Thesis

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The Monetary Approach to Balance of Payment and Exchange Rate Determination: A Case Study of Nigeria

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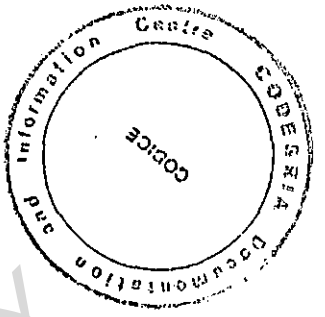
THE MONETARY APPROACH TO BALANCE OF PAYMENTS AND EXCHANGE RATE DETERMINATION: A CASE STUDY OF NIGERIA



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DEDICATION

This thesis is dedicated to my parents for their love and special interest in my academic career, and to all who provided support in one form or the other during its preparation.

ABSTRACT

THE MONETARY APPROACH TO BALANCE OF PAYMENTS AND EXCHANGE RATE DETERMINATION: A CASE STUDY OF NIGERIA

E. C. OBIOMA

The economic problems confronting developing countries like Nigeria have become issues of great concern in recent decades. Notable among these are the adverse balance of payments and exchange rate misalignment. These problems have been ascribed mainly to external shocks and inappropriate domestic macroeconomic policies. One of the attempts to tackle the problems led to renewed interest in the monetary approach to balance of payments and exchange rate determination. The monetary approach attributes balance of payments disequilibrium and exchange rate misalignment mainly to disequilibrium in the money market. This study endeavours, among other things, to empirically verify the proposition that balance of payments disequilibrium and exchange rate misalignment are essentially a monetary phenomenon in a small open economy like Nigeria.

In the course of the study, single-equation econometric models based on the monetary approach to balance of payments and exchange rate determination are estimated using the Ordinary Least Squares (OLS) regression technique. The empirical findings support most of the basic assumptions and postulates of the monetary approach during the period of fixed exchange rate in Nigeria. The model significantly explains the movement of the balance of payments, measured by external reserve flow, during this period. However, there is only modest support for the monetary model in explaining exchange rate behaviour of the Nigerian currency (the

naira) during the period of flexible exchange rate. Though an increase in domestic or relative money supply is found to depreciate the naira exchange rate on equiproportional basis during this period, as predicted by the monetary approach, other explanatory variables such as relative real income and interest rate differential are statistically insignificant and their coefficients often appear with wrong signs in the monetary model of exchange rate determination. The relatively poor performance of the monetary model of exchange rate determination in Nigeria is attributed to a number of factors, including frequent government intervention in the foreign exchange market and the economic/political instability prevalent during the period under study.

On the basis of findings of the study, a number of policy recommendations are made. These include the need for government to be cautious on policies or actions that tend to increase domestic credit and money stock since they are found to lead, with a reasonable degree of certainty, to adverse balance of payments and exchange rate depreciation. The study also suggests that the Central Bank of Nigeria should establish adequate mechanisms for proper coordination, harmonization and control of monetary and credit policy in the country in order to curtail excessive growth in domestic credit and money stock, and to ensure that the rate of monetary and credit expansion is consistent with the rates existing in the major trading partners. This is a major requirement for the attainment of the current objectives of sustainable balance of payments and exchange rate stability. To meet this requriement, the Central Bank of Nigeria should be given adequate autonomy by the government. Given the evidence of significantly inherent tendency of exchange rate to depreciate during the period of floating exchange rates, the study is of the view that government should continue with the present policy of guided exchange rate deregulation, rather than leaving the market to entirely determine the exchange

rate of the naira.

However, the relatively poor performance of the monetary model of exchange rate determination suggests that one should look beyond the monetary model in order to adequately explain exchange rate behaviour in Nigeria.

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CERTIFICATION

We certify that this work was carried out by **EMELOGU CHIMARAOKE OBIOMA** in the Department of Economics, University of Ibadan, Ibadan, Nigeria.

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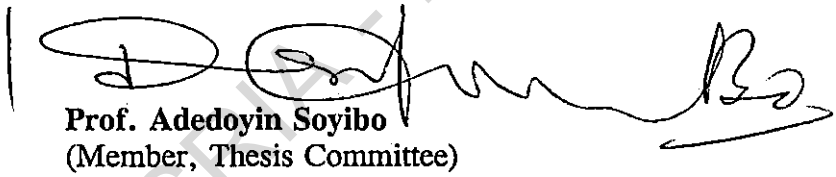

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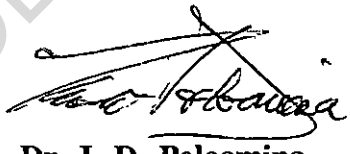

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CHAPTER ONE

INTRODUCTION

1.1 Statement of the Problem

Since the global economic crisis of the 1980s, many developing countries like Nigeria have been grappling with numerous economic problems. Such problems include growing unemployment, unsustainable fiscal deficits, high inflationary pressures, mounting debt burden, adverse balance of payments, under-utilization of capacity and exchange rate misalignment. In Nigeria, the adverse balance of payments and exchange rate misalignment, which could be attributed to a number of factors (both internal and external), reflect the deep-seated problems in the economy.

The internal factors that are responsible for the adverse balance of payments position in Nigeria include, among other things, excessive demand for foreign products, heavy reliance on crude oil for government revenue and foreign exchange earnings, low domestic resource base, political instability, and structural rigidities in the domestic production process. The weaknesses in the domestic macroeconomic policies have tended to exacerbate the problem. For instance, the public sector-led and urban-based development strategy adopted by government prior to the introduction of structural adjustment programme (SAP) resulted in an unregulated growth in the level and pattern of government expenditure. Government parastatals - most of which are still imposing heavy financial and economic burden on the economy - also rapidly multiplied. The

direct consequences of all these government actions have been, as would further be elaborated upon in chapter two, huge public sector deficits (financed increasingly through public borrowing from the banking sector), rapid accumulation of foreign and domestic debt, rising inflation, exchange rate misalignment, and depletion of external reserves. Moreover, the trade and exchange rate policies pursued during the oil boom era of 1970s and early 1980s failed to generate the required incentives for earning or saving foreign exchange. Rather, they resulted in several macroeconomic distortions and entrenched import-oriented consumption and production patterns in Nigeria which widened the trade gap.

Among the external factors contributing to the deterioration in the Nigeria's balance of payments are the economic recession experienced by most industrialized countries following the oil price shocks of 1973/74 and 1979/80. The rapid increase in the price of crude oil during this period made these industrialized countries adopt various energy conserving policies as well as restrictive monetary and fiscal policy measures which all culminated in the global economic recession and consequently resulted in the collapse of the world oil market in the early 1980s. Other external factors include the decline in capital flows, deterioration in Nigeria's terms of trade, and rising (but floating) real interest rates in international capital and money markets, all of which worsened the country's external debt burden.

These internal and external factors are, however, not mutually exclusive. They are, in most cases, interrelated and tend to reinforce one another. Most often, policies needed to maintain external balance conflict with those required to restore internal balance, thereby making

the problems intractable. The huge external debt burden and the dwindling foreign exchange reserves confronting most developing countries tend to constrain their efforts to respond adequately to balance of payments shocks.

The persistence of balance of payments crisis and exchange rate misalignment in most developing countries, particularly since the 1980s, has been an issue of great concern at national and international levels. Attempts to effectively address these problems have led to a tremendous increase of academic interest and developments in the economics of balance of payments and exchange rates. This has induced renewed interest in the theory and empirical analysis of the monetary approach to balance of payments and exchange rate determination, as orthodox approaches could no longer cope with the problems. This monetary approach, which largely reflects the position of the International Monetary Fund (IMF), attributes balance of payments disequilibrium and exchange rate misalignment essentially to disequilibrium in the money market. As stated by Frenkel and Johnson (1978), the monetary approach or its counterpart, the asset-market approach, emphasizes the role of money and other assets in the determination of balance of payments when the exchange rate is fixed, and in the determination of exchange rate in an era of flexible exchange rate. One could view the monetary approach to be more readily applicable to the developing economies than to the advanced industrial economies because limited markets for domestic financial assets in the former tend to make for more direct links between budget deficit and money supply, and between money supply and changes in relative prices which then affect imports, exports and capital flows. There is,

unfortunately, a very limited systematic empirical evidence to support this view or verify the relevance of the monetary approach in many developing economies like Nigeria despite the growing global interest in and support for the approach. This study, therefore, endeavours to provide a more systematic empirical evidence on the monetary model of balance of payments and exchange rate determination in the Nigerian context.

1.2 Need for the Study

The structural adjustment programmes embarked upon by most developing countries, including Nigeria, since the 1980s derive their basic analytical framework largely from the financial programming model of the International Monetary Fund (IMF). Though the adjustment programmes are complex packages of policy measures aimed at a number of objectives including the attainment of a viable balance of payments, satisfactory long-term growth performance, and low inflation (Khan, 1990:195), the immediate objective of the IMF's financial programming model is the attainment of a viable balance of payments position. According to Khan, Montiel and Haque (1986), the model is essentially a monetary model, built on the framework that links the financial sector with the balance of payments. The IMF believes that the basic cause of the external imbalance of a country is excessive monetary and credit expansion which brings about changes in relative prices that affect imports, exports and capital flows, and consequently the balance of payments. It contends that large fiscal deficits in the public sector have been the main cause of excessive monetary expansion in many developing countries in recent years (see

Obadan, 1993a:5). To this end, the IMF emphasises restrictive monetary and credit policy for improvements in the balance of payments.

From the foregoing, it is evident that the theoretical basis of the IMF's approach to economic stabilization and adjustment is the monetary approach to balance of payments which views external imbalance and exchange rate misalignment as emanating essentially from monetary disequilibrium. This has accounted for the extensive use of the monetary approach in analyzing and designing economic policies for countries in balance of payments trouble (Dornbusch and Fischer, 1990:764). Thus, the need to examine the theoretical basis and empirical relevance of the monetary approach to balance of payments and exchange rate determination in the Nigerian context cannot be disputed at this period of economic reform programme in the country. If the monetary model is proved to be workable in Nigeria, it means (as the proponents of the monetary approach suggest) that the effectiveness of various policy reform measures being put in place to address the balance of payments and exchange rate problems in the economy would depend mainly on how their monetary implications are taken into consideration and on the ability of the monetary authorities to control money supply and credit creation.

1.3 Objectives of the Study

The broad objective of this study is to examine the relevance and applicability of the monetary approach to balance of payments and exchange rate determination in Nigeria, with a view to determining the extent to which the approach can serve as a useful framework for analyzing the balance of payments and exchange rate problems in the country.

The specific objectives are to:

(i) estimate the degree of exchange rate misalignment in Nigeria, analyze its implications on the Nigerian economy as well as the effect of government policy responses to the problem;

(ii) determine the nature and stability of money demand function, and the relevance of other basic assumptions of the monetary approach to balance of payments and exchange rate determination in the Nigerian context;

(iii) examine the influence of the determinants of money demand and money supply on the overall balance of payments, as measured by international reserve flows, during the period of fixed exchange rates, and on exchange rate changes during the floating exchange rate period, with a view to verifying the proposition that the balance of payments disequilibrium and exchange rate misalignment are essentially a monetary phenomenon in a small open economy like Nigeria; and

(iv) verify the stability of the monetary model of balance of payments and exchange rate determination so as to determine the extent to which policies based on the model can be relied upon to influence macroeconomic variables in the economy.

In the course of the study, an attempt is made to review the Nigerian economy and its experience in exchange rate and balance of payments management; and to recommend, on the basis of the findings of the study, some policy options that will guide the management of the balance of payments and exchange rates in Nigeria.

1.4 Statement of the Hypotheses

The major hypotheses examined by the study are as follows:

(i) Exchange rate misalignment and balance of payments disequilibrium have been recurring policy problems in Nigeria, particularly since the collapse of crude oil price in the world market in the early 1980s.

(ii) The basic assumptions underlying the monetary approach, such as the existence of a stable money demand function, and the purchasing power parity (PPP) condition, as well as lack of effective sterilization policy, are satisfied in the Nigerian context.

(iii) Determinants of money demand and money supply play a very significant role in the determination of the balance of payments during a fixed exchange rate regime, and in the determination of exchange rates during an era of flexible exchange

rates, thereby confirming the proposition that the balance of payments disequilibrium and exchange rate misalignment arise essentially from the disequilibrium in the money market.

(iv) The monetary model of balance of payments and exchange rate determination is stable and workable in the Nigerian economy. As such, the model provides a useful framework for analyzing the balance of payments and exchange rate problems in the economy.

1.5 Scope and Coverage of the Study

The study covers two distinct periods of exchange rate arrangement in post-independence Nigeria. The first period (1960-1985) covers the regime of relatively fixed exchange rates, while the second period (1986-1993) covers the regime of floating exchange rates. The influence of the determinants of money supply and money demand on the balance of payments (as measured by external reserve flows) is examined in the first period, while the influence of the determinants of money supply and money demand on exchange rate changes is examined in the second period. Annual data are used for the first period, while quarterly data are employed in the second period because of the short period of flexible exchange rate system in Nigeria (i.e. between 1986 and 1993).

It is believed that the use of quarterly data for the second period, notwithstanding the long-run assumptions of the monetary approach, will provide results that can give some insights

into the suitability or otherwise of the monetary model of exchange rate determination in Nigeria. In spite of the long-run assumptions of the monetary model, many other empirical studies on the subject which employed quarterly or monthly data (Bilson, 1978; Blejer and Laiderman, 1981) have produced some useful results. Bilson (1978) has, in fact, observed that the monetary approach could equally be useful in the analysis of short-run behaviour.

The study focuses on the analysis of the individual relationships that exist in the monetary model of balance of payments and exchange rate determination within the framework of single-equation econometric models. These models, which form the groundwork for the analysis of any system equations or time-series models, have been adjudged very useful for testing hypotheses and forecasting (see Pindyck and Rubinfeld, 1991:1). Moreover, as stated by Adam (1992:2):

> ... while practices and estimation techniques do differ, the methodology of econometrics and valid inference is identical no matter what the dimensions of any particular model. Moreover, the block-by-block approach adopted in the construction of most systems requires that the process of equation specification and evaluation is sequential, and a system can be evaluated in terms of the validity of its component single-equation behavioural relationships.

Thus, given the objectives of this study as highlighted in section 1.3, we believe that the use of single-equation econometric models will be adequate for our empirical analysis.

1.6 Arrangement of the Study

This study is presented under seven chapters. In this chapter (chapter one), we have highlighted the problem and hypotheses of the study. The objectives, scope and coverage of the study as well as the need for the study are also stated in this chapter.

In chapter two, we review the Nigerian economy, highlighting its major features and the economic background before, during and after the introduction of the structural adjustment programme (SAP) in the mid-1986.

In chapter three, some conceptual and policy issues on the balance of payments and exchange rate management are discussed. We also discuss, in more details, Nigeria's experience in the balance of payments and exchange rate management. In this chapter, various indices computed in the course of the study to indicate the extent of exchange rate misalignment in Nigeria over the years are also reported and discussed.

The basic features and assumptions as well as some of the existing empirical findings on the monetary approach to balance of payments and exchange rate determination are reviewed in chapter four, while the methodology, model specification and estimation techniques, as well as data description, notations and sources are presented in chapter five. The regression results as well as their analytical implications are presented and discussed in chapter six.

Finally, in chapter seven, we present a summary of findings of the study, on the basis of which some policy conclusions are drawn. The limitations of the study and areas for further study are also highlighted in this chapter.

CHAPTER TWO

AN OVERVIEW OF THE NIGERIAN ECONOMY

2.1 Introduction

Nigeria is a small open economy. Its exports consist mainly of primary commodities whose prices and quantities exported depend on external factors - particularly the economic environment of the industrialized countries. For instance, the price and quantity of crude oil which, since the 1970s, has accounted for about 90 per cent of the country's exports earnings, are fixed by the Organisation of Petroleum Exporting Countries (OPEC) of which Nigeria is a member. Nigeria's imports consist largely of machinery and transport equipment, chemicals, processed food and other miscellaneous manufactured goods that are produced mainly by the advanced industrial economies. The prices of these imported goods are also externally determined.

The degree of openness of an economy can be roughly measured by the ratio of foreign trade (imports plus exports) to the gross domestic product (GDP). By this index, the average ratio was above 30 per cent in Nigeria during the 1970s and early 1980s. This declined to about 20 per cent between 1983 and 1986, rose to 42 per cent in 1987 and 65 per cent in 1991, before declining to about 37 per cent in 1994 (see Table 2.1). Though the Nigerian economy is not as open as most other countries in Sub-Saharan Africa, its degree of openness as highlighted above is considered relatively high when compared with those of the advanced industrial countries like the United States of America (USA). For instance while the average index of openness of the

TABLE 2.1

Index of Openness of Nigerian Economy: 1970-1994

Year	1 GDP (₦m)	2 Exports (FOB) (₦m)	3 Imports (CIF) (₦m)	4 Total Trade (₦m)	5 Index of Openness (%)*
1970	5621	886	756	1642	29.2
1971	7098	1293	1079	2372	33.4
1972	7703	1412	988	2400	31.2
1973	11199	2278	1225	3503	31.3
1974	18811	5795	1737	7532	40.0
1975	21559	4988	3717	8705	40.4
1976	27297	6622	5133	11755	43.1
1977	32747	7882	7160	15042	45.9
1978	36084	6381	8132	14513	40.2
1979	43151	10398	6162	16560	38.4
1980	50849	14199	9096	23295	45.8
1981	50749	11034	12599	23633	46.6
1982	51950	9197	10100	19297	37.1
1983	57142	7752	6556	14308	25.0
1984	63608	9139	4485	13624	21.4
1985	72355	11721	5537	17258	23.9
1986	73062	9048	5975	15023	20.6
1987	108885	29578	15695	45273	41.6
1988	145230	31192	18088	49280	33.9
1989	224760	57971	30860	88831	39.5
1990	260637	109886	45718	155604	59.7
1991	324010	121534	89488	211022	65.1
1992	553160	205612	143151	348763	63.0
1993	821920	218801	165629	384430	46.8
1994	987110	206285	161027	367312	37.2

* Computed as the ratio (in percentage) of total trade (Column 4) to GDP (Column 1).

Sources: 1. Central Bank of Nigeria, Statistical Bulletin (Various Issues)

2. _____, Annual Report and Statement of Accounts (Various Issues).

Nigerian economy was 36.7 per cent between 1983 and 1991 (computed from Table 2.1), those of the United States of America, Congo and Cote d'Ivoire for the same period were 19.0, 100.6 and 69.0 per cent, respectively (see IMF, 1995:150-153). The relatively high degree of openness of the Nigerian economy is largely due to the tremendous growth in crude oil export over the years and the heavy reliance on imports such as machinery and transport equipment, manufactured goods, chemicals and processed food.

The Nigerian economy has undergone some fundamental structural changes since it attained political independence in 1960. Except the agricultural sector which suffered a major setback, virtually all other sectors of the economy witnessed rapid growth in the 1970s. This was due to substantial revenues realised from crude oil during the period, and the government intention to translate the oil revenues into investment in physical, social and economic infrastructures. The outcome of this was the tremendous increase in the contributions of other sectors of the economy to the country's GDP at 1984 constant factor cost, and the relative decline in the contribution of the agricultural sector from over 60 per cent in the early 1960s to about 20 to 30 per cent in the 1970s and 1980s, as shown in Table 2.2. Since 1991, the agricultural sector has been contributing about 38 per cent of the GDP, on the average, while the contribution of mining and quarrying has declined to about 13 per cent.

The Nigerian financial system, which comprises the regulatory authorities, banks and non-bank financial institutions, has undergone remarkable changes in terms of ownership structure, the depth and breadth of instruments employed, the number of institutions established

TABLE 2.2

Sectoral Distribution of Nigeria's GDP at 1984 Constant Factor Cost: 1970-1994

Year	Agriculture (%)	Mining & Quarrying* (%)	Manufacturing (%)	Others (%)
1970	44.56	11.99	7.49	35.96
1971	42.00	15.07	6.52	36.41
1972	36.99	16.79	7.56	38.66
1973	28.92	25.03	4.09	41.99
1974	28.61	29.40	3.54	38.45
1975	26.43	23.88	4.51	45.18
1976	23.46	26.40	5.49	44.65
1977	23.48	25.08	5.38	46.06
1978	22.98	23.53	8.44	45.05
1979	20.15	27.60	9.01	43.24
1980	20.06	23.57	10.40	45.97
1981	21.16	18.48	6.59	53.77
1982	25.04	16.73	5.66	52.57
1983	25.91	17.15	7.00	49.94
1984	26.72	19.62	5.82	47.84
1985	26.56	19.82	6.44	47.18
1986	32.85	14.27	7.98	44.90
1987	31.68	12.84	8.43	47.05
1988	31.94	12.65	8.66	46.75
1989	31.85	12.93	8.36	46.86
1990	31.60	13.81	8.52	46.07
1991	38.82	13.61	8.36	39.21
1992	37.84	13.76	8.42	39.98
1993	37.76	12.99	8.39	40.86
1994	37.70	13.30	8.36	40.64

* Includes crude petroleum

Sources: 1. Central Bank of Nigeria, Statistical Bulletin (Various Issues)
2. Federal Office of Statistics, Digest of Statistics, Various Issues (Lagos: Federal Office of Statistics).

and their branches, as well as the economic environment and the regulatory framework within which the system operates. The money and capital markets have grown rapidly in the past two decades. For instance, the number of commercial banks in Nigeria rose from 14 in 1970 to 65 in 1994, while their branches rose from 273 to 2,403 during the same period. Similarly, the number of merchant banks rose from one in 1970 to 51 in 1994, while their branches increased from zero to 144 during the same period (see Central Bank of Nigeria, 1994:36-53). In spite of these rapid growth and developments in the Nigeria's financial system, transactions in the informal financial sector are still very significant. The use of some financial instruments such as credit cards and travellers cheque is still limited domestically. The Nigerian currency is not yet a convertible or traded commodity internationally.

Following the downturn in the world oil market in 1981, Nigeria has been experiencing very severe economic crisis. Since 1982, when the crisis became very apparent, various concerted efforts have been made by successive governments to revive and put the economy on the path of sustainable growth. The boldest and most revolutionary step taken so far was the introduction of a two-year structural adjustment programme (SAP) in the mid 1986, in which the foreign exchange market was deregulated. Other complementary policies and institutional reforms were also introduced to accelerate the pace of economic transformation and to ameliorate the burden of economic adjustment on the poor and the vulnerable groups. The 1994 Federal budget, however, shifted policy focus from the market-based approach to a system of administrative controls in the management of the economy. This led to the fixing of exchange

and interest rates by government. The policy of administrative controls was later dropped in 1995 when government adopted a policy of guided deregulation which is still in operation.

The subsequent sections of this chapter are devoted to detailed review of Nigeria's economic background before, during, and after the Structural Adjustment Programme. The aim is to fully account for the major features and characteristics of the Nigerian economy so as to engender an appreciable understanding of the magnitude of economic problems currently confronting the country and the context under which this study was undertaken.

2.2 The Pre-SAP Economic Environment

Prior to the oil boom of the 1970s, agriculture was the mainstay of the Nigerian economy. In the 1960s, it provided the main engine of growth and accounted for over 60 per cent of the country's gross domestic product (GDP), 70 per cent of government revenue, and 90 per cent of export earnings. It also provided employment directly or indirectly for over 80 per cent of the country's labour force. In addition to providing substantial staple food crops like millet, sorghum, maize, rice, yam and cassava, the sector provided cash crops such as groundnut, cotton, rubber, cocoa, timber, palm oil and palm kernels for export. These crops then constituted the major sources of foreign exchange earnings and government revenue. At that time, manufacturing played an insignificant role in the economy - its contribution to the GDP was about 6 per cent. The balance of payments and external indebtedness did not constitute a burden to the economy due to substantial foreign exchange earnings from

agricultural exports (Ihimodu, 1991).

Nigeria joined the Organisation of Petroleum Exporting Countries (OPEC) in May, 1970, and benefitted tremendously from the quadrupling of crude oil price between 1973/74 and 1979/80. From 1974, crude oil started to account for over 90 per cent of export earnings, and about 70 per cent of government revenue as shown in Tables 2.3 and 2.4 respectively. Consequently, the economy became heavily dependent on one product, namely crude oil. This resulted in a relative decline in the contribution of agriculture to the gross domestic product (GDP) and a relative increase in the contribution of the mining sector as mentioned earlier.

