	0.043	0.051	0.7487	0.862
. *| . |	. *| . |	4	-0.066	-0.088	0.9213	0.921
. | . |	. | . |	5	0.020	0.039	0.9380	0.967
. | . |	. | . |	6	0.008	-0.019	0.9406	0.988
. | . |	. | . |	7	0.011	0.028	0.9461	0.996
. | . |	. | . |	8	-0.008	-0.021	0.9492	0.999
. | . |	. | . |	9	-0.023	-0.012	0.9753	0.999
. | . |	. | . |	10	0.013	0.007	0.9835	1.000
. | . |	. | . |	11	0.014	0.013	0.9938	1.000
. | . |	. | . |	12	0.022	0.023	1.0197	1.000
. | . |	. | . |	13	0.006	0.005	1.0220	1.000
. | . |	. | . |	14	0.000	0.008	1.0220	1.000
. | . |	. | . |	15	0.004	0.005	1.0231	1.000

A2: Jarque Bera Statistic

F-statistic	41.19665	Probability	0.0000

A3: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.765935	Probability	0.475502
Obs*R-squared	1.905320	Probability	0.385714

A4: ARCH Test:

F-statistic	0.030924	Probability	0.861592
Obs*R-squared	0.032952	Probability	0.855955

A5: White Heteroskedasticity Test:

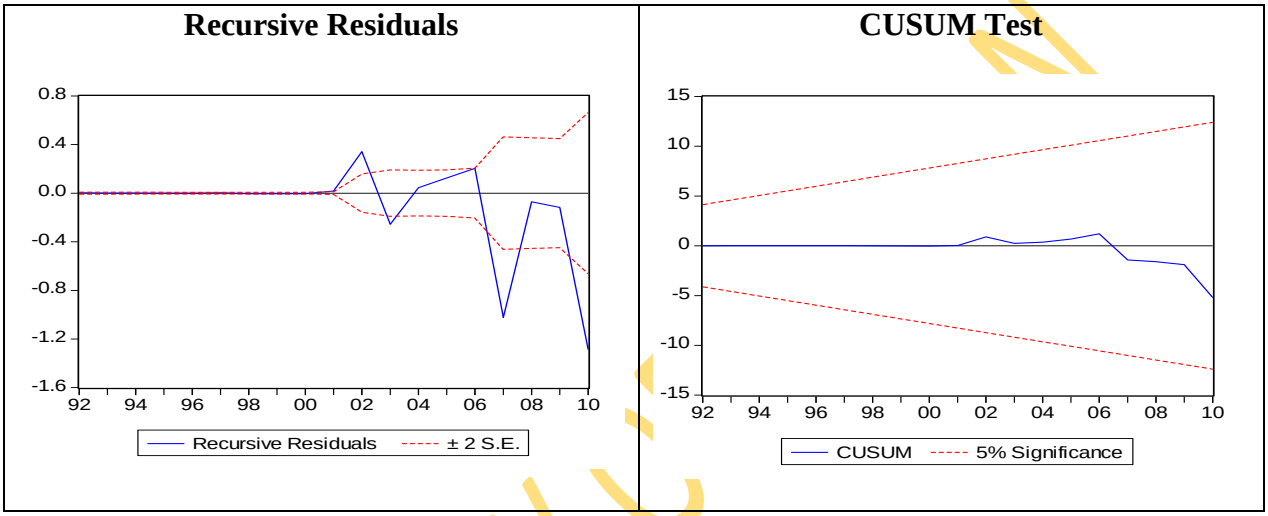
F-statistic	1.287913	Probability	0.295631
Obs*R-squared	11.05802	Probability	0.271753