With the substantial crude oil revenues, which were treated as permanent rather than transitory income (Ajayi, 1986), the Nigerian public sector began to expand its participation in direct economic activity in almost every sector of the economy. The period thus witnessed rapid expansion of parastatals in agriculture, commerce, finance, banking, manufacturing and other sectors of the economy. By 1980, Nigeria was said to have had about 70 non-commercial and 110 commercial federal parastatals, many of which could not cover their operating expenses and had to depend on financial support from the government. By the beginning of the 1980s, the public sector started to account for over 50 per cent of the GDP and two thirds of modern sector employment (See Federal Republic of Nigeria, 1986). The import-substitution industrialization strategy adopted during the period led to the establishment of many capital-intensive and

TABLE 2.3

Sectoral Distribution of Nigeria's Merchandise Exports: 1970-1994

Year	1 Total Exports (₦m)	2 Oil Exports (₦m)	3 Non Oil Exports (₦m)	4 (2) as % of 1	5 (3) as % of (1)
1970	891.4	517.2	374.2	58.0	42.0
1971	1344.4	980.4	364.0	72.9	27.1
1972	1437.1	1186.4	250.7	82.6	17.4
1973	2369.5	2006.0	363.5	84.7	15.3
1974	6100.7	5670.7	435.0	93.0	7.1
1975	5116.1	4766.3	349.8	93.2	6.8
1976	6343.4	5917.8	425.6	93.3	6.7
1977	7976.6	7453.6	523.0	93.4	6.6
1978	6632.6	6004.9	627.7	90.5	9.5
1979	10106.8	9436.8	670.0	93.4	6.6
1980	14186.0	13632.3	553.7	96.1	3.9
1981	11023.3	10680.5	342.8	96.9	3.1
1982	8206.4	8003.2	203.2	97.5	2.5
1983	7502.5	7201.2	301.3	96.0	4.0
1984	9088.0	8840.6	247.4	97.3	2.7
1985	11720.8	11223.6	497.2	95.8	4.2
1986	8920.5	8368.4	552.1	93.8	6.2
1987	30360.6	28208.6	2152.0	92.9	7.1
1988	31192.8	28435.4	2757.4	91.2	8.8
1989	57971.2	55016.8	2954.4	94.9	5.1
1990	109886.1	106626.5	3259.6	97.0	3.0
1991	121533.7	116856.5	4677.2	96.2	3.8
1992	205613.1	201384.8	4228.3	97.9	2.1
1993	218765.2	213778.8	4986.4	97.7	2.3
1994	206285.1	200936.1	5349.0	97.4	2.6

Sources:

1. Central Bank of Nigeria, Statistical Bulletin, Vol. 5, No. 1, (June, 1994)

2. Central Bank of Nigeria, Annual Report and Statement of Accounts, (December, 1994).

TABLE 2.4

Sectoral Distribution of Federally Collected Revenue: 1970-1994

Year	1 Total Revenue (₦m)	2 Oil Revenue (₦m)	3 Non Oil Revenue (₦m)	4 (2) as % of (1)	5 (3) as % of (1)
1970	634.0	166.6	467.4	26.3	73.7
1971	1168.8	510.1	658.7	43.6	56.4
1972	1405.1	764.3	640.8	54.4	45.6
1973	1695.3	1016.0	679.3	59.9	40.1
1974	4537.1	3724.0	813.4	82.1	17.9
1975	5514.6	4271.5	1243.1	77.5	22.5
1976	6765.8	5365.2	1400.7	79.3	20.7
1977	8042.4	6080.6	1961.8	75.6	24.4
1978	7371.0	4555.8	2815.2	61.8	38.2
1979	10912.4	8880.8	2031.6	81.4	18.6
1980	15234.0	12353.8	2880.2	81.1	18.9
1981	12180.2	8564.4	3615.8	70.3	29.7
1982	11764.4	7814.9	3949.5	66.4	33.6
1983	10508.7	7253.0	3255.7	69.0	31.0
1984	11191.2	8269.2	2922.0	73.9	26.1
1985	14689.1	10923.7	3765.4	74.4	25.6
1986	12302.0	8107.3	4194.7	65.9	34.1
1987	25099.8	19027.0	6072.8	75.8	24.2
1988	27595.0	19831.7	7763.3	71.9	28.1
1989	47798.3	39130.5	8667.8	81.9	18.1
1990	69788.2	55215.9	13362.2	79.1	20.9
1991	78640.7	60315.5	18325.2	76.7	23.3
1992	138617.0	115391.7	23225.3	83.2	16.8
1993	192769.4	162102.4	30667.0	84.0	15.9
1994	201910.8	160192.4	41718.4	79.3	20.7

Sources: 1. Central Bank of Nigeria, Statistical Bulletin (Various Issues)

2. Central Bank of Nigeria, Annual Report and Statement of Accounts, (December, 1994).

assembly-type industries, most of which were largely foreign-oriented in terms of inputs and technology. Most of the industries were hurriedly conceived and poorly appraised, and adequate consideration was not given either to their economic viability and technical feasibility or to the executive capacity of government agencies that would implement them. The period also witnessed rapid increases in workers' salaries and wages, and creation of new States. There was also rapid expansion in imports of all kinds. For instance, as earlier shown in Table 2.1, total imports rose from ₦756 million in 1970 to ₦3,717 million in 1975 and further to ₦12,599 million in 1981. Thus, there was an increase of about 1,567 per cent in imports between 1970 and 1981. The ratio of imports to the GDP also rose from 13.4 per cent in 1970 to 24.8 per cent in 1981. Several distortions such as the naira overvaluation, as we will observe later, also manifested in the economy during the period.

From the foregoing, it then became apparent that whatever happened in the external sector, particularly in the oil sub-sector, would have noticeable effects on the economy. It was, therefore, not surprising that the decline in the price of crude oil from about US $40.00 per barrel in 1980 to about $10.00 per barrel in 1981, coupled with the drastic reduction in the total crude oil production from 753.5 million barrels in 1980 to 523.6 million barrels in 1981 (as shown in Table 2.5), could have adverse effects on the economy.

TABLE 2.5

Output of Agriculture and Crude Oil: 1970 - 1994

Year	Agriculture* (Million tonnes)	Crude Petroleum (Million barrels)	Crude Oil Export (Million barrels)
1970	30.8	395.8	383.5
1971	26.4	568.9	542.5
1972	19.2	665.3	650.6
1973	22.0	750.4	695.6
1974	26.0	823.3	795.7
1975	22.0	651.3	627.6
1976	18.9	757.6	736.8
1977	17.8	765.7	715.2
1978	18.0	698.0	674.1
1979	15.1	841.6	807.7
1980	15.4	753.5	625.3
1981	15.7	523.6	469.1
1982	16.4	470.7	401.7
1983	14.2	451.0	392.0
1984	29.6	508.0	450.6
1985	31.6	547.1	486.6
1986	32.5	534.2	486.6
1987	37.1	483.3	390.5
1988	47.0	529.6	435.8
1989	52.8	625.9	522.5
1990	56.0	660.6	548.2
1991	60.9	689.9	585.8
1992	65.8	711.3	604.3
1993	71.2	691.4	563.6
1994	73.6	696.8	578.0

* Comprises only major staple food crops

Sources: 1. Central Bank of Nigeria, Nigeria's Principal Economic and Financial Indicators, 1970 - 1985

2. Central Bank of Nigeria, Statistical Bulletin (Various Issues).

2.3 Emergence of Economic Crisis

As expected, the collapse of world oil market in 1981 led to severe foreign exchange constraint, thereby bringing most economic activities in Nigeria to a halt. The drastic decline in foreign exchange earnings from crude oil made it very difficult to import most of the industrial inputs and spare parts needed for the operation of the assembly-type manufacturing that was developed during the oil boom era. This resulted in closure of many factories. Most of the industries that managed to stay in business operated below 30 per cent of their installed capacity. The low capacity utilisation resulted in a serious decline in output of the industrial/manufacturing sector of the economy. As shown in Table 2.6, the index of industrial production and the manufacturing sub-sector recorded substantial decline between 1983 and 1986. Even at the low level of production, most industries found it difficult to secure a market for their products as product prices rose rapidly owing to tremendous increase in the cost of procuring foreign inputs and spare parts, while households incomes remained constant or reduced substantially. Similarly, the index of agricultural production at the 1985 base year declined from 120.5 per cent in 1970 to 91.00 per cent in 1981 and further to 89.8 per cent in 1983.

In the public sector, the completion of most projects, even those considered to be viable, was delayed due to cut-backs in public expenditure. This escalated the costs of these projects and, in most cases, led to the abandonment of the projects, thereby depriving the economy of their expected benefits.

TABLE 2.6

Indices of Agricultural, Manufacturing and Industrial Production: 1970-1994

Year	Agriculture* (Base Year: 1985 = 100)	Manufacturing (Base Year: 1985 = 100)	Industrial Production (Base Year: 1985=100)
1970	120.5	24.1	41.3
1971	109.2	27.3	54.8
1972	89.9	29.7	62.3
1973	97.7	36.7	72.4
1974	113.5	35.5	76.2
1975	99.7	43.9	71.8
1976	93.3	54.1	85.5
1977	92.4	57.5	88.6
1978	89.4	65.8	90.4
1979	88.3	97.3	120.3
1980	88.4	102.4	119.0
1981	91.0	117.3	115.6
1982	94.0	128.6	122.9
1983	89.8	94.8	96.4
1984	95.6	83.4	91.6
1985	100.0	100.0	100.0
1986	103.5	78.2	103.5
1987	111.0	130.8	122.1
1988	132.4	135.2	108.8
1989	146.3	154.3	125.0
1990	160.1	162.9	130.6
1991	171.0	178.1	138.8
1992	180.3	169.5	136.2
1993	188.6	145.5	129.8
1994	196.3	132.8	122.8

* Figures were normalised from 1984 base year to 1985 base year.

Sources: Central Bank of Nigeria, Statistical Bulletin (Various Issues).

Central Bank of Nigeria, Annual Report and Statement of Accounts, (December, 1994).

A critical look at other major economic indicators in Table 2.7 reveals that a deep economic crisis had erupted in Nigeria by the early 1980s. For instance, the inflation rate, measured in terms of percentage change in the consumer price index (CPI), escalated from 10.0 per cent in 1980 to 21.8, 23.2 and 39.6 per cent in 1981, 1983 and 1984, respectively. The factors responsible for the high inflationary pressures include low domestic output in both the agricultural and industrial sectors, and the great difficulty of bringing in foreign inputs and spare parts due to foreign exchange constraint. The rate of change of real GDP was negative for the period, 1981-1984.

In order to continue the implementation of most of the public investment programmes initiated during the oil boom era, both the federal and state governments resorted to huge deficit financing. As in Table 2.7, the Federal Government budgetary deficit which was ₦0.8 billion in 1970 stood at ₦5.1 billion in 1985. The deficits were financed mainly through substantial public borrowing. By 1985, outstanding domestic debt had risen sharply from about N1 billion in 1970 to ₦28.0 billion. Similarly, outstanding external debt rose from ₦0.2 billion in 1970 to ₦14.0 billion in 1985. External debt service ratio rose steeply from 4.3 per cent in 1970 to a very high level of 33.3 per cent of export earnings in 1985.

As foreign debts piled up, Nigeria could not service or redeem those that fell due, most of which were short-term debts that were accumulated during the oil boom era and were supposed to be repaid or rescheduled between 1986 and 1988. Nigeria's foreign trading partners then began to have less confidence in the economy. They refused to agree on

TABLE 2.7

Some Major Economic Indicators of the Nigerian Economy: 1970-1994

S/N	Economic Indicator	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
1	Rate of change of Real GDP (%)	26.8	21.3	5.5	6.4	11.7	-3.0	11.1	8.2	-7.4	2.4	5.5	-26.8	-0.3	-5.4
2	External Debt Service Ratio (%)	4.3	2.9	2.7	5.7	1.6	2.7	3.4	0.8	0.8	1.4	4.2	4.6	16.2	23.8
3	Overall Budget Deficit (₦ Billion)	0.8	0.3	0.5	0.4	0.4	3.8	4.1	5.2	6.2	4.3	11.6	14.0	1.9	5.3
4	Fiscal Deficit/GDP Ratio (%) (absolute value)	14.7	3.9	6.4	3.6	2.0	18.1	15.3	16.6	18.0	10.3	23.3	27.7	3.6	9.3
5	International Reserves (₦ Billion)	0.1	0.1	0.2	0.2	3.1	3.4	3.1	2.5	1.3	3.0	5.5	2.4	1.0	0.8
6	Inflation Rate	13.8	16.0	3.5	5.4	12.7	33.9	24.3	13.9	21.7	11.7	10.0	20.8	7.7	23.2
7	Exchange Rate (₦:$)	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.7	0.7	0.6	0.5	0.6	0.7	0.8
8	Rate of Change of narrow money Supply (%)	43.9	4.2	11.5	24.0	89.7	48.3	48.3	43.8	-8.2	20.5	59.1	5.6	3.1	12.3
9	Domestic Public Debt Outstanding (₦ Billion)	1.0	1.1	1.0	1.1	1.3	1.7	2.6	4.6	6.0	7.3	7.9	11.4	14.8	22.2
10	External Public Debt (₦ Billion)	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	1.3	1.6	1.9	2.3	6.8	8.6

TABLE 2.7: CONTD.

S/N	Economic Indicator	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
1	Rate of change of Real GDP (%)	-5.1	9.3	3.1	-0.4	9.9	7.4	8.2	4.7	3.0	2.3	1.3
2	External Debt Service Ratio (%)	33.8	33.3	32.6	13.3	29	21.3	50	47.1	71.3	42.1	42.5
3	Overall Budget Deficit (₦ Billion)	4.7	5.1	8.8	5.9	12.2	15.1	22.1	35.8	39.5	107.2	70.8
4	Fiscal Deficit/GDP Ratio (%) (absolute value)	7.4	7.2	12.2	5.5	8.6	6.8	8.6	11.2	7.3	15.5	7.9
5	International Reserves (₦ Billion)	1.1	1.6	3.6	4.6	3.3	13.5	35.0	44.3	14.0	67.3	26.7
6	Inflation Rate	39.6	5.5	5.3	10.3	38.3	51.0	7.1	13.0	44.6	57.2	57.0
7	Exchange Rate (₦:$)	0.8	1.0	3.3	4.1	5.4	7.7	9.0	9.9	17.3	22.1	22.1
8	Rate of Change of narrow money Supply (%)	8.2	8.7	-1.2	13.7	41.9	21.5	44.9	32.6	52.8	54.6	47.9
9	Domestic Public Debt Outstanding (₦ Billion)	25.7	28.0	28.5	36.8	47.0	57.1	84.1	116.2	1619.0	261.1	341.8
10	External Public Debt (₦ Billion)	12.1	14.0	3.1	100.8	141.1	240.2	322.9	660.0	540.7	632.7	648.8

Sources: Central Bank of Nigeria, Nigeria's Principal Economic and Financial Indicators, 1970-1990 (Various Issues).

_____, Statistical Bulletin, Vol. 5, No. 2 (December, 1994).

_____, Annual Reports and Statement of Accounts (Various Issues).

rescheduling arrangement or to extend further credit lines to Nigerian importers. This made it difficult for Nigeria to pay for its accumulated import bills, or to import new industrial raw materials and spare parts.

There were also pressures on the balance of payments which led to rapid depletion of the country's foreign exchange reserves from ₦5.5 billion in 1980 to about ₦2.4 billion, ₦1.0 billion and ₦0.8 billion in 1981, 1982 and 1983, respectively as can be seen from Table 2.7. Though available records indicate that the overall balance of payments recorded some marginal surpluses between 1984 and 1985 due to some stringent import and exchange control measures imposed by the government, the pressures on the balance of payments persisted till 1986 as the government could not drastically reduce foreign exchange expenditure due to the adverse effects that such a measure could have had on both the production and consumption patterns of the nation which still depended heavily upon the foreign sector. The developments in Nigeria's balance of payments are discussed in greater details in the next chapter.

2.4 Introduction of Structural Adjustment Programme (SAP)

Although the symptoms of the structural disequilibrium in the Nigerian economy started to manifest as far back as 1978 when real GDP recorded a substantial negative growth rate of 7.4 per cent (see Table 2.7), the magnitude of the problem was not realised at the time. The government was reluctant to embark on a comprehensive structural adjustment programme due to the belief that the downturn in the crude oil market would be short-lived. Instead, several

fiscal, monetary and foreign exchange control measures were introduced by the Obasanjo regime, but these measures were relaxed in 1980 due to the rise in the price of crude oil in that year. In 1982, when the economy was seriously threatened by severe economic crisis, following the sharp decline in the output and price of crude oil, and the consequent loss of substantial foreign exchange earnings, the then civilian administration introduced the Economic Stabilization (Emergency) Act of April 1982 which was later amended in November 1982. Under the Economic Stabilization Act, some austerity measures aimed principally at conserving foreign exchange and reducing public expenditures were introduced. Both the basic travel allowance (BTA) and the number of pilgrims permitted to perform the Hajj were reduced. The importation of certain commodities were banned, tariffs on some other commodities were raised, while new tariffs were introduced for a number of others. In spite of these and other measures, the economic problems which the policy measures were meant to address continued to plague the nation. The economic situation was such that the Federal Government promulgated the National Economic Emergency Powers Decree of October, 1985. The policy measures under the Decree included the imposition of special levies on imports, factor incomes and the withdrawal of implicit petroleum subsidy by 80 per cent. More stringent fiscal and exchange control measures were added to the existing ones.

Although the various austerity measures helped to reduce fiscal and external imbalances, they created a severe economic recession. Consequently, they led to, among other things, extensive plant closure, substantial drop in capacity utilisation, severe output shortages, high

inflationary pressures and retrenchment of workers, all of which worsened the unemployment problem in the country (Afolabi, 1991; Oke, 1990). The continued shortage of foreign exchange and the numerous exchange control measures resulted in massive price distortions (including exchange rate overvaluation), corruption and inefficient allocation of scarce resources in the economy. This created the need to initiate and accelerate the process of structural adjustment. Moreover, the severe economic constraints, characterised by external payments problem and capital flight, among other things, led the government to seek financial assistance from the International Monetary Fund (IMF) and World Bank, and for debt relief from other international financial institutions. The policy conditionality of these Bretton Woods Institutions also became one of the chief contributory factors in the adoption of the structural adjustment programmes in Nigeria and other African countries (Killick, 1990:1). In Nigeria, the IMF loans and its conditionalities were rejected at a national debate. Rather, the Structural Adjustment Programme (SAP) which, as stated by Ekpo (1993), mirrored a typical IMF/World Bank-supported adjustment programme was adopted in the mid 1986 to cover an initial 2-year period (July 1986 - June 1988). However, its implementation took a period of about 7½ years (mid 1986 - 1993) and the management of the economy has continued to be based on the guiding principles of SAP, despite the current shift of focus from deregulation to guided deregulation.

SAP aimed, among other things, at altering and re-aligning aggregate domestic expenditure and production patterns so as to minimize dependence on imports, enhance the non-oil export base, and place the economy on the path of balanced and sustainable growth. It

emphasized the role of market forces in the allocation and utilization of scarce resources.

The specific objectives of SAP in Nigeria were (Federal Republic of Nigeria, 1986:8):

(i) to restructure and diversify the productive base of the economy in order to reduce dependence on the oil sector and on imports;

(ii) to achieve fiscal and balance of payments viability over the period;

(iii) to lay the basis for a sustainable, non-inflationary or minimal inflationary growth; and

(iv) to lessen the dominance of unproductive investments in the public sector, improve the sector's efficiency and intensify the growth potential of the private sector.

The major instruments for attaining these objectives included:

(i) strengthening of the existing demand-management policies;

(ii) adoption of measures to stimulate domestic production and broaden the supply base of the economy;

(iii) adoption of a realistic exchange rate policy through the establishment of Second-tier Foreign Exchange Market (SFEM);

(iv) rationalisation and restructuring of tariffs in order to aid the promotion of industrial diversification;

(v) improving trade and payments liberalisation;

(vi) reduction of complex administrative controls with greater reliance on market forces;

(vii) adoption of appropriate pricing policies, especially for petroleum products and public enterprises;

(viii) rationalisation of public sector enterprises through commercialisation and privatisation; and

(ix) adoption of concrete measures that would ease the debt burden as well as provide incentives that will attract a net inflow of foreign capital, while keeping a lid on external borrowing.

SAP was thus a policy package, consisting of monetary, fiscal, commercial, external debt and pricing as well as other sectoral policies (including exchange rate). The restrictive monetary and fiscal policies under SAP were geared toward stemming the inflationary trend and reducing pressures on government budget and the balance of payments.

One important focus of SAP was the achievement of a realistic and stable exchange rate of the naira. Such a realistic exchange rate is expected to assist in restoring internal and external balances by promoting agricultural production, encouraging local sourcing of raw materials and inflow of foreign capital, reducing aggregate imports, especially imports of finished goods, and diversifying the export base of the economy, particularly the non-oil exports. To attain this objective, government relied mainly on market forces during the adjustment period through the establishment of a public-auction (or market-based) system for the determination of exchange rate. A detailed analysis of exchange rate management in Nigeria is also carried out in the next chapter.

2.5 Impact of SAP/Policy Changes Since 1994

The impact of SAP on the economy was not entirely positive or negative. It produced a mixed bag of effects; some desirable, others undesirable. Some of the positive and negative effects that could be attributed to SAP are identified below.

On the positive side, the increased reliance on market forces for foreign exchange allocation reduced the bureaucratic bottlenecks and corruption observed during the import licensing and exchange control era. SAP also increased government revenue in naira due to monetization of foreign exchange earnings of the government at the Foreign Exchange Market (FEM) rate and the excess proceeds from the direct operations of the FEM. For instance, oil revenue increased from about ₦8,107.3 million at the inception of SAP in 1986 to ₦162,192.4 million at the end of SAP in 1993. This represents an increase of about twenty folds within a period of about 8 years (see Table 2.4). Similarly, the size of federally-collected revenue increased from ₦12,302.0 million in 1986 to ₦192,769.4 million in 1993, while the retained revenue of the Federal Government increased from ₦9,723.9 million to ₦70,124.2 million over the same period. This additional source of revenue from the naira value of foreign exchange earnings provided some relief to the government in the face of declining international price of oil. However, the substantial increase in government expenditure from about ₦16,774 to ₦177,310 million over the same period resulted in a phenomenal increase in the size of overall budget deficit from ₦8,804 million in 1986 to ₦107,186 million in 1993 (see Central Bank of Nigeria, 1994:115-116). The rapid depreciation of the naira during the SAP era also provided

signals to most manufacturers particularly those in the agro-based industries to start sourcing their raw materials locally. The negative growth rate of real GDP of the early 1980s was reversed during the SAP era, except in 1987 when a marginal negative growth rate of 0.4 per cent was recorded (see Table 2.7). This could be attributed to the slight recovery of the agricultural sector during the period as reflected by the increase of its output and share in the total GDP (see Tables 2.2 and 2.5).

On the negative side, the inflationary consequences of SAP were very disruptive. The rising prices of food, transportation and other essential commodities brought great economic hardships to the people. The massive depreciation of the naira and the removal of the implicit subsidies on petroleum products as well as the public sector rationalization exercise contributed very much in the rise of inflation and unemployment rates. Price instability, particularly that of interest and exchange rates, arising from the deregulation of the financial and foreign exchange markets tended to limit the effectiveness of SAP. The deregulation of interest and exchange rates encouraged speculation and trading more than production, as genuine investors were unable to obtain loanable funds for investments that could increase real output and generate employment (Ekpo, 1993). The persistence of other numerous economic problems such as rising inflation, growing unemployment, external debt overhang, poor performance of non-oil exports, deteriorating infrastructures and rapid exchange rate depreciation then became an issue of concern to the Abacha's government that came into power in 1993. Consequently, by 1994, the need for a change in policy direction in the system of economic management in Nigeria was

inevitable. The market-based system of economic management was de-emphasized. The government re-introduced the system of administrative controls and directed that all foreign exchange earned by both private and public sector exporters should be brought into the National Foreign Exchange Account. It abolished the concession formerly granted to private exporters and parastatals to keep their foreign exchange earnings outside the Central Bank of Nigeria. Another significant measure of regulation was the pegging of the naira exchange rate at N22.00 to one U.S. dollar. Interest rates were also pegged at lower levels to reduce production cost and to stem rapid increases in domestic prices. A Ministerial Foreign Exchange Allocation Committee was constituted to ensure that foreign exchange get to end-users and to permit more allocations to some selected sectors. The objectives of the administrative control system of economic management were not, however, realised. The economic conditions even worsened during the period of regulation. As events turn out, the 1994 budget did not succeed in reversing the increasing inflationary pressures and persistent weakening of the external sector, neither was it able to stimulate economic activities in the real sectors. The rate of inflation as at the end of the year was 57.0 per cent, while budget deficit was ₦70.8 billion. Though the official exchange rate was fixed at ₦22.00 to one U.S. dollar, the rate in the parallel market went up to about ₦105.0 to the dollar towards the end of 1994. The pressures on the balance of payments continued, resulting in the overall balance of payments deficit of about ₦42.6 billion.

These developments resulted in the persistence of macroeconomic instability. The poor performance of the economy in 1994 was attributed to two main factors, namely the continuation of undue fiscal expansion and prolonged political and labour unrest which substantially disrupted economic activities (Central Bank of Nigeria, 1994a:1). Guided by the 1994 experience, government reintroduced some of the deregulatory measures of SAP in 1995. For instance, government started to operate a policy of guided deregulation which permits the free operation of the inter-bank autonomous foreign exchange market, while the prevailing fixed official rate of ₦22.00 to $1.00 remains operational for eligible official transactions. Though the exchange rate of the naira seems to have stabilized at about ₦80 per US dollar at the autonomous foreign exchange market (AFEM) by the end of 1996, it would be pre-mature to effectively assess the adequacy of this current system of economic management at the moment.

Certainly, Nigeria could not be described as one of the success stories in the implementation of the IMF/World Bank-Supported adjustment programmes. In terms of the attainment of the main objectives of the adjustment programmes, which include achievement of sustained economic growth and poverty alleviation, little or no success has been achieved. In his analysis of the trends in the social standard of living of Nigerians prior to, and after the commencement of SAP, Balogun (1993:185) correctly states that the sharp decline in income per capita since its commencement now places Nigeria among the poor countries of the world, while it has also increased the vulnerability of her people to poverty.

Though one could not ascertain what the economic situation would have been without SAP, the poor performance of the adjustment programme in Nigeria could be attributed to a number of factors including the fragile state and narrow productive base of the economy before the adoption of SAP, macroeconomic policy inconsistency, political instability, and unfavourable international macroeconomic environment as manifested by the decline in the official development assistance (Ajayi, 1994). There is therefore the need for policy consistency, stable political and economic environment as well as greater commitment on the part of the Nigerian government and people to ensure the realisation of the objectives of the present economic reform programme in Nigeria. The assistance of the international community will also be required to minimise the adverse effects of the current external debt overhang and to reverse the current trend of capital flight in the country.

CHAPTER THREE

EXCHANGE RATE AND BALANCE OF PAYMENTS MANAGEMENT: SOME CONCEPTUAL AND POLICY ISSUES

3.1 Introduction

The management of exchange rates and balance of payments, as highlighted in chapter 2, is a major policy concern of Nigeria's economic reform programme. As observed by Onitiri (1992), the high degree of openness of the Nigerian economy makes the management of the balance of payments (and exchange rates) a matter of critical importance for many macroeconomic variables. In this chapter, we discuss the basic conceptual and policy issues in the management of exchange rates and the balance of payments.

3.2 Exchange Rate Theory and Policy

3.2.1 The Concept of Exchange Rate

The exchange rate is defined as the relative price of two assets: price of one country's currency in terms of another (Ajayi, 1986). It can be expressed in nominal or real terms.

3.2.1.1 Nominal Exchange Rate

The nominal exchange rate can be quoted in two ways: first, it can be quoted as the number of units of domestic currency that can be exchanged for one unit of a foreign currency. Alternatively, it can be quoted in terms of units of a foreign currency per unit of domestic currency. This second approach of quoting the nominal exchange rate is just the reciprocal or

simply the mirror image of the first one, hence no conceptual issues are involved (Helmers, 1988; Obadan, 1994). Thus, it does not make much difference which of the two approaches one adopts in quoting the nominal exchange rate as long as the measure is well defined and consistent. However, depending on what the analyst wants to emphasize, the first approach indicates immediately the extent to which the price level of international goods has risen/fallen relative to domestic prices, while the second approach tells us immediately the proportion by which the domestic currency has depreciated or appreciated (Obadan 1994:3). If the first approach is adopted in quoting the nominal exchange rate, higher values will indicate a depreciation of the domestic currency while lower values indicate exchange rate appreciation. On the other hand, if the second approach is adopted, higher values will represent an appreciation of the exchange rate while lower values represent depreciation. In general, depreciation (appreciation) of a currency occurs when more (less) units of that currency are required to obtain a unit of another currency.

3.2.1.2 Real Exchange Rate

When the nominal exchange rate is adjusted by differentials in prices at home and abroad, we have the real exchange rate. While the nominal exchange rate is a monetary concept that measures the relative price of two currencies, the real exchange rate attempts to measure the rate at which goods and services (as opposed to currencies) are exchanged between domestic economy and the outside world (Edwards, 1988:3). The real exchange rate measures both the changes in nominal exchange rate and changes in relative inflation rates (Obadan, 1994). It is

believed that if a country has a higher inflation rate than its trading partners, its industry will also tend to have higher costs in terms of its local currency.

In a two-country model (Nigeria and the United States of America, for example), the real exchange rate can be expressed as:

$$RER = \frac{E_N\$/P_D}{\$1/P_{us}}$$

$$= \frac{E_N\$(P_{us})}{P_D} \equiv \frac{\text{Price of Tradables}}{\text{Price of Non-tradables}} \quad \ldots\ldots(3.1)$$

where,

RER = real exchange rate

$E_N\$$ = nominal exchange rate defined in terms of units of naira (₦) per unit of US dollar ($)

P_D = price deflator for the domestic currency (naira)

P_{us} = price deflator for foreign currency (US dollar)

As stated by Helmers (1988) and Obadan (1994), equation (3.1) shows that the RER can be defined as the ratio of price of tradables to price of non-tradables, considering that $E_N\$(P_{us})$ is the price of imports and exports (tradables) and that domestic price deflator (P_D) can be considered as a proxy for the price of domestic goods (non-tradables).

Using the alternative expression where the nominal exchange rate is quoted in terms of units of foreign currency (US dollars) to one unit of domestic currency (naira), we have:

$$RER = \frac{E_{\$/₦}\,(P_D)}{P_{us}} \qquad \ldots\ldots (3.2)$$

where,

$E_{\$/₦}$ = nominal exchange rate expressed as units of US dollar ($) per naira (₦), while other terms remain as previously defined.

3.2.1.3 Effective Exchange Rate (EER) Indices

The nominal and real exchange rates described above are regarded as bilateral exchange rates since they involve only two countries. In reality, a country does not trade with only one country, but with several countries. Thus, bilateral nominal and real exchange rates have limited applications since they assume only a two-country model. Effective exchange rate indices expressed in either nominal or real terms have been devised to take into account trade between the reporting country and several other countries. They are devised to measure for each country the average change of the reporting country's currency against all other currencies (Obadan, 1995a:33).

(i) Methodological Problems in the Construction of EER Indices

One major problem usually encountered in the calculation of effective exchange rate indices, apart from the massive data required, is the choice of appropriate base period, relevant price indices, trade partners, weights and averaging formula. As highlighted below, data availability and the purpose of the analyst usually determine the choice among the various alternatives.

Base Period:

The choice of a base period presumes that one already knows how to recognise whether an actual rate deviates from equilibrium and that a situation can be identified in which the difference between actual rate and the equilibrium rate is small.

Weights:

The real effective exchange rate is supposed to take into account the following:

- trade and payments structure;
- price elasticities of different products;
- competitiveness of a country's exports in foreign markets;
- pattern of bilateral trade;
- effects of capital flows; and
- price effects generated by changes in exchange rates.

According to Ajayi (1986), the IMF Multilateral Exchange Rate Model (MERM) that takes into account most of these items in the calculation of effective exchange rate is available only for industrialised countries. Other simpler indices in the literature that can be used in the developing countries include:

- the export-weighted index;
- the import-weighted index; and
- the total trade-weighted index.

These weights can be used in different combinations. For instance, one can choose a given base period as the reference point - say trade weights in 1980. An alternative method is to vary the weights for each year, while another alternative is to calculate the average weight based on a number of years.

Price Deflators:

The decision on the price index to use in deflating nominal exchange rates is not an easy task, as noted by Ajayi (1986). The various possible alternatives as stated by Edwards (1988), Ajayi (1986) and Bartolini (1995) include:

- Consumer Price Index (CPI);
- Wholesale Price Index (WPI);
- Gross Domestic Product Deflator (GDP Deflator); and
- Wage Rate Index (WARI).

Each of these alternatives has its merits and demerits.

For empirical and policy discussions, the CPI is the most commonly used (Edwards, 1988:53) partly because it provides an accurate measure of changes in competitiveness as it includes a broad groups of goods. Moreover, CPI is available on a more timely basis and with greater frequency in almost all the countries. The major argument against the use of CPI is that it includes a large number of non-tradable goods and, therefore, introduces a bias measure of the changes in the degree of competitiveness of the traded-goods sector. The CPI is also said to reflect, among other things, taxes and other institutional distortions as well as prices of

imported goods, thus making the associated measures of competitiveness less indicative of the prices faced by producers (see Bartolini 1995:48). In real sense, only tradables should be included to deflate the nominal exchange rate for policy purposes (Ajayi 1986). The CPI figures could also be subject to distortion in a regime of price controls, if such indices contain price-controlled goods that are heavily weighted.

The wholesale price index (WPI) should have been a good alternative to the CPI in this respect as it covers mainly tradable goods. However, the use of the WPI is criticised on the ground that the index contains highly homogeneous tradable goods whose prices, when expressed in common currency, are equated across countries such that the real exchange rate utilising WPI will vary slightly and, therefore, not be able to measure the degree of competitiveness. Apart from this criticism, the WPI figures are not available in most developing countries. In fact, the WPI and value-added deflators have been criticised on the grounds that they "tend to be very imprecise, lack cross-country comparability, and are typically available only for manufacturing sector, often with a substantial delay" (Bartolini, 1995:48).

The GDP deflator - a price index of the level of aggregate production for an economy - is a good measure of competitiveness in production as it is not subject to price control (Ajayi, 1986). However, for many developing countries, the GDP deflator is available only on a yearly basis and with considerable lags. Moreover, the GDP deflator contains a large number of non-tradables. It also fails to pick up the exact inflationary rate in most developing countries. Thus, there is a wide discrepancy between inflation as measured by the CPI and inflation as measured

by the GDP deflator. This may, therefore, lead to loss of competitiveness that is supposed to be measured. Apart from a number of arguments against the use of wage rate index, data limitations also make it difficult to use this index in the developing countries.

There is one major problem in the utilisation of only one of the four indices. It has been argued (Ajayi, 1986), that if any of the indices is used to deflate both the foreign currency and domestic currency, the price relation between non-tradables and tradables may not be clearly measured. It is, therefore, suggested that the foreign countries' WPI be used to deflate foreign currency, while the domestic country's CPI be used to deflate domestic currency. The argument is based on the fact that foreign WPI, particularly that of the United States, contains mainly tradable goods, and CPI mainly non-tradables. According to Harberger (1988), the WPI is a good proxy for world prices, while the domestic CPI can be used to deflate the domestic currency as it measures the overall loss of purchasing power of the domestic currency. A more appropriate deflator for foreign countries' currencies would have involved the construction of a weighted average of the wholesale price index of several major foreign countries expressed in terms of the dollar (Helmers, 1988). However, such an index is not published regularly. This has led to the utilisation of domestic CPI to deflate domestic currency and foreign CPI to deflate foreign currency.

Averaging Formula:

There are three main averaging formula commonly used - the arithmetical mean, the geometrical mean and the harmonic mean, with each having its merits and demerits. The

geometric mean is, however, usually favoured because it treats appreciating or depreciating values in a symmetrical manner and is not affected by extreme values. Several other advantages of geometric average over other averaging methods can be found in Mordi and Audu (1991: 192-193). These include the fact that the reciprocal of a geometrically averaged index derived from reciprocal currency values equals the original index.

(ii) Kinds of Effective Exchange Rate Indices

There are two types of effective exchange rate indices - the nominal effective exchange rate index and the real effective exchange rate index.

(a) Nominal Effective Exchange Rate

The nominal effective exchange rate can be defined as a weighted (geometric or arithmetic) average of the nominal exchange rates with the reporting country's trading partners. According to Obadan (1994), it is an index which shows the changing nominal value of a specific fixed basket of currencies over time, deriving from nominal exchange rate movements. Using the arithmetic averaging formulae, this can be calculated simply as:

$$NEER = 100\sum_{i=1}^{n} wi\left(\frac{E_{it}}{E_{io}}\right) \qquad \ldots\ldots (3.3)$$

while by geometric expression, it is estimated as:

$$NEER = 100\prod_{i=1}^{n}\left(\frac{E_{it}}{E_{io}}\right)^{wi}$$

$$= 100 \exp \sum_{i=1}^{n} wi \log\left(\frac{E_{it}}{E_{io}}\right) \quad \ldots\ldots (3.4)$$

where,

NEER = nominal effective exchange rate;

E_{it} = price of domestic currency in terms of the currency of the ith trading partner at time t;

E_{i0} = price of domestic currency in terms of the currency of the ith trading partner at the base period;

n = number of major partner countries included in the estimation of the index;

w_i = weight assigned to the ith trading partner of the reporting country;

Σ = summation over all i;

π = product over all i; and

exp. = take the anti-log of .

(b) Real Effective Exchange Rate

The real effective exchange rate is considered to be the most appropriate measure of exchange rate for both analytical and policy purposes. It is supposed to capture the degree of competitiveness of domestically produced goods and services relative to the goods and services produced in the rest of the world. It incorporates both the notions of nominal effective exchange rate and the differences in inflation rates between the reporting country and its major trading partners. However, controversy exists over its definition and interpretation. It has been

defined in several ways by several authors. The most popular definition is that which views the real effective exchange rate as:

> the ratio of a broadly based index of the foreign price expressed in domestic currency units (through multiplication by the exchange rate) to a similar index of the domestic price level (Ajayi, 1986).

When the exchange rate is expressed in terms of units of foreign currency per unit of domestic currency, the real effective exchange rate can be computed arithmetically as:

$$REER = 100\sum_{i=1}^{n} wi\left(\frac{E_{it}}{E_{io}} \cdot \frac{P_D}{P_f}\right) \qquad \ldots\ldots (3.5)$$

or geometrically as:

$$REER = 100\prod_{i=1}^{n}\left(\frac{E_{it}}{E_{io}} \cdot \frac{P_D}{P_f}\right)^{wi} \qquad \ldots\ldots (3.6)$$

where,

REER = real effective exchange rate;

P_D = price deflator for the domestic currency relative to the base period; and

P_f = price deflator for major trading partners of the country under study relative to the base period; while other notations remain as previously defined.

3.2.2 Exchange Rate Systems

There is a wide spectrum of exchange rate systems, ranging from more or less permanently fixed to freely floating exchange rates. However, one can distinguish between

the following kinds of exchange rate arrangements.

- Fixed Exchange Rates
  - Adjustable peg
- Floating Exchange Rates
  - Clean Floating
  - Dirty Floating
- Intermediate Regime
  - Crawling Peg (Rule-based or Discretionary).

3.2.2.1 Fixed Exchange Rate

A system of fixed exchange rates was introduced after the Second World War to address the exchange rate chaos that arose from the collapse of the Gold Standard in the 1930s. The system, known as the "Bretton-Woods" system, following the outcome of an International Financial Conference held at Bretton Woods, New Hampshire, U.S.A., in 1944 survived for almost 30 years under the auspices of the IMF.

This system of fixed exchange rate is popularly known as an adjustable peg. The system represents a case in which:

> ...exchange rates are permitted to fluctuate within narrow band centered around par values, both of which are fixed but not immutable (Kane, 1988).

The Bretton Woods System did permit an adjustment in par values but only in response to fundamental disequilibria in the balance of payments. It precluded the use of exchange rate realignments as a means of correcting temporary balance of payments disequilibria.

A policy of fixed exchange rate implies maintenance of exchange rate through official intervention, within narrow, clearly defined bands. In fact, under an adjustable peg system, a country undertakes an obligation to defend the peg, but reserves the right to alter the exchange rate to correct a fundamental balance of payments disequilibrium. The key factor under a fixed exchange rate system is that a country's currency is tied or pegged to a foreign currency or other internationally agreed units of account. There may be a single-currency or multi-currency peg; with each having its advantages and disadvantages. Between the end of the Second World War and 1973, most countries had their exchange rates fixed against the US dollar.

The major argument in favour of a fixed exchange rate system is that it provides a measure of exchange rate stability and, thus, reduces uncertainty and price instability. The main case against it is that its inherent inflexibility may prevent economies from responding rapidly to changing economic conditions. The inflexibility of fixed exchange rates may exacerbate economic distortions arising from structural changes in the economy (Kane, 1988).

3.2.2.2 Floating Exchange Rate

This implies that the exchange rate is allowed to fluctuate, depending on the demand for and supply of foreign currencies. Two main versions of floating exchange rate system can be

distinguished, based on the degree of government intervention in the foreign exchange market. Firstly, there is clean floating where government does not intervene in the foreign exchange market. Under this system, the exchange rate is solely market-determined. In practice, this system is rarely adopted as government usually intervenes in the foreign exchange market to achieve some exchange rate targets. Secondly, there is dirty or managed floating, where government's intervention takes place in the foreign exchange market.

Several arrangements exist for exchange rate floating. The choices are usually between an Interbank Market System and the Auction System. In the Interbank Market System, exchange rate is negotiated in a market of commercial banks and specialised foreign exchange dealers and their clients. Though the exchange rate is allowed to fluctuate at any time, maximum and minimum limits are usually imposed by the monetary authorities on the commercial banks and other approved dealers, in order to prevent individual agents from cornering all the foreign exchange, and from speculating or exposing themselves to excessive exchange risk. The Central Banks or Monetary Authorities can intervene through buying, selling or rate-fixing during market fixing sessions to promote stability.

3.2.2.3 Intermediate Regime (The Crawling Peg)

The crawling-peg or gliding parity exchange rate system is middle course between fixed and floating exchange rates. Under the crawling peg regime, a country is obligated to defend the peg by either committing itself to moving the peg in small steps in accordance with a pre-

announced rule (the rule-based crawling peg) or reserving the right to change the peg in steps which are small but discretionary in size and timing (the discretionary crawling peg).

The crawling peg, like the adjustable peg, involves a choice between pegging to a single currency and pegging to a multi-currency composite. It combines the advantages of both flexibility needed to accommodate different trends in inflation rates between countries and relative certainty (stability) about future exchange rates relevant to exporters and importers. The general case against crawling peg is that the system might merely succeed in combining the disadvantages of fixed and floating exchange rates with a few, if any, of the advantages. This may be the reason why only few countries tend to adopt the system.

3.2.3 Models of Equilibrium Exchange Rate Determination

The sustained departure of the actual exchange rate from its equilibrium value is known as exchange rate misalignment. This has created serious macroeconomic imbalances and price distortions in most of the developing countries. There are two forms of exchange rate misalignment, namely, undervaluation and overvaluation. The undervaluation of exchange rate creates problems for monetary control and inflation, while overvaluation, particularly that of real exchange rate, is a recurring policy problem for many developing countries. Real exchange rate overvaluation has had undesirable effects on net exports and economic growth in most of the developing countries. According to Olaloku (1990), it distorts domestic resource allocation by depressing export production and stimulating imports, all of which usually result in widening the

balance of payments deficit. Many countries, therefore, worry more about overvaluation than undervaluation, albeit sustained undervaluation as noted above can equally be deleterious and inimical to growth and development.

It is usually difficult to measure precisely the extent of overvaluation or undervaluation of a country's currency, as one has to, in the first instance, determine the equilibrium exchange rate. As observed by Montiel and Ostry (1994: 56):

> Information about the extent of misalignment requires knowledge of the level of the equilibrium real exchange rate, which depends both on structural factors (including trade and industrial policies, the degree of capital mobility, and the terms of trade) and on macroeconomic factors, such as the level and compositions of government spending and the international macroeconomic environment.

In a world where these fundamental structural factors are constantly changing, the determination of equilibrium real exchange rate becomes a difficult task. Nevertheless, various approaches have been adopted over time in determining the equilibrium exchange rate. The most common approaches are the traditional flow model, the purchasing power parity, and the monetary approach.

3.2.3.1 The Traditional Flow Model

This model posits that the equilibrium exchange rate is determined simply by the flows in the demand for and supply of foreign exchange. In this flow model, the exchange rate is in equilibrium when supply equals demand for foreign exchange (Olisadebe, 1991: 56). The

exchange rates adjust to balance the demand by the domestic residents for foreign money with the supply of foreign exchange. The demand for foreign exchange depends on the demand by domestic residents for foreign goods and assets, while the supply of foreign exchange depends on foreign residents' demand for domestic goods and assets.

On the assumption that the foreign demand for domestic goods is determined primarily by foreign income, and the domestic demand for foreign goods is determined essentially by domestic income, relative income plays a major role in determining exchange rate under the flow model. Since asset demands are seen to depend on the difference between domestic and foreign interest rates, interest rate differential is another major determinant of the exchange rate in this framework. Thus, under the flow model, the exchange rate is simply assumed to be a function of relative income and interest rate differentials.

The model assumes a positive relationship between the spot exchange rate (defined in terms of units of domestic currency per unit of foreign currency) and relative income, and a negative relationship between the spot exchange rate and relative interest rate. In other words, under the flow model an increase in relative income depreciates exchange rate, while an increase in interest rate differential appreciates exchange rate. The assumptions of the flow model, which are basically Keynesian, are in conflict with those of the monetary approach, as could be observed when we discuss the monetary approach.

3.2.3.2 The Purchasing Power Parity Doctrine

The Purchasing Power Parity (PPP) doctrine is one of the earliest and perhaps most popular theory of exchange rate determination. It posits that the exchange rate between two currencies would be equal to the relative national price levels.

There are two versions of the PPP doctrine - the absolute PPP and the relative PPP. In its absolute version, the PPP doctrine equates the equilibrium exchange rate to the ratio of domestic to foreign price levels (Lyons, 1992):

$$E = \frac{P}{P^f} \quad \ldots\ldots (3.7)$$

where,

E is the nominal exchange rate, defined in terms of units of domestic currency per unit of foreign currency

P is the domestic price level and

P^f is the foreign price level.

With perfect efficiency and absence of trade imbalances, Central Bank intervention, transaction cost and other impediments to trade, the PPP doctrine would be tantamount to the application of the law of one price if all the countries produced exactly the same tradable goods.

The relative version of PPP theory relates the percentage change in the equilibrium exchange rate from a given base period to the difference between the percentage change in domestic and foreign price levels:

$$\dot{E} = \dot{P} - \dot{P}^f \quad \ldots\ldots (3.8)$$

where the dot over a variable indicates a percentage change in that variable. Thus, the relative version of PPP posits that the equilibrium exchange rate must change to offset differential inflation between two countries so as to leave the real exchange rate unchanged (Williamson, 1994:2).

The real exchange rate is then defined as the product of the exchange rate and the ratio of the countries' price indices (Officer, 1976). By definition, we have the real exchange rate as:

$$RER = \frac{EP^f}{P} \quad \ldots\ldots (3.9)$$

where RER is the real exchange rate, while other terms remain as previously defined. When absolute PPP holds, equilibrium RER = 1. The more relaxed relative version of PPP permits the equilibrium RER to be some constant scalar, Θ (see Breuer, 1994: 245-6).

The PPP theory defines two equilibrium exchange rates. First, is the short-run equilibrium exchange rate that would exist under a pure freely floating exchange rate system. Second, is the long-run equilibrium exchange rate which is described as:

> the fixed exchange rate that would yield balance of payments equilibrium over a time period incorporating any cyclical fluctuations in the balance of payments, including those related to business cycles at home and abroad (Officer, 1976:2).

Whether absolute or relative, the central tenet of all PPP theories is a tendency for short-run equilibrium exchange rate to approach the PPP. The proponents of the PPP theory claim that with the PPP method, the value of a currency could be determined and any deviation of

exchange rate from that value could be directly attributed to the slow process of arbitrage in the goods markets. The opponents of the PPP theory, however, argue that:

> since in general, prices and exchange rates are endogenous variables that are simultaneously determined, a discussion of the link between them provides little insights into the analysis of the determinants of the exchange rate (Frenkel, 1978:4).

The PPP doctrine has continued to be a subject of empirical and theoretical analysis for several decades now while the results have continued to be mixed. This is due to varying price indices and techniques used by various scholars in the empirical analysis. A recent survey of the evidence on PPP can be found in Breuer (1994).

3.2.3.3 The Monetary Approach

Another major development in the theory of exchange rate determination, which has been attracting the attention of researchers and policy makers, is the view that the exchange rate, being the relative price of two assets (national currencies), is determined primarily by the relative supply of and demand for these currencies, and that the equilibrium exchange rate is attained when the existing stocks of the two currencies are willingly held (Frenkel, 1978). It is, therefore, argued that a theory of exchange rate determination should be stated conveniently in terms of the supply of and demand for these currencies. In this model, exchange rates adjust to allocate the total stock of foreign exchange in question in the asset market.