B: Stability Tests

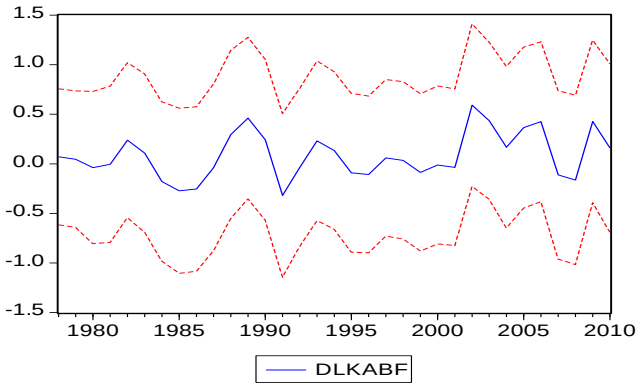
B1: Ramsey RESET Test:

F-statistic	5.545454	Probability	0.026356
Log likelihood ratio	6.379988	Probability	0.011541

B2: Recursive Estimates



Forecast of Capital Account Balance



Forecast: DLKABF
Actual: DLKAB
Forecast sample: 1975 2012
Adjusted sample: 1978 2010
Included observations: 33

Root Mean Squared Error	0.338088
Mean Absolute Error	0.201605
Mean Abs. Percent Error	2770.400
Theil Inequality Coefficient	0.512730
Bias Proportion	0.000120
Variance Proportion	0.281630
Covariance Proportion	0.718250

Appendix 13: Unrestricted Error Correction Model for Exports Equation

Dependent Variable: DLEX
Method: Least Squares
Sample (adjusted): 1975Q4 2010Q4
Included observations: 141 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8.603925	3.293801	-2.612157	0.0100
DLEX(-1)	-0.152191	0.078888	-1.929202	0.0559
DLREER	-1.117247	0.288113	-3.877806	0.0002
$DLGDP^{d}$(-1)	2.993661	1.350630	2.216492	0.0284
DLWPI(-1)	1.251380	0.675000	1.853897	0.0660
LEX(-1)	-0.362610	0.075733	-4.787980	0.0000
LREER(-1)	-0.578155	0.214711	-2.692709	0.0080
LGDP_SL(-1)	1.883733	0.533816	3.528808	0.0006
LMS(-1)	0.223292	0.055861	3.997305	0.0001
DU	0.334764	0.175559	1.906844	0.0587

R-squared	0.338641	Mean dependent var	0.062365
Adjusted R-squared	0.293204	S.D. dependent var	0.664628
S.E. of regression	0.558761	Akaike info criterion	1.742090
Sum squared resid	40.89994	Schwarz criterion	1.951222
Log likelihood	-112.8173	F-statistic	7.453002
Durbin-Watson stat	2.015920	Prob(F-statistic)	0.000000

Appendix 14: Diagnostic Test from the Parsimonious Model for the Exports Equation

A: Residual Tests

A1: Correlogram-Q-Statistics

Sample: 1975Q4 2010Q4
Included observations: 141

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|. |	.|. |	1	-0.013	-0.013	0.0244	0.876
.|. |	.|. |	2	0.031	0.031	0.1649	0.921
.|. |	.|. |	3	0.008	0.009	0.1753	0.981
.|* |	.|* |	4	0.108	0.107	1.8787	0.758
*|. |	*|. |	5	-0.141	-0.140	4.8191	0.438
.|. |	.|. |	6	0.006	-0.002	4.8252	0.566
.|. |	.|. |	7	-0.053	-0.048	5.2438	0.630
.|** |	.|** |	8	0.210	0.209	11.914	0.155
.|* |	.|* |	9	0.111	0.152	13.781	0.130
.|. |	.|. |	10	0.001	-0.028	13.781	0.183
**|. |	**|. |	11	-0.196	-0.229	19.716	0.049
.|* |	.|. |	12	0.097	0.027	21.172	0.048
*|. |	.|. |	13	-0.065	-0.008	21.845	0.058
**|. |	**|. |	14	-0.245	-0.215	31.390	0.005
.|. |	.|. |	15	-0.039	0.008	31.634	0.007
.|. |	.|. |	16	0.035	-0.045	31.834	0.011
.|. |	.|. |	17	0.010	0.001	31.850	0.016
*|. |	*|. |	18	-0.061	-0.066	32.459	0.019
*|. |	.|. |	19	-0.068	-0.049	33.232	0.023
*|. |	*|. |	20	-0.066	-0.059	33.967	0.026

A2: Normality Test - Jarque-Bera Statistic Test:

F-statistic	354.4946	Probability	0.0000

A3: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.334894	Probability	0.716034
Obs*R-squared	0.728311	Probability	0.694783

A4: ARCH Test:

F-statistic	18.25527	Probability	0.000036
Obs*R-squared	16.35617	Probability	0.000052

A5: White Heteroskedasticity Test:

F-statistic	9.864144	Probability	0.000000
Obs*R-squared	81.33860	Probability	0.000000

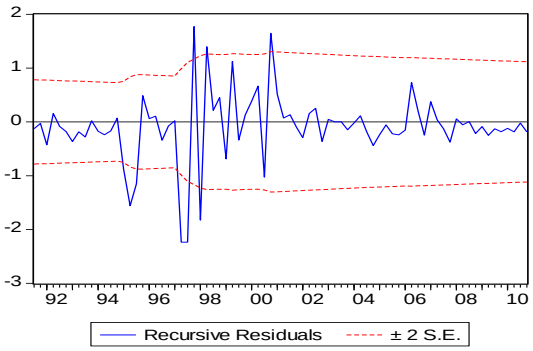
B: Stability Tests

B1: Ramsey RESET Test:

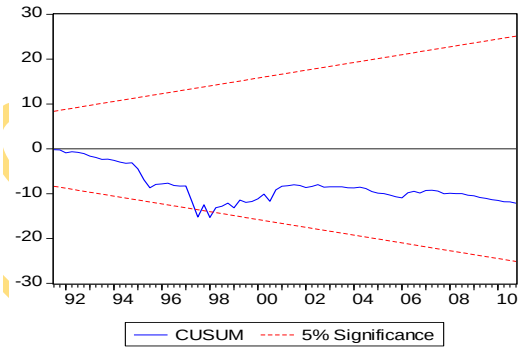
F-statistic	2.956053	Probability	0.087937
Log likelihood ratio	3.170271	Probability	0.074990

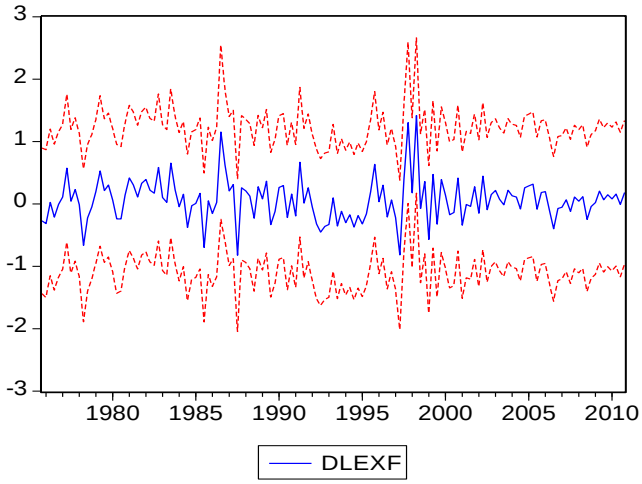
B2: Recursive Estimates

Recursive Residuals



CUSUN Test





Forecast: DLEXF
Actual: DLEX
Forecast sample: 1975Q1 2010Q4
Adjusted sample: 1975Q4 2010Q4
Included observations: 141

Root Mean Squared Error	0.546419
Mean Absolute Error	0.365666
Mean Abs. Percent Error	41511.74
Theil Inequality Coefficient	0.542403
Bias Proportion	0.000000
Variance Proportion	0.355562
Covariance Proportion	0.644438