This new theory of exchange rate determination, according to Hoffman and Schlagenhauf (1985), can be presented in either the form of the monetary approach or the asset-market approach to exchange rate determination. These approaches emphasize the role of money and other assets in determining the exchange rate when it is flexible. The asset-market or monetary approach attributes variation in exchange rate essentially to income and expected rates of return as well as to other factors that influence the supply of and demand for the various national currencies. Given the relative supply of currencies, and the fact that the demand for money could be stated as a function of the level of real income and the interest rate, the monetary approach postulates that the exchange rate is determined primarily by three key factors, namely relative money supply, relative real income and the interest rate differential.

The basic features of the monetary approach which can be found in the works of Bilson (1978), Dornbusch (1976) and others are discussed in the next chapter, while a survey of theories of exchange rate determination can also be seen in MacDonald and Taylor (1992).

3.3 Approaches to Managing the Balance of Payments

The balance of payments consists of three main accounts - the current account, the capital account and the official settlement or reserve account. Details about these accounts can be found in Institute of Cost and Management Accountant (1985), Ellsworth and Leith (1975), and Donnelly (1987). The desire of any nation is usually to keep its balance of payments in equilibrium, though what constitutes a balance of payments equilibrium has been an issue of unending debate. The IMF approach, which is also adopted by member countries including

Nigeria, indicates that "equilibrium" in the balance of payments is defined as a zero reserve money without restriction on external transactions (Ujiie, 1978).

Under the classical assumption of wage and price flexibility with full employment, the balance of payments was not viewed as a policy problem for governments. Hume's work on the balance-of-payments theory and his analysis of the price-specie-flow mechanism viewed international adjustment as an automatic mechanism brought about by money flows and consequential changes in national money price levels. The notion of automatic adjustment was retained up to 1930. However, the balance of payments theory was elaborated during this period to take into account the existence of credit money provided by the banking system and backed with international reserves and the possibility of attracting short-term capital through international interest-rate differentials. From 1930s following the collapse of the Gold Standard of fixed exchange rates, and the emergence of Keynesian revolution which refuted the basic classical assumptions of price and wage flexibility and full employment, the balance of payments came to be viewed as a policy problem for governments rather than just being an automatic process. The key issues then centered on how exchange rate changes or, specifically, devaluation would improve a country's balance of payments (Johnson, 1976a). Consequently, different approaches emerged at different times to explain how and under what conditions could improvements in the trade balance and, hence, the balance of payments result from devaluation. The major approaches that have emerged overtime include the elasticity approach, the absorption approach and the monetary approach.

3.3.1 The Elasticity Approach

The elasticity approach deals with the impact of exchange rate devaluation on the balance of trade in goods and services. It was initially based on a variety of complex elasticity stability conditions; the simplest being the Marshall-Lerner condition expressed as:

$$DB = KX\ (e_m + e_x - 1) \quad \ldots\ldots (3.10)$$

where

DB = change in the trade balance

K = the rate of devaluation

X = the value of exports expressed in foreign currency

e_m = elasticity of home country's demand for imports

e_x = elasticity of foreign demand for exports from the home country

Based on the assumptions of infinite supply elasticities for exports and imports, and of initial trade balance, the Marshall-Lerner condition states that the sum of the absolute values of the two demand elasticities should be larger than unity for devaluation to improve the trade balance. This condition is expressed algebraically as:

$$|e_x| + |e_m| > 1 \quad \ldots\ldots (3.11)$$

If the sum is less than one, devaluation will have a perverse effect on the trade balance. If the sum is equal to unity, devaluation will leave the trade balance unchanged (Dhliwayo 1996:3; Marwah, 1969:742; and Ellsworth and Leith 1975:348). As stated by Crocket (1987), devaluation will increase the value of exports in domestic currency if the elasticity of demand

for exports is greater than zero, and will reduce the value of imports in domestic currency if the elasticity of demand for imports is greater than one. A more complex model of elasticity conditions assumed independent elasticities of demands for imports and supplies of exports.

The elasticity approach to devaluation was found inadequate on many grounds. Firstly, its implicit assumption of the existence of unemployed resources that could be used to increase domestic output could not stand the test of time in the immediate post-war period of full employment. Secondly, the approach is concerned mainly with the current account of the balance of payments and ignores the capital account. It could therefore be regarded as a theory of balance of payments in a world without capital flows. Moreover, it fails to take account of the induced income and price effects that may arise from devaluation. It supposes that all other factors including fiscal and monetary variables as well as the wage rate and domestic price of non-tradables are held constant. Thirdly, it implicitly assumes that there are no quantitative restrictions on trade. Finally, it was feared that most countries would not be able to fulfill the background assumptions of the elasticity model (elasticity pessimism). The dissatisfaction with the elasticity framework for analyzing devaluation led to (i) the recommendation of exchange controls, tariff and other quantitative restrictions as alternatives to devaluation; and (ii) an alternative approach known as the absorption approach.

3.3.2 The Absorption Approach

The absorption approach to external balance was formulated in terms of general equilibrium framework, and was first developed by Alexander (1952) who criticised the elasticity approach as a partial equilibrium analysis. The approach views the balance of trade as the difference between national income (injections) and total expenditure (absorptions) (see Sodersten, 1981: 366). The deficit in the balance of payments is attributed to an excess of domestic absorption over domestic output. According to the absorption approach, in an economy with full employment, excess demand generated by devaluation will raise the domestic price level and, consequently, reduce the value of real cash balances. The reduction in real cash balances will cut down aggregate absorption or expenditure relative to aggregate productive capacity. Thus, the absorption approach postulates that, for trade balance to improve, devaluation should be able to increase national output more than domestic absorption.

The analysis of the absorption approach begins with the specification of a simple national income identity:

$$Y = C + I + G + (X - M) \quad \ldots\ldots (3.12)$$

where,

Y = national income

C = level of private consumption

I = level of total investments

G = level of government expenditure on goods and services

X = value of exports of goods and services

M = value of imports of goods and services.

Re-arranging the terms, and making (X - M) the subject of the formula, equation (3.12) can be re-written as:

$$(X - M) = Y - (C + I + G) \quad \ldots\ldots (3.13)$$

where

(X - M) = the trade balance (B)

C + I + G = domestic absorption (A)

while other terms remain as previously defined.

Further simplification of the equation yields:

$$B = Y - A \quad \ldots\ldots (3.13a)$$

where all terms are as previously defined.

From equation (3.13a), devaluation will improve the trade balance (B) if either the level of real national income (Y) is increased more than the level of real domestic absorption (A), or the level of real domestic absorption (real expenditure) is reduced more than the level of real national income, or both.

Like the elasticity approach, the absorption approach which again is concerned only with the balance of trade in goods and services also generated its own controversy. However, despite its shortcomings, the absorption approach was an improvement over the cruder version of the elasticity approach which placed emphasis merely on changes in relative prices of imports and

exports. The introduction of the real balance effect into the analysis of external balance is a major improvement over the elasticity approach. One policy implication of the absorption approach is that any policy measure to reduce a deficit in the balance of trade cannot succeed unless it increases real output or reduces real expenditure or both. In other words, devaluation will not succeed in reducing deficit in the balance of payments unless it has one or the other or both of these effects. Considerable efforts made to reconcile the two approaches led to the Meade and Tinbergen economic policy approach. It was then recognised that in a fully employed economy, devaluation cannot be used alone to correct balance-of-payments deficits. What is needed in such an economy is a proper mix of expenditure-reducing and expenditure-switching policies. According to the Meade-Tinbergen model, in order to maintain internal balance, a country must deflate aggregate expenditure when it devalues to offset the impact of devaluation on its trade balance.

3.3.3 The Monetary Approach

The main departure of the monetary approach from other orthodox approaches (elasticity and absorption approaches) to external balance is that it emphasizes monetary rather than the relative price effects of balance-of-payments adjustment. This is based on the assumption that the monetary account of the balance of payments of a country is influenced directly by the country's monetary policy. In the framework of the monetary approach, relative prices play a negligible role as they affect only the composition rather than the aggregate expenditure. The

monetary approach places less emphasis on the distinction between export, import and non-traded goods. It concentrates, however, on the factors that give rise to international money flows (balance of payments deficits and surpluses). In the context of the monetary approach, the balance of payments refers to items which constitute the monetary account or official settlements balance. These items are referred to as "items below the line". Other items that make up the current and capital accounts are lumped together as "items above the line", and the monetary approach does not attempt to explain them. In accordance with the rules of double entry book-keeping, the net sum of all "items above the line" should equal the official settlements balance. The monetary approach attempts to provide a theory of this net sum rather than explaining its decomposition. In essence, the focus of the monetary approach is on the overall (official settlements) balance of payments rather than on individual accounts that make up the balance of payments. Until the development of the monetary approach to balance of payments (MABP), it could be argued that there were no widely accepted theories of the balance of payments which combined both the current and capital accounts. Majority of the traditional models used in the balance of payments theory, as earlier highlighted, treat either the capital or the current account separately. The monetary approach to balance of payments (giving special attention to its origin, basic features, assumptions and applications) is discussed in the next chapter.

3.4 The Exchange Rate and Balance of Payments Management in Nigeria

Exchange rate management is one of the most discussed economic policy subjects in which a consensus is hard to reach. As noted by Guitian (1992:13):

> this state of affairs reflects the complex interrelationship between exchange rate management and domestic economic policy, as well as the importance of these two policy areas for economic performance.

In view of the numerous dimensions of exchange rate policy, governments are usually interested in its management. The choice of exchange rate regime therefore goes beyond purely technical criteria to issues of a more normative nature, such as government's reputation, credibility, and commitment. However, the most important objective of exchange rate policy is to keep a country's real exchange rate in line with its long-run equilibrium level. This is based on a consensus that maintaining the real exchange rate at the "wrong" level generates incorrect signals to economic agents and results in greater economic instability and welfare costs (Edwards, 1992: 45). The dramatic deterioration in agriculture and external accounts of many African countries and the international debt crisis of the early 1980s have been attributed to inappropriate exchange rate policies pursued by most of these countries in the late 1970s. In this section, therefore, an attempt is made to closely examine the challenge of managing the exchange rate since independence and to analyze the developments in the country's balance of payments and policy measures taken to address them.

3.4.1 The Management of Nigeria's Exchange Rate Since Independence

Two distinct phases, based on the structure of foreign exchange policy, have become conventional in contemporary analyses of exchange rate management in Nigeria. The first is the period from the establishment of the Central Bank of Nigeria (CBN) to the adoption of the structural adjustment programme (SAP) in Nigeria - the period between 1959 and mid-1986. The second phase covers about seven years beginning from the adoption of SAP i.e., from September 1986 to December 1993.

From independence till the adoption of a market-based system of exchange rate determination in Nigeria shortly after the introduction of the structural adjustment programme (SAP) in mid-1986, the Nigerian currency was more or less administratively fixed. This derived initially from the 1958 Central Bank Ordinance which, using the pegged exchange rate system, fixed the Nigerian pound at par with the British pound sterling (Odubogun, 1995; Obaseki, 1991). In March 1961, Nigeria joined most other countries of the world to fix the exchange rate of its currency against the American dollar, with the declaration of a par value of US$2.80 for the then Nigerian pound that was introduced in 1959 with its value defined and fixed at par with the British pound sterling (Ajayi, 1989). However, the Exchange Control Act of 1962 allowed for the Nigerian pound to be defined in terms of gold, rather than having it merely fixed at par with the pound sterling. This meant that Nigeria could, at any time, decide on whatever adjustments that would be deemed necessary in the official rate between her currency and other currencies. Odubogun (1995) notes that this was supposed to send strong signals to the

international community that Nigeria, as an independent nation, was free to take decisions on her own. Nonetheless, the one-to-one relationship between the Nigerian pound and the British pound sterling remained until November, 1967 when the latter was devalued by 14.3 per cent against the U.S dollar, but the Nigerian pound was not devalued. The autonomy which the 1962 Act engendered appeared justified as the devaluation of the pound sterling had no severe effect on the Nigerian currency; it merely induced an adjustment from the one-to-one relationship to 1.6672 pound sterling per unit of the Nigerian currency. However, strict import and exchange control measures were imposed to maintain the exchange rate of the Nigerian pound which was not devalued along with the British pound sterling.

Following the temporary suspension of gold convertibility as well as the generalized float which attended it in August 1971, the Nigerian monetary authorities adopted a two-tier system of exchange rates. The official parity of US$2.80 per Nigerian pound was, however, restored two months after the introduction of the two-tier system of exchange rates. The devaluation of the U.S dollar by 7.9 per cent in consequence of the Smithsonian realignment of December 1971 led to a *de facto* revaluation of the Nigerian pound vis-a-vis the U.S dollar and other major currencies that devalued. As a result, the exchange rate between the Nigerian and U.S currencies changed from U.S $2.80 to U.S $3.64 per Nigerian pound, whereas the relationship between the Nigerian pound and the pound sterling as well as that between the former and gold remained unchanged. It was felt that a devaluation of the Nigerian pound when most of the currencies of her trading partners were revalued in terms of gold would induce increases in

import prices.

The fixed relationship between the Nigerian currency and the British pound sterling was terminated on June 29, 1972 following the decision of the United Kingdom to float her currency on June 23 of that year. However, the exchange rate between the Nigerian pound and the U.S dollar was not altered, while that between the former and the pound sterling became determinable through the floating pound sterling/U.S dollar cross rates. Even when the U.S dollar was devalued again by 10 per cent, the Nigerian pound was not devalued.

Early in 1973, the Nigerian currency was decimalized and changed from the pound to the naira. The autonomy that characterized its valuation from 1962 was dropped initially after the naira was introduced. Its exchange rate was fixed at ₦1.00 to U.S$1.52. The devaluation of the dollar in that 1973 led to a fall in the value of the naira because of its direct relationship with the dollar. This became a worrisome issue when the dollar depreciated persistently. Furthermore, the collapse of the Bretton Woods system in 1973 led most industrialised countries, including the United States of America, Japan, Britain and Germany to float their currencies. It was then left for Nigeria and other developing countries to decide whether to continue to peg their currencies to a single dominant currency or to a basket of currencies, or whether to adopt independent or managed floating exchange rate system (Ajayi, 1989; and Fischer, 1988). Many of the developing countries continued to maintain the fixed exchange rate arrangements. Several African countries in the Francophone sub-region pegged their currencies to the French franc. Other smaller countries adopted various versions of adjustable peg system. Given the relatively

underdeveloped financial and capital markets existing in the country at that time, it was not feasible for Nigeria to float her currency. Hence, it continued to maintain a fixed parity with the U.S dollar up till March, 1974 when it started to fix its exchange rate independently in terms of the relative strength of the U.S. dollar and the British pound sterling. In April 1974, Nigeria stopped maintaining any specified margins between currencies and adopted an independent exchange rate policy.

Between 1974 and 1975, the decision to manage the naira exchange rate independently of the fortunes of the pound sterling and the U.S dollar was considerably enhanced by the country's improved and strong position from increased earnings from exports of crude oil. A policy of progressive appreciation of the naira was adopted. To further minimize the effects of fluctuations of other major currencies on the naira, a policy of pegging to a basket of currencies of the country's major trading partners was adopted in February 1978. The basket comprised the currencies of France, the Federal Republic of Germany, Japan, the Netherlands, Sweden, the United Kingdom, and the United States of America. However, the officially quoted exchange rate during this period, and up till the adoption of a second-tier foreign exchange market (SFEM) in September 1986, showed that the method of import-weighted basket of currencies was not strictly applied in fixing the exchange rate in Nigeria, as other factors such as fluctuations of the U.S. dollar against other currencies were also considered. By implication, the naira was, as Ajayi (1986) pointed out, pegged to either the U.S. dollar or the British pound sterling during this period, while the determination of exchange rate between the naira and other

currencies was more or less based on the value judgement of the monetary authorities.

The exchange rate reforms which started with the commencement of the second-tier foreign exchange market (SFEM) on September 29, 1986 marked the second major phase in exchange rate management in Nigeria. The operational framework of SFEM at its inception was the closed auction whereby the Central Bank of Nigeria (CBN) called for bids from all authorized dealers once a week. The first-tier rate, reserved for official transactions, was expected to move in sympathy and eventually merge with the SFEM rate within a period of nine months.

Initially, the major source of supply of foreign exchange to the SFEM was expected to be the Central Bank of Nigeria. Over time, the flow from autonomous sources such as foreign currency domiciliary accounts and capital inflows through individuals as well as corporate and non-corporate bodies were expected to become the major sources of supply to the market. At the first two SFEM biddings, the exchange rate was determined by averaging the successful bid rates. Afterwards, the average rate method was replaced by the marginal rate pricing method which had the potential to reduce observed continuous depreciation of the currency (Olisadebe, 1991:166). A Dutch Auction System (DAS) was instituted in April, 1987 to ensure that bids reflected economic fundamentals. It required funds to be allocated to dealers at their bid rates. This was aimed at reducing the propensity for high bids. The official rate had to be determined at the margin given multiplicity of bid rates. The bidding frequency was also changed from weekly to fortnightly.

The two-tier system was terminated on July 2, 1987 when the market was renamed the foreign exchange market (FEM). A market for autonomous transactions in foreign exchange also existed alongside the auction market as a segment of the FEM. This was called the autonomous foreign exchange market (AFEM). The autonomous market produced a set of naira exchange rates different from those generated at the FEM. The Central Bank of Nigeria (CBN) - based auction and AFEM rates were merged into a single inter-bank foreign exchange market, the IFEM, with a single naira exchange rate in January, 1989. The IFEM operated through daily auctions. The aim of the merger was to stabilize the naira exchange rate and bring about more rational behaviour in the market with a view to enhancing its efficiency.

Later in August, 1989 the government approved the establishment of the bureaux de change to be operated by private entrepreneurs. Its basic goal was to enlarge the scope of the official market for foreign exchange transactions. The bureaux were to serve small dealers in order to widen the breadth of, and accessibility to, the foreign exchange market. They were licensed spot dealers on foreign exchange. The specific objectives of the bureaux de change were to:

(i) accord legal recognition to small dealers in foreign exchange;

(ii) provide free access to foreign exchange by small buyers in a convenient and informal manner;

(iii) enhance the efficiency of macroeconomic management through more adequate statistical coverage of foreign exchange flows; and

(iv) improve fiscal efficiency (Central Bank of Nigeria, 1989:12).

The daily bidding at the IFEM continued until December 13, 1990. On December 14, 1990 the Dutch Auction System of bidding (DAS) was re-introduced to "inject some element of competition into the market". This was carried through 1991, but with slight modifications in the computation of the central exchange rate. The DAS was, however, abolished with further deregulation of the market on March 5, 1992. It was supplanted by an inter-bank market in which the Central Bank of Nigeria became an active participant, free to buy and sell foreign exchange at rates determined by market participants. The naira exchange rate was unified with the rates prevailing in the bureaux de change and parallel markets so as to realign the official and parallel rates to eliminate the parallel market premium which was then enlarging.

To ensure the effectiveness of the new policy stance, the Central Bank of Nigeria decided to provide foreign exchange to all dealers who could provide requisite naira cover for such demands. This measure narrowed the premium on the black market for foreign exchange from about 136.2 per cent in 1991 to about 119.4 per cent in 1992. The process could not, however, be sustained because it induced declines in external reserves to uncomfortable levels. The implicit devaluation was followed by substantial depreciation of the naira. The existing measures in 1992 were retained in 1993. In addition, the exchange rate was officially stabilized at ₦21.9960 to the dollar in May, 1993.

The market-based system for exchange rate determination was suspended in 1994. In its 1994 budget, the federal government announced the fixation of the exchange rate at ₦22.00 to

the dollar. The immediate objective of the re-regulation, as it were prior to 1986, was to stem further slide in the value of the naira so as to reverse the problems of inflation in particular and gross macroeconomic instabilities over the adjustment period in general. The government also decided that all foreign exchange earned by both private and public sector exporters be brought into a national foreign exchange account. It abolished concessions formerly granted to private exporters and parastatals to keep their foreign exchange earnings outside the Central Bank of Nigeria. Other important measures introduced by the 1994 budget include:

- all imports to be done on the basis of letters of credit (L/C) supported by import duty report (IDR) and clean report of finding (CRF) except for imports that cost $1000 or less;
- imports on open account (OA) including "bills on collection" except on specific approvals for the manufacturing and agricultural sectors were abolished;
- all imports of foreign exchange for subsequent import of goods and services to be through the Central Bank. All such importers must first declare to the Central Bank, complete Form M and establish necessary letters of credit based on the use of funds earlier lodged with the CBN or designated banks. Such would, however, not form the basis for operating an L/C nor could it be repatriated subsequently;
- high custom duties to be imposed on luxury goods and such goods should not be funded from official sources;

- Bureaux de Change to serve as agents of the CBN to sell foreign exchange at the rate prescribed by the CBN plus a fixed commission; must not sell foreign exchange to finance imports nor sell more than $2,500 or equivalent to any one customer; the parallel market for foreign exchange was outlawed;
- establishment of a National Economic Intelligence Committee to monitor the strict implementation of the above and related measures.

However, the exchange rate policies of 1994 did not fully achieve their stated objectives as stated in the 1995 budget of the Federal Government. Guided by the 1994 experience, the government announced, in the 1995 budget, a policy of guided deregulation which permits the free operation of an inter-bank autonomous foreign exchange market (AFEM). While the prevailing official rate remained (and still remains) operational, the Central Bank of Nigeria can, and does, intervene in the autonomous market. The practice of regular bidding for foreign exchange was suspended and domiciliary accounts became permissible.

In what could be described as reversion to liberalization, the government in the 1995 budget abrogated two major legislations bordering on economic regulation, namely:

(i) the Exchange Control Act of 1962, and

(ii) the Enterprises Promotion Decree of 1989.

The repeal of the two laws was designed to allow the inflow of funds and foreign investment into the country and to assure investors of the safety of their investments. It is remarkable that the operation of the AFEM from 1995 witnessed a substantial and unprecedented official devaluation

of the naira in an endeavour to merge its rate with the prevailing parallel rates. Both rates have, however, remained stable since the early 1995 to date, but at relatively high rates of about ₦85 to the U.S dollar.

3.4.2 Crisis in and Policy Responses to Nigeria's Balance of Payments

In the 1960s and early 1970s, Nigeria earned substantial foreign exchange from agricultural exports. There were also substantial capital inflows to sustain the fixed exchange rate regime and cushion its effects on the balance of payments. Hence, as we stated in chapter 2, the balance of payments and external indebtedness did not constitute a serious problem during the period. Between 1973 and 1977, the country also accumulated substantial foreign exchange reserves due to the oil boom. This made it possible for a fixed exchange rate policy during the period to be managed through reserve movements. Official reserve depletion helped to meet private excess demands. There was, however, a reluctance to devalue when the reserve level became too low in 1977 to sustain the fixation of the exchange rate. Strict rationing and exchange controls with import licensing requirements were adopted in the allocation of foreign exchange from the Central Bank of Nigeria with a view to protecting official reserves. The enactment of the Exchange Control (Anti Sabotage) Decree of 1977, and the introduction of the Comprehensive Import Supervision Scheme from 1979, among other measures, were aimed at ensuring the success of the controls. The measures were, however, relaxed in 1980-81 partly because of the difficulty in enforcing them, and mainly due to improved receipts from oil exports from 1980. As observed earlier, stringent measures had to be re-introduced through an

Economic Stabilization Act in April, 1982 which embodied austerity measures in response to the collapse of oil prices by mid-1981.

Inspite of the exchange control measures of the Stabilization Act, disbursements for imports continued to overshoot receipts from both oil and non-oil sources. The result was some slide in external reserves and large trade deficits. The large trade deficits were financed by short-term external loans. Outstanding letters of credit and trade arrears also accumulated. External debts began to mount as revealed by external debt figures in Table 2.7. The growing external debt outstanding led to further tightening of the control measures in 1984 by the Buhari/Idiagbon administration. These, however, proved inadequate responses to the serious economic and financial crises which, as discussed in previous chapter, led to the adoption of economic reform programmes in 1986 whose centrepiece was the advent of market-oriented approach to exchange rate determination.

Overall, the administrative fixing of the exchange rate of the domestic currency prior to SAP appeared to avoid proper consideration of pragmatic solutions to emergent balance of payments and external reserve problems. Responses to difficulties in the balance of payments were basically ad-hoc. It did not take into account the implications of trends in such critical variables as the relative differentials between domestic and foreign inflation and interest rates (Ajayi, 1989). This, as generally believed, led to gross misalignment of the Nigerian currency. As at May, 1984 the naira was considered by the IMF to be overvalued by about 60 per cent (Oyejide, 1990). The overvaluation case is one of the major arguments in support of the

adoption of market based approach to exchange rate determination during the SAP era. Estimates of effective exchange rate indices computed in the course of this study appear to lend credence to the contention. The estimates are presented in Tables 3.1 and 3.2.

The effective exchange rate indices of the naira reported in Table 3.1 were calculated using 1980 as the base year, while those in Table 3.2 were computed with a reference base of 1985. The major purpose of using two alternative base years is to see how the effective exchange rate indices will evolve with varying base periods. The exchange rates used in the computation of the indices were expressed in terms of units of foreign currency per unit of naira, such that higher values represent appreciation while lower values represent depreciation of the naira. The eleven trading partners used in the computation and the weights assigned to them are presented as Appendix I. The tables, irrespective of the base year used, reveal clearly that the Nigerian currency (naira) was highly overvalued during the period 1981 - 1985. The rate of over-valuation, with 1980 as the base year, was above 80 per cent in real terms between 1980 and 1984, and 60 per cent between 1980 and 1985 (see Table 3.1). However, with 1985 as the base year, the real effective exchange rate appreciated by about 40 per cent between 1980 and 1985 (see Table 3.2). However, between 1980 and 1990, the real effective exchange rate depreciated by about 73 per cent when 1980 is used as the base year, and by about 83 per cent when 1985 is used as the base year. The rate of depreciation in nominal terms is higher within this period. Figures 3.1 through 3.4 which show movements in the nominal and real effective exchange rates clearly illustrate this point. As could be seen from the graphs of various

TABLE 3.1

Nominal and Real Effective Exchange Rates of the Naira
(Base Year: 1980 = 100)

Year	REER1	REER2	REER3	NEER1	NEER2	NEER3
1970	57.0	60.6	54.2	93.9	98.4	90.5
1971	61.4	64.8	58.9	92.5	96.5	89.5
1972	61.5	64.5	59.3	94.6	98.1	91.9
1973	56.2	58.8	54.2	88.5	92.1	85.8
1974	59.7	61.8	58.0	94.4	97.9	91.7
1975	70.6	73.4	68.5	94.1	98.7	90.6
1976	85.8	89.0	83.4	100.4	105.7	96.4
1977	86.1	88.3	84.4	97.1	101.2	93.9
1978	91.2	91.7	90.9	90.9	92.2	89.9
1979	93.2	93.7	92.8	91.1	92.0	90.4
1980	100.0	100.0	100.0	100.0	100.0	100.0
1981	112.6	112.0	113.1	103.3	101.9	104.5
1982	113.9	115.0	113.0	105.2	104.6	105.7
1983	135.4	136.8	134.2	105.9	105.0	106.6
1984	182.0	186.0	179.0	109.2	108.4	109.9
1985	162.0	165.6	159.2	96.4	95.5	97.2
1986	70.0	70.5	69.2	40.5	39.4	41.3
1987	29.2	29.2	29.2	15.8	15.2	16.2
1988	33.8	33.2	34.2	13.6	12.9	14.2
1989	31.7	31.4	31.9	8.8	8.4	9.1
1990	27.0	26.9	27.0	7.3	7.1	7.6

Notes:
REER1 = Trade-weighted real effective exchange rate
REER2 = Import-weighted real effective exchange rate
REER3 = Export-weighted real effective exchange rate
NEER1 = Trade-weighted nominal effective exchange rate
NEER2 = Import-weighted nominal effective exchange rate
NEER3 = Export-weighted nominal effective exchange rate

Source: Calculated using IMF's International Financial Statistics yearbook, 1991

TABLE 3.2:

Nominal and Real Effective Exchange Rates of the Naira
(Base Year: 1985=100)

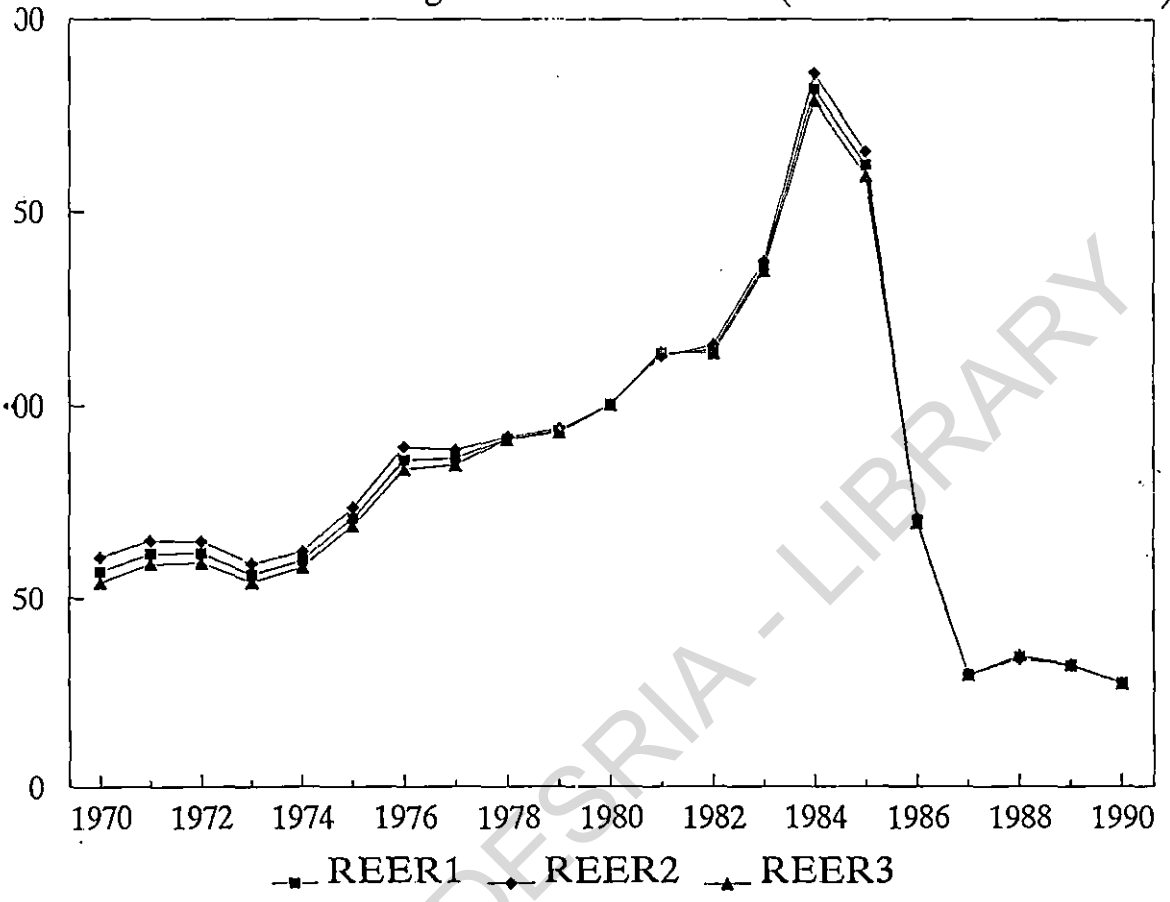
Year	REER1	REER2	NEER1	NEER2
1970	35.2	34.1	97.4	93.1
1971	37.9	37.0	95.9	92.0
1972	38.0	37.3	98.1	94.5
1973	34.7	34.0	91.8	88.3
1974	36.8	36.4	97.3	94.4
1975	43.6	43.1	97.5	93.2
1976	53.0	52.4	104.1	99.2
1977	53.2	53.0	100.7	96.6
1978	56.3	57.1	94.3	92.5
1979	57.6	58.3	94.5	93.0
1980	61.8	62.8	103.7	102.9
1981	69.5	71.1	107.2	107.5
1982	70.3	71.0	109.1	108.7
1983	83.6	84.3	109.8	109.7
1984	112.4	112.4	113.3	113.1
1985	100.0	100.0	100.0	100.0
1986	43.2	43.7	42.0	42.5
1987	18.1	18.4	16.3	16.7
1988	20.9	21.5	14.1	14.6
1989	19.6	20.0	9.1	9.4
1990	16.7	17.0	7.6	7.8

Notes:
REER1 = Trade-weighted real effective exchange rate
REER2 = Export-weighted real effective exchange rate
NEER1 = Trade-weighted nominal effective exchange rate
NEER2 = Export-weighted nominal effective exchange rate

Source: Calculated using IMF's International Financial Statistics yearbook, 1991

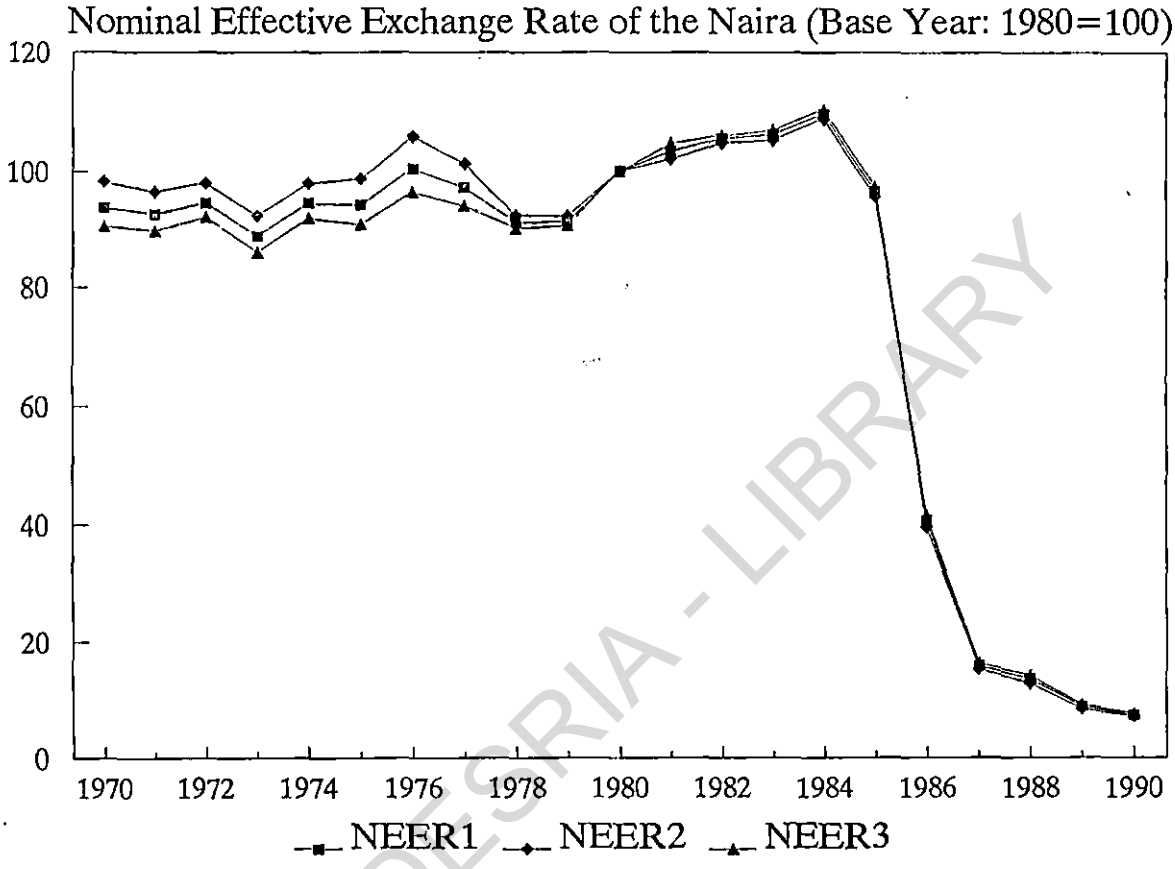
FIGURE 3.1

Real Effective Exchange Rate of the Naira (Base Year: 1980=100)



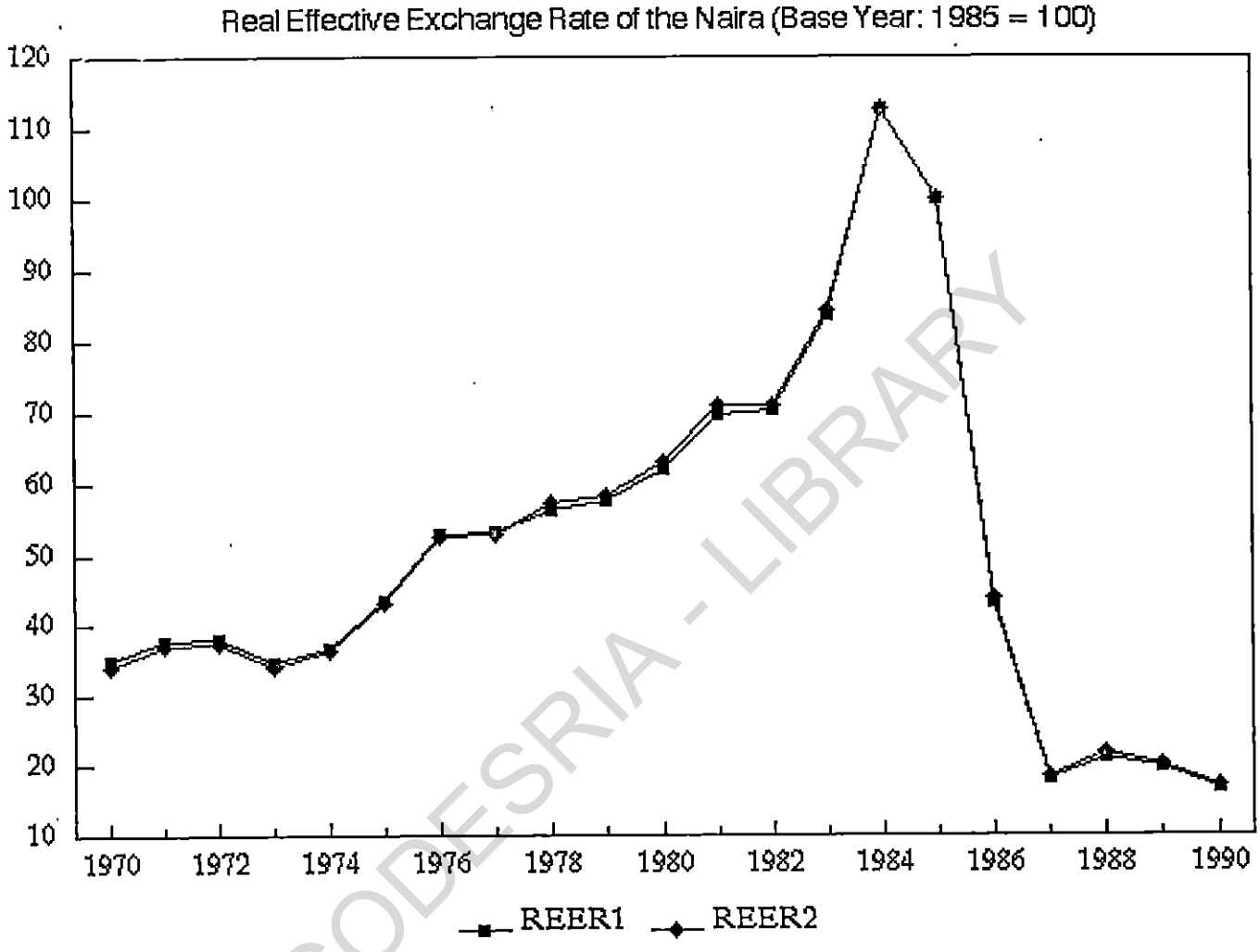
Source: Derived from Table 3.1

FIGURE 3.2



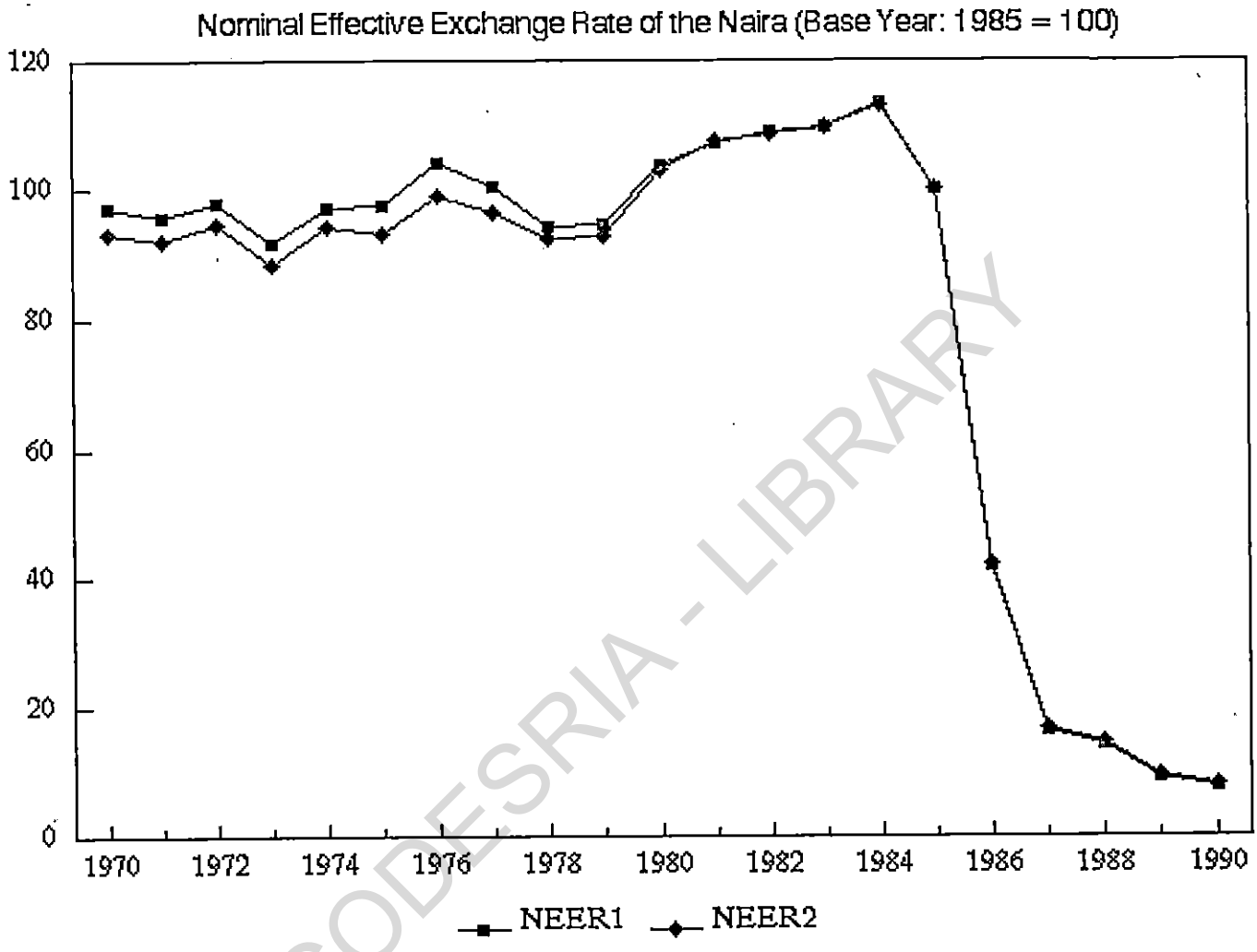
Source: Derived from Table 3.1

FIGURE 3.3



Source: Derived from Table 3.2

FIGURE 3.4



Source: Derived from Table 3.2

effective exchange rate indices, the real effective exchange rate (REER), irrespective of the base year or weights used in the computation, was continuously rising (i.e. appreciating) from 1980-1985, before it started to decline (i.e. depreciating). The nominal effective exchange rate (NEER) maintained a fairly steady (but high) level up till 1985 before it started to decline (depreciate) very rapidly. The rate of depreciation of nominal effective exchange rate has been higher than that of real effective exchange rate since 1986. This is due to the massive depreciation of nominal exchange rate of the naira since the exchange rate deregulation in Nigeria. One major observation from the various effective exchange rate indices presented in this study is that varying the weights does not yield much difference as could be seen from Tables 3.1 and 3.2 and Figures 3.1 to 3.4.

Information about the parallel or black market premium on foreign exchange could also roughly provide an indication of the extent of deviation of actual exchange rate from its equilibrium value. The existence of a high premium on parallel or black market for foreign exchange is an indication of excess demand over supply of foreign exchange at the official exchange rate, which in turn is associated with overvalued exchange rates (Montiel and Ostry, 1994). For Nigeria, the calculated black market premium on foreign exchange market is presented in Table 3.3. The parallel market premium is calculated as the ratio of the parallel market exchange rate to the official exchange rate multiplied by one hundred (see Ajayi, 1986:17-18; Pinto, 1989:332). As could be observed from Table 3.3, the premium was very high between 1982 and 1986, ranging from about 188.3 to 575.2 per cent over the period. The

TABLE 3.3

Parallel Market (P.M.) Premia in Nigeria's Foreign Exchange Market: 1970-1993

Year	(1) Parallel Market (PM) Exchange Rate (₦:$)	(2) Official Exchange Rate (₦:$)	P.M. Premium* (%)
1970	0.6666	0.7143	93.3300
1971	0.5714	0.7129	80.1500
1972	0.4545	0.6579	69.0800
1973	0.8333	0.6579	126.6600
1974	0.8265	0.6303	131.1300
1975	0.9009	0.6155	146.3700
1976	0.7937	0.6266	126.6700
1977	1.3514	0.6447	209.6200
1978	1.1111	0.6353	174.8900
1979	0.9804	0.6040	162.3200
1980	0.9346	0.5468	170.9200
1981	0.9346	0.6177	151.3000
1982	1.2346	0.6735	188.3100
1983	4.1666	0.7244	575.1800
1984	3.5714	0.7665	465.9400
1985	3.7037	0.8938	414.3800
1986	7.6923	1.7545	438.4300
1987	5.0000	4.0160	124.5000
1988	10.000	4.5370	220.4100
1989	10.5317	7.3647	143.0000
1990	9.6100	8.0333	119.6300
1991	13.4979	9.9090	136.2200
1992	20.6550	17.2980	119.4100
1993	35.3372	22.0650	160.1500

* Computed as a ratio of the parallel market exchange rate to the official exchange rate, multiplied by one hundred, i.e. $\left[\frac{\text{Col. 1}}{\text{Col. 2}}\right] \times \frac{100}{1}$

Source: Pick Currency Year Book (Various Issues).

major factor that contributed to the rise in the parallel market premium was the collapse of international oil price in the early 1980s which reduced foreign exchange earnings and resulted in import licensing and tightening of administrative controls over foreign exchange allocation. These measures created scarcity rent in the official foreign exchange market. The existence of premium between the parallel market rate and the official rate has persisted (but at a lower rate) since the deregulation of the Nigerian foreign exchange market in 1986.

The overvaluation of the domestic currency is deemed to have encouraged unbridled imports but penalised non-oil exports. This is especially so with the adoption of an import substitution strategy towards industrialisation. This strategy has consistently elicited polemics. Meier (1989) averred that whereas the persistent shortage of foreign exchange has dominated considerations of trade policy, the results of the import substitution strategy have, however, been disappointing in most countries. He argued that the policies have not succeeded in reducing the foreign exchange constraint; indeed, in some cases, it can be claimed that the import substitution policies have actually intensified the shortage. Krueger (1983) contended that the growth rate of exports (and foreign exchange earnings from other sources) diminished after an import substitution strategy was adopted. This was partly a conscious outcome of an import substitution strategy that aimed to diminish dependence on trade. In effect, while the growth of foreign exchange declined, the growth in demand for imports of goods and services frequently accelerated instead of decelerating. The resulting foreign exchange shortage caused severe difficulties in many countries and became a binding constraint upon the growth rate.

In Nigeria, the strategy could not yield the desired self-sustaining industrialisation and growth. It did not encourage the utilisation of local raw materials; rather it reinforced the dependence of the manufacturing sector and industry on external sources through increase in derived demand for imported products (Obadan and Uga, 1996). Furthermore, it generated little employment effects because the industries are capital intensive. The technology was never adapted to local circumstances leading to negligible forward and backward linkages. Most of all, there was an acceleration of foreign exchange expenditures than the antithesis. Olaniyan (1990) summed the overall outcome as follows:

> ...the failures in the industrial sector in part accounts for the aggravation of the unemployment and balance of payments difficulties... Also, the cause of the external debt build-up could be found in the import substitution industrialization policy... It was a policy which encouraged the import of both capital and raw materials.

The mutual reinforcement between the naira overvaluation and mode of application of the import substitution industrialisation (ISI) strategy generated and sustained some fundamental disequilibria in the Nigeria's balance of payments.