Appendix 15: Unrestricted Error Correction Model for Imports Equation

Dependent Variable: DLIM
Method: Least Squares
Sample (adjusted): 1975Q4 2010Q4
Included observations: 141 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.033506	1.012583	2.995811	0.0033
DLIM(-1)	0.172209	0.075980	2.266505	0.0251
DLIM(-2)	-0.115526	0.081531	-1.416950	0.1589
DLREER	-1.066600	0.222799	-4.787285	0.0000
DLREER(-2)	-0.378959	0.248489	-1.525052	0.1297
DLGDP^{d}(-2)	1.936718	0.994368	1.947688	0.0536
DLMS	-1.534323	0.615383	-2.493282	0.0139
LIM(-1)	-0.510405	0.083414	-6.118956	0.0000
LREER(-1)	-0.562002	0.171764	-3.271938	0.0014
LMS(-1)	0.450104	0.077503	5.807552	0.0000

R-squared	0.428291	Mean dependent var	0.065679
Adjusted R-squared	0.389013	S.D. dependent var	0.545663
S.E. of regression	0.426521	Akaike info criterion	1.201973
Sum squared resid	23.83159	Schwarz criterion	1.411105
Log likelihood	-74.73910	F-statistic	10.90416
Durbin-Watson stat	2.058499	Prob(F-statistic)	0.000000

Appendix 16: Diagnostic Test for the Imports Equation

A: Residual Tests

A1: Correlogram-Q-Statistics

Sample: 1975Q4 2010Q4
Included observations: 141

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|. |	.|. |	1	-0.030	-0.030	0.1316	0.717
.|. |	.|. |	2	-0.001	-0.002	0.1318	0.936
.|* |	.|* |	3	0.083	0.083	1.1298	0.770
*|. |	*|. |	4	-0.176	-0.173	5.7105	0.222
.|** |	.|** |	5	0.238	0.239	14.087	0.015
*|. |	*|. |	6	-0.067	-0.083	14.759	0.022
*|. |	*|. |	7	-0.101	-0.071	16.293	0.023
.|. |	*|. |	8	-0.024	-0.099	16.379	0.037
*|. |	.|. |	9	-0.075	0.022	17.250	0.045
.|. |	.|. |	10	0.019	-0.056	17.303	0.068
.|. |	.|. |	11	-0.013	0.004	17.328	0.099
*|. |	*|. |	12	-0.073	-0.062	18.155	0.111
.|* |	.|* |	13	0.077	0.103	19.085	0.120
.|. |	*|. |	14	-0.037	-0.062	19.303	0.154
.|. |	.|. |	15	-0.014	-0.004	19.334	0.199
.|. |	.|. |	16	0.002	-0.051	19.335	0.252
.|. |	.|. |	17	-0.050	0.016	19.733	0.288
.|. |	.|. |	18	0.021	-0.055	19.803	0.344
.|. |	.|. |	19	0.016	0.045	19.846	0.404
*|. |	*|. |	20	-0.063	-0.082	20.510	0.426

A2: Normality Test - Jarque-Bera Statistic Test:

F-statistic	4635.796	Probability	0.00000

A3: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.529154	Probability	0.590377
Obs*R-squared	1.147341	Probability	0.563453

A4: ARCH Test:

F-statistic	28.42430	Probability	0.000000
Obs*R-squared	23.91118	Probability	0.000001

A5: White Heteroskedasticity Test:

F-statistic	6.955797	Probability	0.000000
Obs*R-squared	71.41384	Probability	0.000000

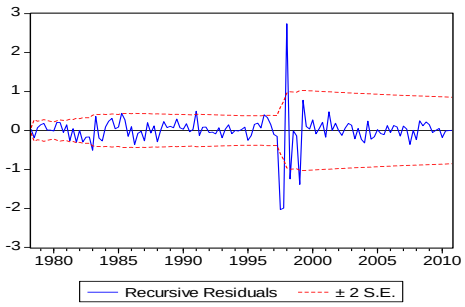
B: Stability Tests

B1: Ramsey RESET Test:

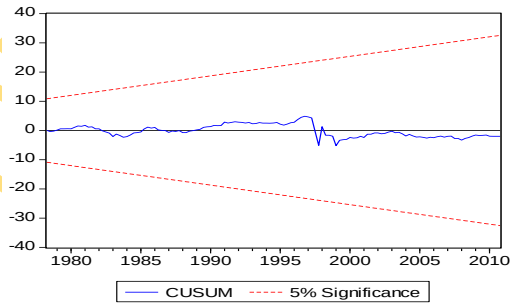
F-statistic	4.547837	Probability	0.034840
Log likelihood ratio	4.848334	Probability	0.027673

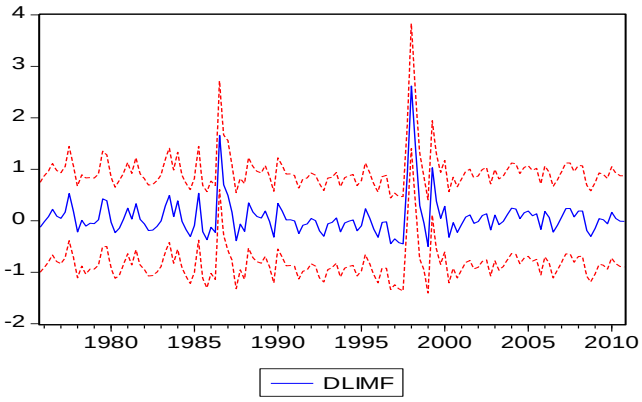
B2: Recursive Estimates

Recursive Residuals



CUSUM Test





Forecast: DLIMF
Actual: DLIM
Forecast sample: 1975Q1 2010Q4
Adjusted sample: 1975Q4 2010Q4
Included observations: 141

Root Mean Squared Error	0.415966
Mean Absolute Error	0.216822
Mean Abs. Percent Error	915069.1
Theil Inequality Coefficient	0.450693
Bias Proportion	0.000000
Variance Proportion	0.175477
Covariance Proportion	0.824523

Appendix 17: Unrestricted Error Correction Model for Foreign Direct Investment Equation

Dependent Variable: DLFDI
Method: Least Squares
Sample (adjusted): 1978 2010
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-133.9727	296.3174	-0.452126	0.6649
DLFDI(-1)	-0.878867	0.216683	-4.056008	0.0048
DLREER	71.08220	25.94615	2.739605	0.0289
LGGDP	58.43941	15.94244	3.665650	0.0080
LGGDP(-1)	-15.86568	4.230619	-3.750203	0.0072
LOPEN	112.4008	28.59384	3.930944	0.0057
LOPEN(-1)	35.92566	23.20858	1.547947	0.1656
DTBR(-1)	4.801689	1.273898	3.769288	0.0070
LFDI(-1)	53.52748	37.12741	1.441724	0.1926
LREER(-1)	-30.91103	20.46321	-1.510566	0.1746
TBR(-1)	-3.029355	0.799399	-3.789541	0.0068

R-squared	0.976066	Mean dependent var	11.78230
Adjusted R-squared	0.941875	S.D. dependent var	49.06898
S.E. of regression	11.83013	Akaike info criterion	8.056936
Sum squared resid	979.6633	Schwarz criterion	8.601052
Log likelihood	-61.51243	F-statistic	28.54720
Durbin-Watson stat	2.394553	Prob(F-statistic)	0.000099

Appendix 18: Diagnostic Test of the Foreign Direct Investment Equation

A: Residual Tests

A1: Correlogram-Q-Statistics

Sample: 1978 2010
Included observations: 18

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. *| . |	. *| . |	1	-0.074	-0.074	0.1157	0.734
. **| . |	. **| . |	2	-0.209	-0.215	1.0951	0.578
. |** . |	. |** . |	3	0.260	0.238	2.7230	0.436
. *| . |	. *| . |	4	-0.086	-0.110	2.9132	0.572
. | . |	. |* . |	5	-0.001	0.107	2.9133	0.713
. | . |	. *| . |	6	0.002	-0.114	2.9134	0.820
. | . |	. |* . |	7	-0.001	0.085	2.9134	0.893
. | . |	. *| . |	8	-0.011	-0.088	2.9179	0.939
. | . |	. |* . |	9	0.013	0.086	2.9249	0.967
. | . |	. *| . |	10	0.003	-0.065	2.9253	0.983
. | . |	. | . |	11	-0.019	0.048	2.9445	0.991
. | . |	. *| . |	12	-0.007	-0.071	2.9476	0.996