An examination of the country's trade and balance of payments statistics over the years reveals a number of points (see Table 3.4). One is that between 1970 and 1977, the balance of trade was in surplus as the surpluses in oil sector balance of trade more than off-set non-oil deficits during the period. Available records indicate that the non-oil merchandise balance (balance of trade) was perennially in deficit throughout the period. However, between 1978 -

TABLE 3.4

Nigeria's Balance of Payments - Summary Statement (₦ million): 1970-1994

Year	1 Trade Balance	2 Balance on Services	3 Unrequited Transfers (Net)	4 Current Account Balance	5 Capital Account Balance	6 Net Errors & Omissions	7 Overall Balance	8 Exceptional Financing	9 Change in Reserves[1/]
1970	173.0	-268.0	45.0	-50.0	49.2	47.4	46.6	-	-46.6
1971	285.0	-516.2	1.8	-229.4	293.4	53.4	117.4	-	-117.4
1972	477.5	-785.9	-14.3	-322.7	269.2	3.7	57.2	-	-57.2
1973	1,166.9	-1,078.8	-35.4	52.7	144.8	23.1	197.5	-	-197.5
1974	4,439.3	-1,314.7	-62.1	3,062.5	-5.9	45.6	3,102.2	-	-3,102.2
1975	1,487.1	-1,367.7	-76.8	42.6	141.1	-26.2	157.5	-	-157.5
1976	1,293.5	-1,455.0	-97.8	-259.3	-50.6	-30.0	-339.0	-	+339.0
1977	1,553.9	-2,082.7	-118.7	-647.1	150.4	-30.1	-527.2	-	+527.2
1978	-741.7	-1,474.6	-170.6	-2,386.9	1,111.9	18.6	1,293.6	-	-1,293.6
1979	2,967.4	-1,724.4	-2.9	1,009.5	813.2	46.2	1,868.9	-	-1,868.9
1980	-6,132.7	-3,462.2	-315.2	-2,355.3	97.4	-50.2	2,402.2	-	-2,402.2
1981	-703.5	-2,948.4	-346.5	-3,998.4	929.5	48.1	-3,020.8	-	+3,020.8
1982	-1,810.2	-2,779.9	-289.4	-4,879.5	3,470.9	10.3	-1,398.3	-	+1,398.3
1983	-781.4	-2,070.7	-285.8	-3,137.9	2,735.7	100.9	-301.3	-	+301.3
1984	2,299.8	-2,001.9	-253.8	44.1	171.9	138.9	354.9	-	-354.9
1985	5,065.1	-2,617.7	-232.0	2,215.4	-2,555.0	-94.3	349.1	-	-349.1
1986	3,443.9	-6,202.6	-240.4	-2,999.1	-1,900.9	-767.7	-5,667.7	4,883.4	+784.3
1987	13,968.1	-14,167.2	-96.2	-295.3	-16,743.3	-1,226.2	-18,264.8	18,429.0	-159.2
1988	11,435.0	-12,786.0	385.3	-965.7	-18,447.3	-1,382.0	-20,795.0	18,500.9	+2,294.1
1989	30,770.3	-23,678.8	1,140.8	8,232.3	-30,221.9	-1,003.9	-22,993.5	31,721.3	-8,727.8
1990	70,114.9	-54,379.1	3,614.6	19,350.4	-23,864.5	-1,247.8	-5,761.9	24,260.1	-18,498.2
1991	44,677.9	-64,547.4	7,291.9	-12,577.6	-2,249.9	-971.1	-15,798.6	21,756.2	+5,957.6
1992	80,998.5	-98,763.8	12,679.8	-5,085.2	-94,247.9	-2,086.0	-101,419.4	36,133.1	-65,286.3
1993	72,060.4	-109,343.2	17,794.0	-19,488.8	-19,740.9	-2,507.1	-41,736.8	55,350.7	-13,613.9
1994	63,059.4	-122,592.8	10,952.4	-48,581.0	7,644.1	-1,686.4	-42,623.3	49,818.2	-7,194.9

Notes

[1/] minus (-) sign indicates increase in reserves
plus (+) sign indicates decrease in reserves.

Sources:
1. Central Bank of Nigeria, Statistical Bulletin (December, 1994).
2. Central Bank of Nigeria, Annual Report and Statement of Accounts (Various Issues).

85, the balance of trade was in deficit except in 1979, 1984 and 1985. Secondly, the invisible trade balance (services and income) was also in deficit all through the period 1970 - 1985 for both oil and non-oil transactions. The same is true of unrequited transfers except in 1970 - 71. Thirdly, the current account balance was in deficit for the most part due to the combined deficits of the unrequited transfers, services, and non-oil merchandise which frequently exceeded oil merchandise balances. Fourthly, favourable capital account developments led to narrower overall balance of payments deficits in most years up till 1984. The overall balance was, nonetheless, persistently in deficit between 1981-83. The continued growth of imports at an unsustainable rate in the early 1980s was largely financed by trade arrears. An obvious result of the sustained mismatch between export earnings and import bills was a rapid accumulation of trade debts on letters of credit, bills for collection, and open account transactions. As the trade debt backlog threatened to close normal credit lines, the government had to commence refinancing and rescheduling arrangements. Oyejide, Soyode and Kayode (1985:17) remarked that:

> these arrangements led to the conversion of $1.9 billion of the short term trade credits into medium-term debt at floating interest rates. There remained, however, a second set of trade debt arrears, perhaps another $6 billion or so, in the form of insured trade and guaranteed export credits. Those to whom this debt was owed insisted on Nigeria's acceptance of an IMF structural adjustment programme as a precondition for any rescheduling proposals. This then is the proximate origin of the application for an IMF loan of about $2.4 billion.

The foregoing portended three related unfavourable external sector developments, all bordering on external imbalance prior to the introduction of economic reform programme in Nigeria. They were a deteriorating balance of payments position, increasing debt and debt service burdens, and dwindling foreign reserves. There were also contemporaneous problems of domestic or internal imbalance such as worsening unemployment, shortage of inputs, and inflation as highlighted earlier in chapter 2. The stabilization Act of 1982 which sought to address the deterioration in the balance of payments position could not achieve much. The stabilization measures, as previously pointed out, were largely demand management in content and concentrated on exchange control and import restrictions, as well as restrictive monetary and fiscal policies (Omoruyi, 1987:29). These measures created their own distortions in the economy and contributed largely to the adoption of a formal IMF-supported structural adjustment programme (SAP) in the second half of 1986 (Central Bank of Nigeria, 1986:11).

The fundamental objective of the exchange rate reforms in 1986 was to evolve a realistic and sustainable market determined exchange rate for the naira so as to reduce demand for foreign exchange to available supply, and reduce the pressure on the balance of payments. However, over the 1986-93 period, the balance of payments (BOP) was characterised by mixed results. Adverse developments, however, appeared to predominate. Merchandise balance (the balance of trade) was in surplus all through (see Table 3.4). The naira values however exaggerate the growth rates because of valuation changes. If adjustments are made for the depreciation of the naira, the dollar values will show only modest increases. Converse to the merchandise surpluses, the invisible balance (the balance on services) was in perennial deficit

between 1986-93. On the other hand, the unrequited transfers account recorded successive improvements. From a state of deficit in 1986 which narrowed in 1987, there were increasing annual surpluses from 1988.

The current account recorded deficits throughout the period, 1986-93, except between 1989-90 when it recorded some surpluses. The capital account was persistently in deficit all through. Similarly, the overall balance of payments, measured by the sum of current and capital account balances, including the balancing item (net errors and omissions), was in deficit throughout 1986-93. However, the advent of exceptional financing in the BOP records tended to obscure the magnitude of the overall balance of payments deficits from 1986. The exceptional financing consists of a combination of the following measures in financing the chronic deficits: deferment of obligations falling due during the period, debt rescheduling, promissory notes arrears, and draw down on external reserves.

The pressures on the balance of payments were generally influenced by:

- huge external debt and debt service burdens;
- precarious international oil market and low earnings from non-oil exports;
- exchange rate misalignment and inadequate supply of foreign exchange;
- fiscal and monetary imbalances;
- inadequate strategy for managing oil shocks; and
- political instability.

The exchange rate management system has been about the most controversial aspect of SAP due to the pervasive influence of the accelerated depreciation of the naira on virtually all facets of

the economy. Individually and collectively, the above factors also accentuated other domestic problems such as inflation, unemployment, persistence of low capacity utilisation, decline in real per capita income, and deterioration of social and economic infrastructure.

Over the ten-year period, 1986-96, the exchange rate management system under the reforms underwent considerable metamorphosis. In all, however, the value of the naira rapidly declined due to accelerated depreciation throughout the period.

CHAPTER FOUR

LITERATURE REVIEW

4.1 Introduction

The monetary approach to balance of payments (MABP) has been a dominant view in international monetary economics, particularly since the 1970s. Despite the new orientation in the monetary approach, the theory is believed to have a long historical background, which can be traced back to the writings of the classical economists who conceived a system of integrated world capital market and mobility. It is linked to the origin of balance of payments theory in the work of David Hume, and more specifically, to his theory of price-specie-flow mechanism (Johnson, 1976a). While criticising the objective of mercantilism in accumulating precious metals, David Hume pointed out that the amount of money in a country would be adjusted automatically to the demand for it. In Hume's analysis, the process in which this adjustment takes place is through surpluses and deficits in the balance of payments brought about by changes in relative national money price levels. However, while drawing heavily from Hume's theory of balance of payments and his analysis of price-specie-flow mechanism, the monetary approach places emphasis on monetary considerations in the interpretation of external balance problems rather than on changes in relative national price levels (Dornbusch and Fischer, 1990: 764).

The monetary approach to balance of payments could be regarded as an extension of the rudiments of monetary theory to the area of the balance of payments. Three main factors could be attributed to the renewed interest in the approach in the post-world war II. The first factor was the renaissance of academic interest in monetary problems as spearheaded by Milton Friedman and others from the University of Chicago. The second factor emanated from the search by the International Monetary Fund (IMF) for a monetary framework within which the balance of payments policies could be evaluated. The difficulties in applying the conventional elasticity/absorption approaches to external balance in the developing economies prompted the search. Thirdly, it was then the view that the monetary approach might provide a better framework within which the balance of payments policies could be easily applied and evaluated, given the reliance of majority of the developing economies on monetary policies which operated in conjunction with relatively unsophisticated financial markets (Kane, 1988: 223).

An early exposition of the MABP is found in the work of Polak (1957). The monetary approach was, however, operationalised in the International Monetary Fund in the 1950s and 1960s (see Khan, 1990:197), while academic interests in the approach gained momentum in the 1970s. The approach enjoyed considerable support in the 1980s as a monetary explanation of balance of payments disequilibrium. At present, a considerable volume of literature has been written on the subject, but a lot of issues are yet to be resolved, particularly at the empirical level, regarding the developing countries. While a good number of studies based on the advanced industrial countries lend support to the monetary approach, those relating to the

developing countries (though relatively few) have, contrary to expectations, produced mixed results. This, as we would observe in the rest of this chapter, could be due to some of the restrictive assumptions on which the monetary approach relies.

In the remaining part of this chapter, we provide an overview of the basic features and assumptions of the monetary approach. A survey of literature on the theoretical and empirical application of the monetary approach is also presented and discussed.

4.2 Basic Features and Assumptions of the Monetary Approach

The basic features of the monetary approach can be found in the works of Frenkel and Johnson (1976), Mussa (1974, 1976), Johnson (1958, 1972, 1976a, 1976b & 1977), Coppock (1978), Melvin (1984) and Uddin (1985). Other contributors to the development of the monetary approach to balance of payments (MABP) theory include Mundell (1968), Dornbusch (1971), Tsiang (1977) and Bilson (1979). The central argument of the MABP is that external balance problems are essentially (but not exclusively) monetary in nature. As such, the proponents of the monetary approach argue that the:

> balance of payments problems in a monetary world should be analysed by models that explicitly specify monetary behaviour and integrate it with the 'real' economy, rather than by models that concentrate on 'real' relationships and treat monetary behaviour as a (usually not integrated) residual of real behaviour" (Johnson, 1977)

As stated by Mussa (1976: 18), a monetary approach is essential for any meaningful discussion of the behaviour of the balance of payments. The credit policy of the banking system, according to Mussa, is linked directly to the balance of payments, and the adjustment mechanism cannot be properly analyzed without focussing on monetary policy and the resultant excess flows in demand for or supply of money. The MABP thus highlights the critical role of money in the adjustment process.

In the framework of the monetary approach, any balance of payments disequilibrium represents a disequilibrium in the money market, that is, imbalances between the demand for and supply of money (Melvin, 1984; Johnson 1976a, 1976b; Aghevli and Khan, 1977). Specifically, balance of payments deficits are considered to be a reflection of excessive money supply while payments surpluses are said to reflect excessive money demand. This view is in line with one of the classical principles which states that there can be no balance of payments deficit unless there is an excess supply of money. The balance of payments position of a country is, therefore, viewed as a reflection of decisions on the part of the country's residents to accumulate or run down their stock of money balances (Aghevli and Khan, 1977). Disequilibrium in the balance of payments is considered as a transitory phenomenon in the absence of continuous domestic credit creation or economic growth.

Specifically, the basic features of the monetary approach to balance of payments (MABP) adjustment are highlighted as follows:

(i) The approach relates to a small open economy. The small country assumption implies that the country under study cannot, for instance, significantly influence the levels of foreign income, prices, or interest rates that it faces (Swoboda, 1976: 239). In this case, the country's interest rates and the international prices of its traded goods and services will be equal to their respective world values and can, therefore, be regarded as exogenously determined. In a sense, the country is said to be a price taker in the world market and is thus faced with a parametric set of world prices and interest rates. Openness, on the other hand, implies that the country is largely engaged in international transactions with the rest of the world. Given the nature of Nigeria's imports which are mainly machinery and manufactured goods, and its exports which consist mainly of crude oil and some agricultural products, Nigeria could be rightly described as a small economy as it could not significantly influence the prices of these products.

(ii) The model assumes that the country's output and employment tend to full employment levels with reactions to changes taking the form of price and wage adjustments, and that the growth in real income is determined by factor inputs and the current technology. In other words, output is regarded as exogenous to monetary shocks. Based on the small country, long-run and full employment assumptions, the domestic income is assumed to be exogenous and unaffected by money supply.

(iii) The approach assumes that there are no binding overall restrictions between the country concerned and the rest of the world. In essence, there has to be some channels by which money can move in and out in response to demand and supply. This assumption will be difficult to justify in the present world that is characterised by sanctions and all forms of trade barriers, among other restrictions on goods and capital movements.

(iv) Given the above assumptions, it is argued that "any disequilibrium that emerges in the markets for goods and financial assets or in the money market will be fully reflected in the balance of payments" (Aghevli and Khan, 1977: 277). For instance, it is expected that an increase in money supply will generate a proportionate amount of loss of international reserves while a decrease in money supply will lead to a proportionate inflow of foreign reserves. This assumption could only hold if the monetary authorities do not pursue effective sterilization policy as equally assumed by the monetary approach.

(v) The approach assumes that there is a perfect substitution (that is, infinite cross elasticities of substitution in demand) across countries in both product and capital markets. This ensures one price for each commodity and one rate of interest. This "law of one price" implies that the MABP relies on the assumption of efficient market for goods, services and securities. This is one major criticism of the monetary approach. There are several reasons why the law of one price

may not hold. According to Bartolini (1995:46):

> transportation and information costs and institutional impediments to trade, such as tariffs and quotas, may limit consumers and firms responses to cross-country price differences, thus preventing absolute price levels from being equalised internationally

The existence of highly differentiated products particularly between the industrial and developing countries could make it difficult to justify the assumption of perfect substitution in goods and services.

(vi) The monetary approach focuses on the determinants of excess domestic flow in the demand for and supply of money. Thus, it assumes a stable money demand function and a stable process through which money supply is generated. The assumption of a stable money demand ensures that the demand for money is a function of a relatively few aggregate economic variables that are controllable independently of the money stock. It implies that the effects of economic changes on the demand for money can easily be assessed because they can operate only through one or several of these factors. With respect to the determination of money supply, a similar argument can also be made. By focussing directly on the relevant monetary aggregates, it is argued that this approach eliminates the intractable problems associated with the estimation of numerous elasticities of international transactions encountered in other orthodox (elasticity and income-absorption) approaches to the balance of payments policies. The question of

money demand stability is one of the major controversies between the Monetarists and the Keynesians on the relative effectiveness of monetary and fiscal policies in stabilising an economy. The Monetarists rely on the stability of money demand to argue that monetary policy is more effective than fiscal policy in achieving economic stability. As pointed out by Friedman (1971):

> if an unstable demand for money exists, the predictable results that a change in the money supply is to have on the level of income cannot exist, and the basis of the monetarist position is destroyed.

(vii) Since the balance of payments is assumed to be essentially a monetary phenomenon, it is claimed that effects of any balance of payments policy, such as tariffs or devaluation, cannot be properly analyzed without considering the monetary implications of the policy itself. It is believed that balance of payments policies will not produce an inflow of international reserves unless they increase the quantity of money demanded and unless domestic credit policy forces the resident population to acquire the extra money created through the balance of payments via an excess receipts over payments. As argued by Johnson (1977), "import quotas, tariffs, exchange controls and other interferences with trade and payments introduced for balance of payments' reasons" will improve the balance of payments only if their effect is to increase the demand for money, most obviously by raising the domestic price level.

(viii) Under the monetary approach, it is assumed that the country in question is maintaining a fixed exchange rate with the rest of the world. This assumption is not rigid as it has been demonstrated that the theory is equally applicable to a regime of flexible exchange rate. However, as we will illustrate later, the adjustment process/mechanism differs between the two exchange rate regimes.

(ix) It is also assumed that monetary inflows or outflows associated with the balance of payments surpluses or deficits are not sterilized within a period relevant to policy analysis. Instead, they influence the domestic money supply (Johnson, 1976). In other words, it is assumed that countries do not pursue effective sterilization policies over a long period either because they cannot or are unwilling to sterilize, as it is believed that sterilization policy suspends the automatic adjustment mechanism only temporally.

(x) Under the monetary approach, growths in income and price levels, by increasing money demand, are assumed to lead to external reserve inflows or surpluses in the balance of payments when exchange rate is fixed and to an appreciation of exchange rates when exchange rate is flexible. The growth in interest rate (by reducing money demand) and the growth in domestic credit (by increasing money supply) all result in external reserve outflows or deficits in the balance of payments and in exchange rate depreciation.

From the foregoing, one observes that the monetary approach runs counter to some of the propositions of the non-monetary approaches to the balance of payments theory. For instance, the Keynesian approach emphazises the marginal propensity to import as a major determinant of the balance of payments. In the Keynesian analysis, an increase in income or domestic price level will lead to higher imports and, consequently, to larger balance-of-payments deficits. The monetary approach on the other hand posits that an increase in income or price levels will generate excess demand for money and, thus, lead to external reserve inflows or balance of payments surpluses (Dornbusch, 1971; Mundell, 1968; Frenkel, 1971; and Johnson, 1977). Under the monetary approach, price increases (not financed by the monetary authorities) reduce the value of nominal cash balances and generate excess money demand, which also results in the balance of payments surplus. In addition, the Keynesian theory posits that expansion of domestic credit will improve the balance of payments by stimulating investment. The increase in investment, according to the theory, will raise productivity, lower domestic prices relative to foreign prices, and improve the balance of payments position. The monetary approach, however, postulates that expansion of domestic credit will generate excess supply of money which will result in external reserve loss or balance of payments deficit as residents attempt to get rid of the excess cash balances by purchasing goods and services abroad. The role of the interest rate in the balance of payments and exchange rate determination has been one of the most controversial issues in economics. According to the Monetarists, a high nominal interest rate reflects a high expected inflation rate which would lead to a decrease in the demand

for domestic currency, thereby resulting in the balance of payments deficit or exchange rate depreciation depending on the exchange rate system in place. In the Keynesian (Mundell-Fleming) view with the assumption of a slow adjustment of goods prices, a high interest rate reflects a tight monetary policy which would increase money demand leading to balance of payments surplus or exchange rate appreciation (Eun and Shim, 1989).

By focussing on import demand (current account), the Keynesian analysis is said to be relevant only in a world without capital flows as it ignores the capital account of the balance of payments completely. It is misleading in the present world with capital flows since it neglects the influence of money demand on export supply and import demand, and on the international flow of securities (Melvin, 1984, Johnson, 1976a). Thus, the apparent conflict in the monetary and Keynesian approaches could be resolved by the inclusion of capital flows in the Keynesian approach, since an autonomous investment-induced increase in income may induce more capital inflows than imports that may result in a balance of payments surplus (Kane, 1988: 230). Under the monetary and non-monetary approaches, exchange rate changes may lead to comparable, but temporarily different results. For instance, an exchange rate devaluation might yield comparable results under both approaches, but the effect might only be temporary under the monetary approach and permanent under the non-monetary approaches. The monetary approach even considers exchange rate changes as unnecessary since external equilibrium is automatically achieved in the long run.

The monetary approach regards all balance of payments disequilibria and all movements in the exchange rate not as problems in themselves but as resulting from a prior disequilibrium in the money market which will be self-corrected in the long-run. The non-monetary approaches consider the balance of payments disequilibrium as a problem in itself for which policies are required.

4.3 Adjustment Mechanism Under the Monetary Approach

As we pointed out earlier, the monetary approach considers external disequilibrium to be a monetary phenomenon resulting from stock imbalances between the demand for and supply of money. In the absence of any official intervention, the approach views external disequilibrium and internal monetary disequilibrium as transitory and self-correcting in the long-run. The approach is said to apply equally to fixed and floating exchange rate regimes, but the adjustment process differs between the two regimes. The adjustment process is highlighted below.

4.3.1 Balance of Payments Adjustment Under Fixed Exchange Rates

In a fixed exchange rate regime, external reserves flow between countries to adjust to the balance of payments equilibrium. The monetary authorities cannot control total money stock since they have to meet whatever demand that arises for foreign currency in order to maintain the fixed exchange rate. In this regard, the total money stock which consists of the domestic

component (i.e. domestic credit) and foreign component (i.e. foreign exchange reserves) becomes endogenous. Only the domestic component of the money stock (i.e. domestic credit) can be controlled by the monetary authorities. Any disequilibrium in the money market will, therefore, result in an adjustment which affects the demand for goods, services and assets.

When the money supply (M^s) exceeds the demand for money (M^d), the excess money balances will be spent on goods, services and assets. Given the assumptions of full employment and small country, the increase in expenditure resulting from the excess money supply will raise the prices of domestic goods only. In an open economy, with a high degree of substitutability between domestic and foreign goods, the rise in the prices of domestic goods switches demands to foreign goods, thereby leading to higher demand for foreign exchange. The excess of absorption over real income thus manifests itself as a deficit in the current account of the balance of payments. The excess supply of money balances also causes a decline in the domestic interest rate which could result in capital outflow, given the assumption of high degree of capital mobility. Thus, an excess supply of money, relative to the demand to hold it, causes a deficit both on the current and capital account of the balance of payments. This is the inevitable result of residents being unable to increase their demand for nominal money balances to match the increased supply of money, either by driving down interest rates or by raising the relative domestic price level when the exchange rate is fixed. The only way residents can get rid of their excess cash balances is by spending them on foreign goods, services and assets. This will reduce the stock of external reserves and, hence, domestic money supply. While a balance of

payments deficit is being run, the domestic money supply is declining due to the depletion of foreign exchange reserves to finance the deficit. This will continue until internal monetary equilibrium is achieved.

In the case of excess demand for money over the supply, domestic residents will tend to reduce their expenditure in order to increase their cash balances. Consequently, aggregate income will fall, and there will be a tendency for expenditure on foreign goods, services and foreign securities to fall. The demand for foreign exchange will fall and this will result in a balance-of-payments surplus. Given the assumptions of the monetary approach, the only way to obtain the desired additional money balances is to obtain an expansion of money supply by running a balance-of-payments surplus.

The steps in the adjustment process under a fixed exchange rate regime can be stated schematically as follows:

(i) An excess supply of total money stock ($M^s > M^d$) will result in:

(a) an increase in expenditure on domestic and foreign goods, services and securities by domestic residents;

(b) a deficit in the balance of payments due to the increase in expenditure on foreign goods, services;

(c) a fall in foreign exchange reserves as the monetary authorities attempt to finance the deficit by running down foreign exchange reserves;

(d) the outflow of foreign exchange reserves leads to a reduction in the foreign component of money supply (R) and consequently to the total money supply ($M^s \downarrow$), until money supply is equal to money demand ($M^s = M^d$); and

(e) an equilibrium in the balance of payments is restored as equilibrium in the money market is achieved, halting further outflow of foreign exchange reserves.

(ii) When there is excess demand for money ($M^d > M^s$), the following will occur:

(a) a reduction in expenditure on both domestic and foreign goods, services, and securities;

(b) a surplus in the balance of payments due to the reduction in expenditure on foreign goods, services and securities;

(c) an increase in external reserves as the monetary authorities buy the excess foreign exchange from the domestic residents;

(d) the inflow of foreign reserves expands the foreign component of money supply (R), thereby increasing the total money supply ($M^s \uparrow$), until money supply is equal to money demand ($M^d = M^s$); and

(e) an equilibrium in the balance of payments is restored as equilibrium in the money market is restored, halting further inflow of foreign exchange reserves.

From the foregoing, one observes that the balance of payments disequilibrium is merely a symptom of some prior disequilibrium in the domestic money market. More importantly, external reserves flow represents a way of establishing equilibrium in the domestic money market under a regime of fixed exchange rate.

There are at least two main reasons why the adjustment mechanism described above may not hold. Firstly, the adjustment process is based on the assumption that domestic and foreign goods, services and securities are substitutable. Secondly, there is the assumption of no effective sterilization operation. Indeed, the ability of the monetary authorities to sterilize external reserve flows could make irrelevant the adjustment process. The contractionary or expansionary effects of external reserve flows on total money supply would not take place if the monetary authorities pursue effective sterilization policies by expanding or contracting domestic credit to offset the direct link between reserve flow and domestic money supply. These are, however, empirical issues that need to be investigated.

4.3.2 Balance of Payments Adjustment under Freely Floating Exchange Rate Regime

Under a freely floating exchange rate system, the adjustment of money supply to money demand is achieved by changes in the domestic prices and also by changes in the exchange rates, rather than by changes in external reserves. Since the exchange rate freely adjusts to maintain monetary equilibrium and, by extension, external equilibrium, the balance of payments must always be in equilibrium and there can be no change in foreign reserve assets. Since the foreign

reserve assets can no longer adjust to restore domestic monetary equilibrium, the domestic money supply is insulated against external monetary flows. The money supply now becomes an exogenous variable or a policy instrument under the direct control of the monetary authorities. Internal monetary disequilibrium will, thus, manifest itself as exchange rate fluctuations. An excess demand for money now results in appreciation of the exchange rate, while an excess supply of money results in depreciation of the exchange rate. Equilibrium in the domestic money market is now achieved through exchange rate changes which operate through domestic price changes to change the value of the nominal money stock.

Schematically, the steps in the adjustment process under the flexible exchange rate regime can be stated thus:

(i) When there is excess supply of money ($M^s > M^d$), the following will occur:

(a) Expenditure on both domestic and foreign goods, services and securities will increase.

(b) The increase in expenditure on foreign goods, services and securities will result in a tendency towards balance of payments deficit (but this cannot occur). The balance of payments (BOP), by assumptions, will always be in equilibrium since there will be no contraction of money supply arising from reduction in foreign exchange reserves like under the fixed exchange rate system.

(c) However, in the foreign exchange market, the value of domestic currency falls (exchange rate depreciation).

(d) Exchange rate depreciation increases the price of domestic imports in terms of domestic currency and reduces the prices of exports in terms of foreign currency (but raises the prices of exports in terms of domestic currency).

(e) The level of domestic prices rises due to the increased demand for domestic goods by foreigners and by import substituting residents which increase aggregate demand at home.

(f) The increase in the level of domestic prices leads to a fall in the real money supply until it is equal to the level of real demand for money. Inflation in the domestic economy will continue until the price level has risen sufficiently enough to equalise the demand for and supply of real money balances.

(g) Equilibrium exchange rate is thus obtained as real money supply equals real money demand.

(ii) When there is an excess demand for money ($M^d > M^s$), the opposite adjustment will occur:

(a) There will be a reduction in expenditure on both domestic and foreign goods, services and securities.

(b) The reduction in expenditure on foreign goods, services and securities results in a tendency towards balance of payments (BOP) surplus but this cannot occur because the BOP by assumption is always in equilibrium, as there is no expansion of money supply resulting from an increase foreign exchange reserves as we have under fixed exchange rate system.

(c) However, in the foreign exchange market, the value of domestic currency rises (appreciates).

(d) Exchange rate appreciation leads to reduction in the prices of imports in terms of domestic currency and to increases in the prices of exports in terms of foreign currency (but reduces the prices of exports in terms of domestic currency) exports.

(e) The level of domestic prices falls (reduces).

(f) The fall in the level of domestic prices increases the real stock of money up to the level of real demand for money.

(g) Equilibrium exchange rate is thus obtained, as real money demand equals real money supply.

The adjustment process under flexible exchange rates is also based on some restrictive assumptions such as the existence of a stable money demand and the PPP condition, some of which may not hold in a developing country like Nigeria.

4.4 Review of Existing Empirical Evidence on the Monetary Approach

With the renewal of academic interest in the monetary approach to balance of payments and exchange rate determination, a number of empirical studies have been conducted to verify the validity of the theory. The initial studies on MABP under a fixed exchange rate system can be found in Frenkel and Johnson (1976), while those under a flexible exchange rate system can be found in IMF (1978). Most of the studies relate to the advanced or industrial countries, while only very few can be found for the developing countries. Some of the major empirical findings are reported below under two main headings: evidence based on data for industrial countries and evidence based on data for developing countries.

4.4.1 Evidence Based on Data for Industrial Countries

With respect to the monetary approach to balance of payments under a fixed exchange rate regime, most of the studies have focussed on the influence of changes or growth in determinants of money demand as well as domestic component of money supply on changes or growth in external reserves. The results of these studies in most cases support the propositions of the monetary approach. For instance, Courchene and Youssef's (1967) study of the relative influence of imports and money supply on the demand for foreign exchange reserves for a group of nine countries (Switzerland, Netherlands, Denmark, Sweden, Germany, Belgium, Italy, Japan and Australia) indicates that money supply is superior to the level of imports in determining the level of foreign reserves. Their empirical results indicate that money supply and long-term

interest rate are arguments in the demand function for individual country's foreign exchange reserves. From their study, Courchene and Youssef conclude that "the application of the concepts of monetary theory to the field of international payments can be very fruitful".

In another related study, Courchene and Singh (1977) attempt to determine the degree to which the behaviour of the international monetary system, especially country-by-country changes in international reserves, lends support to the monetary interpretation of the balance of payments. The thirteen "industrial" countries listed in the IMF's International Financial Statistics were selected together with Switzerland for the study. The study attempts to explain quarterly changes in international reserves in terms of monetary aggregates such as the excess demand for real money balances in the home country, the excess demand for money in the world and the change in world reserves. The following hypotheses relating to the monetary approach to balance of payments were examined by the study:

(i) an increase in the excess demand for real balances in country j will lead to an increase in the balance of payments surplus of country j, and vice versa.

(ii) an increase in the excess demand for real balances in the world will decrease the balance of payments surplus in country j and vice versa.

(iii) an increase in world reserve will result in a balance of payments surplus for country j, other things remaining constant.

The results of the study lend empirical confirmation to the dictates of the monetary approach to the balance of payments.

Zecher's (1976) study of Australia, Genberg's (1976) study of Sweden, Bean's (1976) study of Japan, and Guitan's (1976) study of Spain are all consistent with the predictions of the monetary approach to balance of payments.

In Zecher's empirical study, the effects of interest rate on foreign reserve flows, are however, found to be weak, but not inconsistent with the overall regression results. The negative relation between foreign reserve flows and interest rate implied by the monetary approach to balance-of-payments theory is confirmed by the study. As implied by the hypothesis, growth in output and price levels are associated with balance of payments surpluses, while growth in the domestically determined portion of the money stock tends to be associated with deficits or reserve outflows. In his own study, Genberg observes that the sterilization hypothesis does not offer a very plausible alternative to the explanation of reserve flows in Sweden. Bean's empirical analysis of Japan supports the theses of the monetary approach and suggests that the approach provides a useful framework for analysing the balance of payments. As predicted by the monetary approach, Ujiie's (1978) study of Japan also finds that an expansion or contraction of domestic credit has a strong impact on the balance of payments.

On the monetary approach to exchange rate determination under a flexible exchange rate regime, Blejer and Laiderman (1981) carry out an analysis of joint determination of exchange rate, international reserves, and the rate of inflation under a crawling-peg system, using quarterly data from Brazil for the period, 1966-77. A full-information maximum likelihood method is used to estimate the structural model. The results obtained are also in line with the

assumptions of the monetary approach. Their empirical results show that:

> an increase in the rate of domestic-credit creation will generally tend to raise domestic inflation, reduce international reserves and depreciate the exchange [rate].

Examining the experiences of several European countries after the First World War under the regime of floating exchange rate, Tsiang (1959) observes moderate exchange rate fluctuations in countries that restrict expansion in money supplies. This made him conclude that:

> the sharp and cumulative depreciation of the Franc in 1926, which used to be cited as an example of the inevitable instability of a floating exchange rate system, was really due to the virtually infinitely elastic supply of money at a pegged interest rate then prevailing in France.

Tsian's empirical observations led to his theoretical article in 1961 which emphasises the vital role played by money supply in the balance of trade.

Bilson (1978) examines the empirical validity of a simple monetary model of exchange rate determination and obtains results that are consistent with the predictions of the monetary approach. He uses monthly data for the Federal Republic of Germany and the United Kingdom, thereby demonstrating the usefulness of the monetary approach in the analysis of short-run behaviour and as a guide to intervention policies.

In his contribution, Frenkel (1978) examines the factors influencing exchange rate during the German hyper-inflation, a situation in which he perceives the source of disturbances to be monetary. The results of his empirical study are consistent with the monetary approach to exchange rate determination. In Dornbusch's (1978) study of the determination of exchange

rates and of the operation of flexible exchange rate system, the empirical evidence shows that exchange rate, as a first approximation, is determined in the asset markets. His empirical results also indicate that expectations and changes in money supplies dominate the course of the exchange rate in the short run.

Hodrick (1978) considers the United States as the home country and examines the monetary approach to the determination of exchange rates for the United Kingdom and Germany. Monthly data, covering the period July 1972 to June 1975 for the United Kingdom, and April 1973 to September 1975 for Germany are used in the study. The regression results when the variables are in their levels of the natural logarithms and when the variables are in rates of change are broadly consistent with the predictions of the monetary model.

Mussa (1978) extends the fundamental principles of the monetary approach to the analysis of a regime of floating exchange rates, with active intervention by the authorities to control exchange rate movements. He is of the view that "real" factors as well as monetary factors are important in determining the behaviour of exchange rates, and that changes in exchange rates are frequently induced by "real" factors operating through monetary channels.

Hoffman and Schlagenhauf (1985) examine the impact of news on alternative theories of exchange rate determination, including the monetary approach in terms of U.S. dollar/French franc, U.S. dollar/pound, U.S. dollar/deutsch mark and U.S. dollar/yen exchange rates. Using quarterly data and what he terms as "news" framework, which judges models on how unanticipated changes in explanatory variables influence the spot exchange rate, he obtains

empirical results which suggest that neither the monetarist nor portfolio-balance models, in general, outperform the other models considered. According to him, all the models (seven in number) are characterised by low adjusted coefficient of multiple determination ($\bar{R}^2$) and frequent counter-intuitive signs. However, he is of the view that the traditional flow approach is clearly inferior to asset market models. Quoting the work of Meese and Rogoff published in 1983, he argues that his empirical results are not entirely surprising given that a number of papers have found that structural models have not performed well over the 1970s. He is of the view that continued investigation will clearly be required to determine whether or not the increased interest generated by newly developed theoretical models of exchange rate determination yield empirical structures that are consistent with observed data.

MacDonald and Taylor (1991) re-examine the monetary approach to exchange rates for three key currencies, namely those of Germany, Japan and United Kingdom, and come out with two important findings. Firstly they demonstrate, using the recent multivariate cointegration techniques, that an unrestricted monetary model is a valid framework for analysing the long run exchange rate. Secondly, they find that the proportionality of the exchange rate to relative money supplies is valid for the German mark. This result contrasts sharply with the findings of other researchers like Meese (1987) who were unable to discover even a long-run relationship for the monetary variables.

El-Shazly (1989) extends the basic monetary model of exchange rate determination to capture the impact of real shocks in explaining exchange rate behaviour. The study, which

modifies the standard model by incorporating the relative price of oil on the demand for money, examines the behaviour of the dollar/pound rate of exchange over the period, 1978 - 1985. The empirical findings support the monetary model during the period.

4.4.2 Evidence Based on Data for Developing Countries

In the developing economies, the few empirical studies relating to the analysis of monetary model under a fixed exchange rate system include those of Tsiang (1957) on the Peruvian economy; Aghevli and Khan (1977) on 39 developing countries; Bhatia (1982) on Indian economy; Uddin (1985) on India, Pakistan and Thailand; and Asogu (1985) on Nigeria. For the monetary analysis of flexible exchange rate, we could identify the works of Fry (1976) on Afghanistan; Edwards (1983) on Peruvian economy; Lyons (1992) also on Peruvian economy; and Odedokun (1992) on five countries including Nigeria in the Sub-Saharan Africa.

In terms of the MABP under the fixed exchange rate regime, Aghevli and Khan's (1977) study, using cross-sectional data for 39 developing countries, gives a strong indication of the usefulness of the monetary approach in explaining the rate of growth in international reserves of developing countries. The study gives plausible results with most of the relevant explanatory variables exerting statistically significant influence on the rate of growth in money balances (real or nominal) which represents a crucial relationship of the monetary approach or on the rate of growth in international reserves. The empirical results, however, could not strictly justify the assumptions that prices and real income are exogenous. This, according to Aghevli and Khan,

implies that an increase in the domestic component of high-powered money will not all leak out in the balance of payments. In other words, there does not appear to be a one-to-one correspondence between the domestic component of high-powered money and the balance of payments.

Bhatia's (1982) empirical results conform to the propositions of the monetary approach to balance of payments with fixed exchange rate. Two functional relations pertaining to the demand for money and international reserve flows are tested and both give plausible results with most of the relevant explanatory variables exerting significant influence on the demand for nominal money balances as well as the rate of growth of international reserves. Bhatia, therefore, concludes that increasing government deficits, particularly due to income inelastic revenue structure, led to excessive expansion of domestic credit and finally to a loss of foreign exchange reserves during certain years of the sample period.

Uddin (1985) applies his empirical analysis to three countries - India, Pakistan and Thailand - with varying degrees of capital mobility. In contrast with Bhatia, Uddin finds that the monetary model performs poorly in the case of India which, according to him, has the least degree of capital mobility among the three developing economies of the South Asian region examined. Uddin observes moderate performance of the model in the case of Pakistan with moderate degree of capital mobility and very good performance in the case of Thailand, with the highest degree of capital mobility and openness. From his empirical findings, he concludes that the applicability of the monetary approach to balance of payments in any economy depends

mainly on the economic characteristics of the economy under study, particularly on the degree of capital mobility. Among the three countries (India, Pakistan and Thailand) studied, Uddin observes that the degree of capital mobility in India was least because of the various exchange control regulations and other restrictions imposed by the authorities, while Thailand's exchange arrangements, according to him seem to be the most liberal.

Asogu's study which tests the various assumptions of the monetary approach for Nigeria has a lot of doubts surrounding the validity of its results. The results indicate that money supply and domestic credit are insignificant, apart from possessing wrong signs in explaining variations in international reserves. Though the author attributes the prevalence of the inelastic responses in most of the regression equations to the over-control of the economy, there is no doubt that the problem lies, as Akinnifesi (1986) points out, on the mis-specification errors in the model.

With respect to monetary approach to exchange rate determination, while the empirical studies of Fry (1976) and Edwards (1983) for Afghanistan and Peru, respectively, lend support to the propositions of the monetary approach, that of Lyons (1992) comes out with contradictory results. Odedokun's (1992) study which analyzes the monetary approach to floating exchange rates in five Sub-Saharan African countries for the period, 1986 - 92, comes out with results that are in support of the approach.

From the above literature, one observes that the monetary model has generally performed well in both the developed and developing economies in explaining the balance of payments or external reserve flows during the period of fixed exchange rates. When it comes to the analysis

of floating exchange rate system, the whole idea about the monetary approach becomes, as noted by Odedokun (1992:1), an unsettled issue at the empirical level. This could be attributed to, among other factors, the high exchange rate volatility that has been observed since the advent of the generalised exchange rate floating of 1973 and the fact that governments, even in the developed countries, often intervene in the supposedly floating foreign exchange markets for several reasons. As we observed earlier, the monetary approach to exchange rate determination assumes that the exchange rates are permitted to float freely. Thus, in the present real world situation where exchange rate is very volatile and often moves very erratic, while governments intervene frequently in its determination, the performance of the monetary model as well as other models of exchange rate determination will not be expected to be very satisfactory.

CHAPTER FIVE

METHODOLOGY, MODEL SPECIFICATION AND ESTIMATION TECHNIQUES

5.1 Introduction

An empirical analysis of the monetary approach to balance of payments and exchange rates rests on three building blocks, namely, money demand function, money supply function, and the condition defining equilibrium in the money market. From the equation defining money market equilibrium, equations for the determination of the balance of payments (as measured by foreign exchange reserve flows) and exchange rates are derived, based on the prevailing exchange rate regime. The procedure is discussed below.

5.2 The Money Market

5.2.1 Money Demand

The demand for real money balances is generally specified as a function of real income or wealth and one or more opportunity costs of holding cash as a nominally non-interest bearing asset (Boorman, 1976; Deadman and Ghatak, 1981, Levacic, 1976; and Shahi, 1977). Other variables such as the rate of return on holding foreign currency (currency substitution effects) have also been pointed out in the literature to be among the determinants of money demand (Adam, 1992:20).

The nature of demand for money in Nigeria, as in other developing countries, is still a subject of empirical investigation. The pioneering work by Tomori (1972) on the demand for money in Nigeria generated a lively debate, christened the "TATOO" debate (Ajayi and Ojo, 1980), where the letters stand for the publications of Tomori (1974), Ajayi (1974), Teriba (1974), Odama (1974) and Ojo (1974), respectively. Since that time, more studies have been conducted by other scholars including Ajayi (1977), Akinnifesi and Phillips (1978), Fakiyesi (1980) and Obioma (1987). Despite the mass of literature on the empirical analysis of the demand for money in Nigeria, a lot of controversies still surround some basic issues that are necessary for effective monetary policy and analysis. Such issues include the determination of sizes and magnitudes of income and interest rate elasticities in the demand for money, and the class of assets that constitutes the closest substitutes for money, as well as the stability of money demand function.

For this study, we assume a demand for real money balances that is a function of real income and a few opportunity cost variables such as interest and inflation rates. The choice of relevant opportunity cost variables of holding money in the developing economies is a highly controversial issue. Much of the controversy derives from the inconclusive evidence on the nature of substitutability between money and other financial assets. In the developed countries where there are well developed financial markets, the opportunity cost of holding real money balances can be represented by the rate of interest on alternative financial assets. In Nigeria, the choice of appropriate interest rate is an empirical issue since all interest rates seem to have

generally moved in the same manner even in the era of interest rate deregulation. However, following previous empirical evidence on the issue (see Ajayi, 1974; and Obioma, 1987), we choose treasury bills rate as the most relevant opportunity cost for holding cash balances in Nigeria. In the developing countries with limited range of alternative financial assets, it is also argued that substitution can take place between goods and money (Adekunle, 1968; Ojo, 1974; and Aghevli and Khan, 1977). In this case, the rate of inflation which mirrors the degree of substitution between money and physical assets can be included as one of the opportunity cost variables in the demand for money function.

Another issue of concern is the choice of appropriate price deflators. There are several price series that one can use, including the consumer price index (CPI), the GDP deflator and the wholesale price index (WPI). The CPI is however chosen on two main reasons. Firstly, the CPI is a more consistent available price series for Nigeria than the other price series; it is reported on both monthly, quarterly and annual bases. Secondly, the CPI gives, to a large extent, a true reflection of the real prices faced by consumers relative to other officially reported price series, since private consumption has over time been above 60 to 86 per cent of GDP in Nigeria (see IMF 1995: 174-175). As pointed out by Adam (1992:21), "using a CPI measure is acceptable if it is a true reflection of real prices faced by consumers".

From the foregoing, the demand for real money balances in Nigeria can be specified as:

$$\frac{M^d}{P} = F(y, r, \pi) \qquad \ldots\ldots (5.1)$$

where, $F_y > 0$; F_r, $F_\pi < 0$

M^d = demand for domestic nominal money balances;

P = domestic price level as measured by the consumer price index;

y = level of domestic real income;

r = domestic interest rate; and

π = rate of inflation, calculated as $(P_t - P_{t-1})/P_{t-1}$, with P_t and P_{t-1} denoting the current and previous domestic price levels, respectively.

Taking equation (5.1) as our starting point, and assuming an exponential function, we have:

$$\frac{M^d}{P} = \alpha_0 \, y^{\alpha 1} \, r^{-\alpha 2} \, \pi^{-\alpha 3} \, e^u \quad \ldots\ldots (5.2)$$

If we let g denote the relative growth rate of the variable appearing as a subscript in the following and subsequent equations, differentiating equation (5.2) logarithmically with respect to time and then transforming the equation into rates of growth, we have:

$$g_M{}^d - g_P = \alpha_0 + \alpha_1 g_y - \alpha_2 g_r - \alpha_3 g_\pi + u \quad \ldots\ldots (5.3)$$

where:

$g_M{}^d$ = rate of growth in the demand for nominal money balances;

g_P = rate of growth in domestic price level;

g_y = rate of growth in real income;

g_r = rate of growth in interest rate;

g_π = rate of growth in inflation;

α_0 = constant term;

u = error term; and

α_1, $-\alpha_2$, $-\alpha_3$ = the coefficients of real income, interest rate, and inflation rate respectively with respect to the demand for real money balances.

As shown in equation (5.3), the rate of growth in real income is positively related to the rate of growth in the demand for real money balances, while rates of growth in interest and inflation rates are inversely related to the rate of growth in real money demand.

Equation (5.2) can be specified in nominal terms, if it is assumed that the demand for money function is not homogenous of degree one in prices. This can be done by simply multiplying both sides of equation (5.2) by the price level (P). This yields:

$$M^d = P\ \Theta_0 y^{\Theta 1}\ r^{-\Theta 2}\ \pi^{-\Theta 3}\ e^u \qquad \ldots\ldots\ (5.4)$$

Expressing the variables in terms of their rates of growth yields:

$$g_M{}^d = \Theta_o + g_p + \Theta_1 g_y - \Theta_2 g_r - \Theta_3 g_\pi + u \qquad \ldots\ldots\ (5.5)$$

The growth in the domestic price level is expected to have a positive effect on the demand for nominal money balances. As the rate of growth in domestic price level increases, real money balances decrease. Residents now demand for more money to augment their real cash balances. In the absence of money illusion, the coefficient of g_p is set equal to unity. The two money demand functions, equations (5.3) and (5.5), will thus be identical if the coefficient of growth in domestic price level (g_p) in equation (5.5) is equal to unity.

5.2.2 Money Supply

The money supply process which is the second building block of the monetary approach is generally expressed as:

$$M^s = aH \quad \ldots\ldots \quad (5.6)$$

where,

M^s = nominal stock of domestic money;

H = stock of high-powered money or reserve money or monetary base;

a = money multiplier, defined as $\frac{M^s}{H}$

The high-powered money (H) has two components: the foreign component, consisting of the net foreign assets or international reserves (R), and the domestic component, the net domestic assets or net domestic credit (D). The equation for high-powered money can thus be stated as:

$$H = R + D \quad \ldots\ldots \quad (5.7)$$

Equation (5.7) expresses the stock of high-powered money as the sum of stock of international reserves (R) and the domestic asset (net of liabilities) holdings of the monetary authorities (D). By substituting equation (5.7) into equation (5.6), we derive the money supply equation as:

$$M^s = a(R + D) \quad \ldots\ldots \quad (5.8)$$

where all variables are as previously defined.

5.2.3 Money Market Equilibrium

The third building block of the monetary model is the condition defining equilibrium in the money market. Although it may be possible to specify a lagged adjustment monetary model but, for simplicity, we assume that the supply of money is instantaneously adjusted to its demand since, as Johnson (1976) has pointed out, any adjustment process will only influence the composition rather than the overall balance of payments. As indicated earlier, the MABP is concerned primarily with the overall rather than the individual components of the balance of payments. Moreover, as Bean (1976: 334) has observed, "the model is geared to long-run analysis and acknowledges the transitory periods of stock adjustment".

Equilibrium in the money market thus involves equating equations (5.4) and (5.8):

$$P\,\Theta_0\,y^{\theta 1}\,r^{-\theta 2}\,\pi^{-\theta 3}\,e^{u} = a(R + D) \qquad \ldots\ldots (5.9)$$

As we observed in chapter 4 of this thesis, the adjustment mechanism that ensures that the equilibrium condition in equation (5.9) is fulfilled varies with the exchange rate regime. Under a fixed exchange rate regime, money supply adjusts to money demand through international reserve flows via the balance of payments imbalances. In a flexible exchange rate regime, money demand adjusts to an exogenous money supply via exchange rate changes. However, under a "dirty" float or managed float, the adjustment mechanism involves changes in both international reserve flows and exchange rates.

With the assumption of the purchasing power parity (PPP), the relationship between the domestic and foreign price levels can be expressed as:

$$P = EP^f \quad \ldots\ldots (5.10)$$

where,

E = nominal exchange rate (defined in terms of units of domestic currency per unit of foreign currency);

P = domestic price level;

P^f = foreign price level, where superscript f denotes foreign notation in the rest of the thesis.