A2: Normality Test - Jarque-Bera Statistics Test:

F-statistic	0.444991	Probability	0.800518

A3: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.460253	Probability	0.655432
Obs*R-squared	2.798599	Probability	0.246770

A4: ARCH Test:

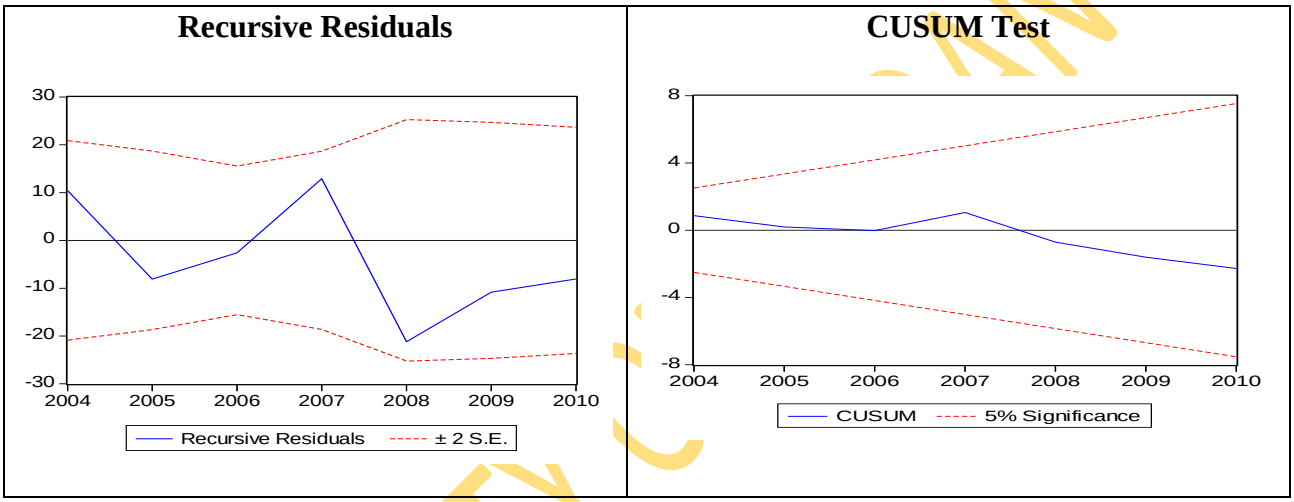
F-statistic	0.294533	Probability	0.597266
Obs*R-squared	0.335390	Probability	0.562502

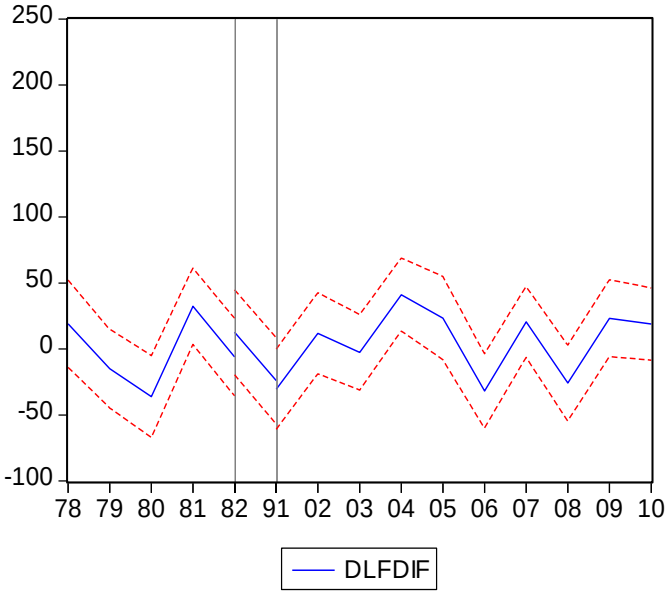
B: Model Stability Tests

B1: Ramsey RESET Test:

F-statistic	0.001080	Probability	0.974850
Log likelihood ratio	0.003240	Probability	0.954611

B2: Recursive Estimates





Forecast: DLFDIF
Actual: DLFDI
Forecast sample: 1975 2010
Adjusted sample: 1978 2010
Included observations: 18

Root Mean Squared Error	7.377380
Mean Absolute Error	5.482656
Mean Abs. Percent Error	138.3731
Theil Inequality Coefficient	0.075523
Bias Proportion	0.000000
Variance Proportion	0.006056
Covariance Proportion	0.993944

Appendix 19: Unrestricted Error Correction Model for Consumer Price Index Equation

Dependent Variable: DLCPI_SL
Method: Least Squares
Sample (adjusted): 1976Q1 2010Q4
Included observations: 140 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.05429	1.757222	5.721699	0.0000
DLCPI_SL(-3)	-0.107098	0.072102	-1.485358	0.1399
DLNER	0.254673	0.047816	5.326113	0.0000
DLNER(-1)	-0.098051	0.053585	-1.829812	0.0696
$DLGDP^{d}(-3)$	-0.417069	0.217864	-1.914356	0.0578
$DLGDP^{f}$	-6.982289	1.911702	-3.652395	0.0004
$DLGDP^{f}(-2)$	7.924909	1.918353	4.131101	0.0001
DLWPI(-2)	-1.890624	0.539299	-3.505703	0.0006
LCPI(-1)	-0.233988	0.045110	-5.187019	0.0000
LNER(-1)	0.259306	0.046969	5.520786	0.0000
$LGDP^{d}(-1)$	0.100660	0.057875	1.739250	0.0844
$LGDP^{f}(-1)$	-1.945991	0.309370	-6.290178	0.0000
LWPI(-1)	0.910302	0.147755	6.160872	0.0000

R-squared	0.489373	Mean dependent var	0.068665
Adjusted R-squared	0.441124	S.D. dependent var	0.117347
S.E. of regression	0.087726	Akaike info criterion	-1.940931
Sum squared resid	0.977380	Schwarz criterion	-1.667779
Log likelihood	148.8652	F-statistic	10.14280
Durbin-Watson stat	2.179417	Prob(F-statistic)	0.000000

Appendix 20: Diagnostic Test of the Consumer Price Index Equation

A: Residual Tests

A1: Correlogram-Q-Statistics

Sample: 1976Q1 2010Q4
Included observations: 140

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
*|. |	*|. |	1	-0.099	-0.099	1.4066	0.236
*|. |	*|. |	2	-0.152	-0.164	4.7541	0.093
.|. |	.|. |	3	0.004	-0.031	4.7569	0.190
.|* |	.|* |	4	0.114	0.090	6.6733	0.154
.|. |	.|. |	5	0.025	0.047	6.7623	0.239
*|. |	*|. |	6	-0.119	-0.083	8.8578	0.182
.|* |	.|. |	7	0.070	0.062	9.5971	0.213
.|. |	.|. |	8	0.046	0.024	9.9215	0.271
.|. |	.|. |	9	0.008	0.028	9.9318	0.356
.|. |	.|* |	10	0.041	0.078	10.186	0.424
.|. |	.|. |	11	-0.057	-0.047	10.685	0.470
*|. |	*|. |	12	-0.093	-0.117	12.039	0.443
.|. |	.|. |	13	0.035	0.005	12.236	0.508
.|. |	*|. |	14	-0.036	-0.075	12.435	0.571
.|. |	.|. |	15	0.053	0.056	12.888	0.611
.|* |	.|** |	16	0.173	0.223	17.686	0.343
*|. |	*|. |	17	-0.103	-0.070	19.409	0.306
.|. |	.|. |	18	-0.040	-0.021	19.672	0.352
.|. |	.|. |	19	0.005	-0.010	19.676	0.414
.|. |	*|. |	20	-0.010	-0.087	19.693	0.477

A2: Normality Test - Jarque-Bera Statistic Test:

F-statistic	138.2034	Probability	0.000000

A3: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.245866	Probability	0.042240
Obs*R-squared	6.911784	Probability	0.031559

A4: ARCH Test:

F-statistic	5.126889	Probability	0.025129
Obs*R-squared	5.014094	Probability	0.025142

A5: White Heteroskedasticity Test:

F-statistic	4.163850	Probability	0.000000
Obs*R-squared	65.09273	Probability	0.000012

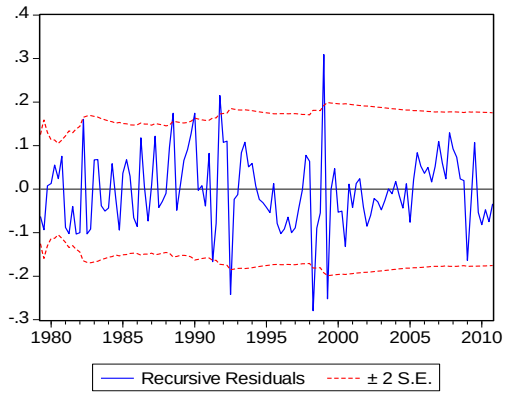
B: Model Stability Tests

B1: Ramsey RESET Test:

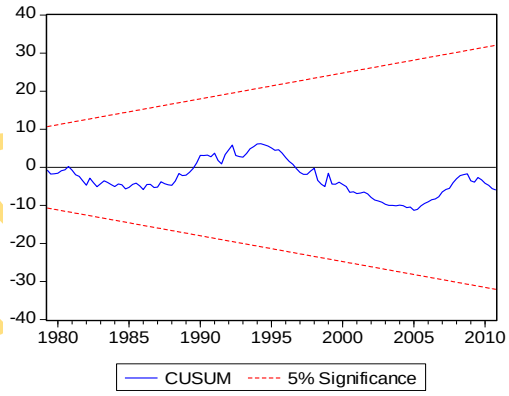
F-statistic	3.930942	Probability	0.049581
Log likelihood ratio	4.300966	Probability	0.038091

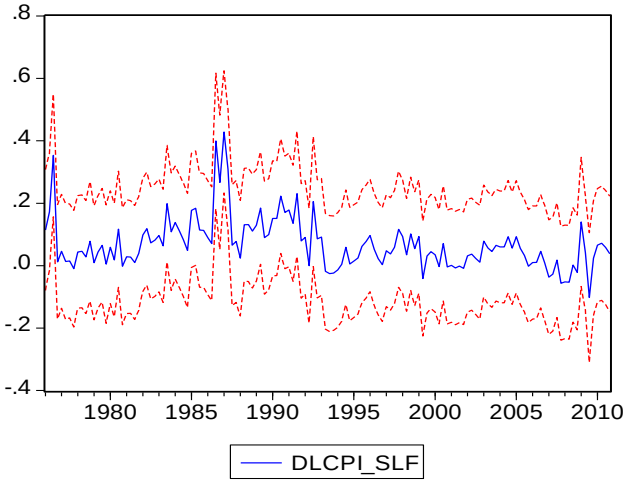
B2: Recursive Estimates

Recursive Residuals



CUSUM Test





Forecast: DLCPI_SLF
Actual: DLCPI_SL
Forecast sample: 1975Q1 2010Q4
Adjusted sample: 1976Q1 2010Q4
Included observations: 140

Root Mean Squared Error	0.083883
Mean Absolute Error	0.058886
Mean Abs. Percent Error	784.4908
Theil Inequality Coefficient	0.346224
Bias Proportion	0.000001
Variance Proportion	0.177736
Covariance Proportion	0.822263