Substituting equation (5.10) into equation (5.9), we have:

$$EP^f \ \Theta_o \ y^{\theta 1} \ r^{-\theta 2} \ \pi^{-\theta 3} \ e^u = a(R + D) \quad \ldots\ldots (5.11)$$

The PPP condition implies that the monetary authorities must make a policy choice between an exchange rate or a domestic price level. Since $P = EP^f$, E is constant under a fixed exchange rate system so that maintaining the pegged value of E implies, in the absence of any trade barrier and other impediments to perfect competition, that the domestic price level will correspond to that of the rest of the world. In other words, the domestic price level must change or grow at the same rate with the foreign price level (i.e. $g_p = g_p^f$) in order to maintain the fixed exchange rate. This condition results in what is generally termed imported inflation, a situation in which a country finds it difficult to insulate itself from foreign inflation. However, with flexible exchange rate system, exchange rate is free to vary to any level so that the domestic rate of inflation can be chosen independently of the rest of the world. If the domestic level of inflation is lower than the foreign rate of inflation, the domestic currency tends to appreciate

through the process of the PPP theorem. If the domestic level of inflation is higher than the foreign rate of inflation, the domestic currency tends to depreciate (Melvin, 1984).

Converting equation (5.11) into rates of growth and re-arranging the terms, we have:

$$\left(\frac{R}{H}\right)g_R - g_E = \theta_0 + g_{P^f} + \theta_1 g_y - \theta_2 g_r - \theta_3 g_\pi - g_a - \left(\frac{D}{H}\right)g_D + u \quad \ldots\ldots (5.12)$$

where,

H = R + D, as in equation (5.7)

g_R = rate of growth in international reserves;

g_E = rate of growth in nominal exchange rate;

g_D = rate of growth in net domestic credit;

g_a = rate of growth in money multiplier;

g_P^f = rate of growth in foreign price level whose coefficient is expected to be equal to unity; while other variables remain as previously defined.

As would be observed in sections (5.3) and (5.4) below, two sets of equations - external reserve flow equations and exchange rate equations - can be derived from equation (5.12) for the purpose of testing the predictions of the MABP under fixed and flexible exchange rate regimes.

External reserve flow equations are used to test the proposition of the monetary approach that a country's balance of payments or changes in its external reserves are a result of excess demand for or supply of money as a stock by its residents under a fixed exchange rate system.

If R denotes external reserves of a country in question, then the dependent variable in a reserve flow equation is R which can be expressed in logarithms, rate of change or growth terms. The explanatory variables are the determinants of money demand and money supply, such as (real) domestic income, price level, inflation rate, interest rate, money multiplier and domestic credit. These variables can also be expressed in logarithms, rate of change or other forms depending on appropriate functional form (Obadan, 1995).

Exchange rate equations are used to test the propositions of the monetary model under a flexible exchange rate system. Exchange rate, which can also be expressed in logarithm, rate of change or growth terms is the dependent variable, while the determinants of money supply and money demand constitute the explanatory variables in the exchange rate equations. The process of deriving the equations is discussed below.

5.3 External Reserve Flow Equation

Under a fixed exchange rate system, the rate of change or growth in exchange rate is/or tends towards zero. Thus, the variable, g_E, denoting the rate of growth in exchange rate in equation (5.12) can conveniently be excluded from the equation. The growth in domestic price level (g_p), as explained earlier, will be equal to the growth in foreign price level (g_p^f) if the fixed exchange rate is to be maintained. Thus, one can include either the growth in domestic price level (g_p) or growth in foreign price level (g_p^f) as one of the explanatory variables in the reserve flow equation. We then have the basic equation for the determination of external reserve flows, expressed as:

$$\left(\frac{R}{H}\right)g_R = \theta_0 + g_{P^f} + \theta_1 g_y - \theta_2 g_r - \theta_3 g_\pi - g_a - \left(\frac{D}{H}\right)g_D + u \quad \ldots\ldots (5.13)$$

or alternatively as:

$$\left(\frac{R}{H}\right)g_R = \theta_0 + g_P + \theta_1 g_y - \theta_2 g_r - \theta_3 g_\pi - g_a - \left(\frac{D}{H}\right) g_D + u \quad \ldots\ldots (5.13a)$$

where all terms remain as previously defined.

In line with the principles of the MABP, equation (5.13) or its variant, equation (5.13a), states that growth in foreign exchange reserves is positively related to the growths in real income (g_y) and foreign price level (g_p^f) or, alternatively, growth in domestic price level (g_p), and inversely related to the growths in interest rate (g_r), inflation rate (g_π), money multiplier (g_a), and domestic credit $\left(\frac{D}{H}\right)g_D$. The parameter relating to income is expected to be positive while those relating to interest and inflation rates are expected to be negative. The coefficients of the other variables, g_p^f, g_p, g_a and $\left(\frac{D}{H}\right)g_D$, are expected to be in the neighbourhood of +1, +1, -1 and -1 respectively.

An increase in the domestic price level is expected, in the first instance, to reduce the stock of real money balances. Other things being equal, the reduction in the stock of real money balances will lead to an increase in the demand for money, in order to restore real money balances to their previous position. This may not be met by an increase in domestic money supply, but by an inflow of foreign reserves just sufficient to restore real money balances to their

previous level. An increase in foreign price level is also expected to have similar effect. An increase in any of these two variables, g_a and $\left(\frac{D}{H}\right)g_D$, will lead to an increase in the supply of money, and through the adjustment mechanism discussed in section (4.3) of chapter 4, results in an outflow of foreign reserves. The outflow of foreign reserves occurs as residents attempt to get rid of the excess money supply through increased purchase of foreign goods and assets. A decrease in any of the two variables will have the opposite effects on external reserve flows.

For estimation purposes, we write equation (5.13) as follows:

$$\bar{g}_R = a_0 + a_1 g_P^* + a_2 g_y + a_3 g_r + a_4 g_\pi + a_5 g_a + a_6 \bar{g}_D + u \quad \ldots\ldots (5.14)$$

where,

$\bar{g}_R$ = $\left(\frac{R}{H}\right)g_R$

$\bar{g}_D$ = $\left(\frac{D}{H}\right)g_D$

g_p^* = growth in either the domestic or foreign price level, since by the PPP method, $g_p = g_p^f$ under a fixed exchange rate system

a_0 = constant term

a_1 = coefficient of rate of growth in price level which is expected to be positive and in the neighbourhood of +1.

a_2 = coefficient of rate of growth in real income, which is expected to be positive.

a_3 = coefficient of rate of growth in interest rate which is expected to be a small negative number

a_4 = coefficient of rate of growth in inflation rate which is also expected to be a small negative number.

a_5 = coefficient of rate of growth in money multiplier which is expected to be negative and in the neighbourhood of -1.

a_6 = coefficient of rate of growth in domestic credit which is expected to be negative and also in the neighbourhood of -1.

u = stochastic disturbance term.

From the above model, one observes that both real and monetary variables interact through the money demand and money supply to determine the balance of payments or international reserve flows. However, the real variables enter into the model through their influence on money demand.

Most of the empirical studies on the monetary approach to balance of payments under a fixed exchange rate system have confirmed the validity of this model or its variants (see Dhliwayo, 1996). We, therefore, adopt the model for the monetary analysis of balance of payments determination under a fixed exchange rate system for this study. However, there are certain problems that could arise in fitting the model with the Nigerian data. Firstly, the problem of multicollinearity might arise when either g_p^* and g_π or g_a and $\bar{g}_D$ are included in the same equation. To solve this problem, we adopt the strategy of starting from the general to the specific. In other words, we start by estimating the model with the inclusion of all the

explanatory variables as specified in equation (5.14). Then, guided by the traditional test statistics and economic criteria, some of the variables will be dropped, except where the exclusion of any of the variables reduces the overall performance of the model.

Secondly, a spurious simultaneity might arise in the estimation of equation (5.14) if the assumption of "no sterilization" does not hold. Sterilization is the ability of the Central Bank to offset or neutralise external reserve flows and follow an independent monetary policy without having foreign reserve flows offset the monetary goals of the Bank. Under the MABP with fixed exchange rates, a country that has an excess supply of money would lose international reserves or run a deficit until money supply equals money demand. However, if for some reasons, the monetary authorities desire this higher money supply and react to the deficit by further increasing the money supply, then the deficit will increase and persist as long as the money supply is kept in excess of money demand. The reverse would be the case for an excess money demand (Obadan, 1995:27). Sterilization thus enables the Central Bank to keep the base money and the total money supply constant by decreasing or increasing domestic credit by an amount equal to the growth of international reserves. Hence, if sterilization is possible, the link between the balance of payments (external reserve flows) and the domestic stock of money (domestic credit), which is central to the monetary approach, will be broken through sterilization operations by the Central Bank (Dornbusch and Fischer, 1990:767). In addition, the ordinary least squares (OLS) estimates of the external reserve flow equation (5.14) will give biased estimates of the regression parameters (Uddin, 1985:93). The issue of sterilization, therefore,

needs to be investigated in this study. Following the suggestion by Melvin (1984: 98-99), a test of sterilization requires the investigation of the properties of an equation like:

$$\bar{g}_D = b_0 - b_1\bar{g}_R + u_t \quad \ldots\ldots (5.15)$$

where, b_0 is constant term and b_1 is the sterilization coefficient whose value ranges from 0 (when there is no sterilization) to 1 (when there is complete sterilization), while other terms are as previously defined.

5.4 Exchange Rate Equation

Under a flexible exchange rate system with no Central Bank's intervention, the MABP assumes that the change in foreign reserve flows (i.e. the balance of payments) is zero or very insignificant, while changes in exchange rates are non-zero. Thus with flexible exchange rate, it is assumed that domestic monetary policy will not cause flows of money internationally but will lead to exchange rate changes. The monetary authorities can, therefore, exercise sufficient control over the supply of money, while the interaction of domestic and foreign monetary policies determines the exchange rate rather than the balance of payments, which assumes zero magnitude by definition. Under this condition, the variable ($\bar{g}_R$) depicting the growth rate in foreign reserves will drop out from equation (5.12). We then have an equation for the determination of exchange rate, expressed in this form after re-arranging the terms:

$$g_E = \Theta_0 - g_P^f - \Theta_1 g_y + \Theta_2 g_r + \Theta_3 g_\pi + g_a + \bar{g}_D + v \quad \ldots\ldots (5.16)$$

where v is the stochastic error term, while other notations remain as previously defined.

From equation (5.16), the growth in exchange rate (g_E) is negatively related to growths in foreign price level and real domestic income. It is, however, positively related to growths in interest rate, inflation rate, money multiplier and net domestic credit. An increase in either the foreign price level or real domestic income will reduce the exchange rate. Since exchange rate is defined, in this context, as the number of domestic currency units that can be exchanged for one unit of foreign currency, a reduction in it implies an appreciation of the domestic currency in terms of foreign currency, while an increase implies an exchange rate depreciation.

However, an increase in interest rate, inflation rate, money multiplier or net domestic credit will *ceteris paribus* lead to a depreciation of the domestic currency. However, the coefficients of the variables on the right of equation (5.16) will take the opposite signs if exchange rate is defined in terms of units of foreign currency per unit of domestic currency. In that case, an increase in exchange rate represents appreciation while a decrease represents depreciation. It should be recalled that any of the explanatory variables in equation (5.16) will increase (depreciate) or reduce (appreciate) exchange rate depending on the impact of the variable on money demand or money supply. On the one hand, if the effect of a change in any of the variables is to increase money demand or reduce money supply or both, exchange rate will appreciate. On the other hand, if the effect of a change in any of the variables is to decrease money demand or increase money supply or both, exchange rate will depreciate in accordance with the adjustment mechanism discussed in chapter 4.

Despite the logical nature of exchange rate equation (5.16), most researchers have

adopted other alternative monetary models in the empirical analysis of floating exchange rates. Notable among these models are the flexible price model and its extension, the sticky-price model as developed by Dornbusch (1976). A survey of these models of exchange rate determination, as said earlier, can be found in Macdonald and Taylor (1992). These alternative monetary models of exchange rate determination, which are based on the PPP doctrine and the quantity theory of money, posit that since exchange rate is the relative price of two national monies, the analysis of its determination should be carried out in terms of the relative demands for and supplies of these monies (Frenkel, 1978). Given the relative supplies of monies, and the fact that the demand for money is thought to depend mainly on the level of real income and the interest rate, the exchange rate is assumed to be determined by three key factors, namely the relative money supply, relative real income, and the interest rate differential (see Eun and Shim, 1989).

As noted by Edwards (1983), the flexible price monetary model relies on two main assumptions: a continuous fulfillment of the purchasing power parity (PPP) condition even at short-run and the existence of stable demand for money functions for the domestic and foreign economies. The sticky price model relies on the same assumptions as the flexible price model, except that it allows for accommodation of short-term deviations from the PPP condition. In other words, the sticky price model accepts the fact that even when there may be deviations from PPP in the short-run, that the deviations will tend to disappear in the long-run. It, therefore, tends to explain observable facts better than the flexible price model since short-run deviations

from PPP are inevitable as they reflect the intrinsic difference between commodity and asset prices (Beng, 1989:2). Asset prices are affected little by current events, unlike prices of services or non durable goods (Ajayi, 1986: 45).

In the flexible price model, exchange rate is expressed as a function of some constant, relative money supply and relative money demand. The conventional money demand function of the following form or its variants is assumed for the domestic and foreign countries respectively:

$$m^d_t - p_t = \Theta_0 + \Theta_1 y_t - \Theta_2 r_t + V_t \quad \ldots\ldots (5.17)$$

and

$$m^{df} - p^f_t = \Theta_0{}^f + \Theta_1{}^f y^f_t - \Theta^f_2 r^f_t + V^f_t \quad \ldots\ldots (5.17a)$$

where:

f superscript, as explained earlier, is used to denote notations for foreign country, and

m^d_t, m^{df}_t = log of current domestic and foreign nominal money demand respectively;

p_t, p^f_t = log of current domestic and foreign price levels respectively;

y_t, y^f_t = log of current domestic and foreign real income respectively;

r_t, r^f_t = current domestic and foreign nominal interest rates respectively;

Θ_0, $\Theta_0{}^f$ = constant terms for domestic and foreign money demand functions respectively;

Θ_1, $\Theta_1{}^f$ = domestic and foreign income elasticities of money demand functions respectively;

Θ_2, Θ_2^f = domestic and foreign interest (or any other scale) quasi elasticities of money demand functions respectively; and

V_t, V_t^f = error terms for domestic and foreign money demand functions respectively.

Equilibria in the domestic and foreign money markets are expressed as:

$$m_t^s = \Theta_0 + p_t + \Theta_1 y_t - \Theta_2 r_t + V_t \quad \ldots\ldots (5.18)$$

and

$$m_t^{sf} = \Theta_0^f + p_t^f + \Theta_1^f y_t^f - \Theta^f_2 r_t^f + V_t^f \quad \ldots\ldots (5.18a)$$

where,

m^s_t, m^{sf}_t = log of current domestic and foreign stocks of money respectively.

The PPP condition can be stated as:

$$e_t = p_t - p_t^f \quad \ldots\ldots (5.19)$$

where,

e_t = log of current nominal exchange rate (where nominal exchange rate is defined in terms of units of domestic currency per unit of foreign currency), and other terms remain as previously defined.

The continuous fulfillment of PPP condition ensures that the logarithm of the deviation from PPP or real exchange rate (re_t) does not vary. In other words, the real exchange rate always adjusts for differences in domestic and foreign price levels and cannot vary. By definition:

$$re_t = e_t - p_t + p_t^f \quad \ldots\ldots (5.20)$$

With the small country assumption, the foreign price level (p^f) is exogenous and cannot be influenced by the domestic economy. It is rather determined by the world money supply, while the domestic money supply determines the domestic price level (p). Hence, the exchange rate is determined by relative domestic and foreign money supplies. By solving for p_t and p_t^f in equations (5.18) and (5.18a) respectively and substituting their values into equation (5.19) yields, after rearranging the terms:

$$e_t = \Theta_0 + (m^s - m^{sf})_t - \Theta_1 y_t + \Theta_1^f y_t^f + \Theta_2 r_t - \Theta_2^f r_t^f + \in_t \quad \ldots\ldots (5.21)$$

where,

$\in_t$, Θ_0 = error term and constant term respectively, while other terms remain as previously defined.

Equation (5.21) is the basic flexible price monetary model. It states that an increase in the domestic money supply, relative to the foreign money stock, will result in an equiproportional rise (or depreciation) of nominal exchange rate. This happens because the increase in relative money stock creates excess money supply in the domestic economy. As residents attempt to get rid of the excess money supply by spending on goods and services, domestic prices rise and this in turn depreciates the nominal exchange rate through the PPP mechanism. From the equation, it also implies that an increase in the domestic income, relative to foreign income, will lead to a fall in (or appreciation of) the domestic nominal exchange rate. Like the domestic money supply, a rise in the domestic interest rate relative to the foreign interest rate results in the rise (depreciation) of the domestic nominal exchange rate. From the

foregoing, one observes the apparent conflict between the predictions of the monetary approach and the orthodox approaches (based on the predictions of the Mundell-Fleming model) in respect of the influence of income and interest rate on exchange rate. This apparent conflict can be resolved if one takes into account the fundamental role of relative money demand in the monetary model. For instance, in the popular Mundell-Fleming model, a rise in domestic interest rate will increase capital inflows and hence result in the appreciation of exchange rate, while an increase in income will increase import and the demand for foreign exchange thereby resulting in exchange rate depreciation. However, in the case of the monetary approach, a relative rise in domestic real income creates an excess demand for the domestic money stock. As residents try to increase their (real) money balances, they reduce expenditure. The reduction in expenditure makes prices fall until real money balances equal the money demand. As domestic prices fall, PPP ensures an appreciation of the domestic currency in terms of the foreign currency. A rise in domestic interest rate, on the other hand, reduces the demand for money, thereby creating excess domestic money supply, and hence a depreciation in nominal exchange rate.

If it is assumed that the PPP condition will not be fulfilled in the short-run, the real exchange rate equation (5.20) can be replaced by:

$$re_t \equiv e_t - p_t + p_t^f = \gamma re_{t-1} + \epsilon_t \quad \ldots\ldots (5.22)$$

where:

re_{t-1} = logarithm of previous deviation from PPP or real exchange rate,

ϵ_t = error term, and

γ = coefficient of the logarithm of previous real exchange rate (re_{t-1}), an inverse indicator of the speed at which any deviation from PPP would be removed, while other terms remain as previously defined.

Clark, et al (1994:5) have identified four main reasons why the PPP condition may not hold. The four reasons are:

> hysteresis effects due to adjustment costs in trade; price rigidities in terms of currency in which the goods are sold; imperfectly substitutable traded goods; and structural changes in technology and demand, particularly between traded goods and services.

The first two factors are believed to explain why PPP cannot hold in short run, while the last two factors result in persistent failure of PPP.

Equation (5.22) expresses the current real exchange rate as a function of its previous value. It suggests that deviations from PPP can be represented as a stationary autoregressive process of order one; and that if there are short-run deviations from PPP, the deviations will tend to disappear in the long-run (Edwards, 1983: 75). The coefficient of previous real exchange rate tends to zero if PPP condition always hold, and 1 or unity if there is no tendency for the condition to hold even in the long run. The speed at which the deviations from PPP will tend to disappear depends on the value of γ.

The inclusion of the lagged value of real exchange rate (re_{t-1}) in equation (5.21) converts the flexible price model into that of a sticky-price model, as follows:

$$e_t = \Theta_0 + (m^s - m^{sf})_t - \Theta_1 y_t + \Theta_1^f y_t + \Theta_2 r_t - \Theta_2^f r^f + \gamma re_{t-1} + V_t \quad \ldots\ldots (5.23)$$

where v_t is the error term and other notations are as previously defined. Thus, the major difference between the flexible price model (5.21) and the sticky-price model (5.23) is that short-run deviation from PPP condition is allowed to exist in the latter. If the money markets in the domestic and foreign countries adjust slowly, the long-run money demand equations in (5.17) and (5.17a) can be replaced by short-run ones. This can simply be done through the following partial adjustment process (see Edwards, 1983; Lyons, 1992):

$$m_t^d - m_{t-1}^d = \lambda(m_t^{*d} - m_{t-1}^d); \quad \ldots\ldots (5.24)$$

$$m_t^{df} - m_{t-1}^{df} = \lambda^f(m_t^{*df} - m_{t-1}^{df}) \quad \ldots\ldots (5.24a)$$

where,

m^d_t, m^{df}_t = current real demand for money balances (in logarithm) for the domestic and foreign countries respectively;

m^d_{t-1}, m^{df}_{t-1} = previous real demand for money balances for the domestic and foreign countries respectively (all in logarithm);

m^{*d}_t, m^{*df}_t = current desired real money balances (in logarithm) for the domestic and foreign countries respectively; and

λ, λ^f = adjustment coefficient for the domestic and foreign countries respectively, which is expected to be within the range $0 \leq \lambda \leq 1$ and is inversely related to the speed of adjustment of desired to actual money balances. The closer λ is to one, the faster is the speed of adjustment (Ajayi, 1978; Deadman and Ghatak, 1981).

By series of substitution and re-arrangement of terms such as substituting equations (5.17) and (5.17a) into the partial adjustment equations (5.24) and (5.24a) respectively, and substituting the resulting expressions for p_t and p_t^f into equation (5.22), the following reduced-form equation for exchange rate determination in the short-run can be obtained (see Edwards, 1983: 75):

$$e_t = \Theta_0 + (m^s - m^{sf})_t - \{\lambda\Theta_1/[1-(1-\lambda L)]\}y_t + \{\lambda^f \Theta_1^f/[1-(1-\lambda^f L]\}y_t^f + \{\lambda\Theta_2/[1-(1-\lambda L)]\}r_t - \{\lambda^f\Theta_2^f/[1-(1-\lambda^f L)]r_t^f + \gamma re_{t-1} + V_t \quad \ldots\ldots (5.25)$$

where:

L is the lag operator;

equilibrium in the money market ensures that:

$m_t^d = m_t^s = m_t$ and $m_t^{df} = m_t^{sf} = m_t^f$; while other terms remain as previously defined.

In the short-run exchange rate equation (5.25), both the current and lagged values of domestic and foreign income and interest rates affect the current value of exchange rate. The equation suggests that the log of current exchange rate is related, with a unitary coefficient, to the log of relative money supply and to the infinite distributive log of income and interest rates differentials. It is the inclusion of the lagged values of income and interest rates among the regressors in the short-run exchange rate equation that distinguishes it from the long-run equation. The coefficients of current and lagged values of y_t, y_t^f, r_t and r_t^f in equation (5.25) are related to the parameters of the money demand equations and to the speed of adjustment coefficient. If λ, $\lambda^f = 1$, the coefficients of the income and interest rate terms will be equal

to their respective coefficients in the money demand equations (Lyons, 1992: 108).

Owing to the possibility of high inter-correlations between y and y^f, and r and r^f, estimates of parameters of equations (5.23) and (5.25) can be difficult or impossible to derive with reasonable precision. There is, therefore, the tendency to impose the following restrictions: $\Theta_1 = \Theta_1^f$; $\Theta_2 = \Theta_2^f$; and $\lambda = \lambda^f$. With these restrictions, equations (5.23) and (5.25) could be represented, respectively, as:

$$e_t = \phi_0 + (m^s - m^{sf})_t - \phi_1(y - y^f)_t + \phi_2(r - r^f)_t + \gamma re_{t-1} + V_t \quad \ldots\ldots (5.23a)$$

$$e_t = \phi_0 + (m^s - m^{sf})_t - \{\lambda\phi_1/[1-(1-\lambda L)]\}(y - y^f)_t + \{\lambda\phi_2/[1-(1-\lambda L)\}$$
$$\{r - r^f)_t + \gamma re_{t-1} + V_t \quad \ldots\ldots (5.25a)$$

From the foregoing, four specifications or variants of monetary models of exchange rate determination could be derived as follows for estimation purposes in this study:

$$e_t = c_0 + c_1 m_t + c_1^f m_t^f + c_2 y_t + c_2^f y_t^f + c_3 r_t + c_3^f r_t^f + u_t \quad \ldots\ldots (5.26)$$

$$e_t = \delta_0 + \delta_1(m-m^f)_t + \delta_2(y-y^f)_t + \delta_3(r-r^f)_t + \mu \quad \ldots\ldots (5.27)$$

$$e_t = \alpha_0 + \alpha_1(m-m^f)_t + \alpha_2(y-y^f)_t + \alpha_3(r-r^f)_t + \alpha_4 re_{t-1} + v_t \quad \ldots\ldots (5.28)$$

$$e_t = \beta_0 + \beta_1(m-m^f)_t + \beta_2 \sum_{i=0}^{n} (y_{t-i} - y^f_{t-i})$$
$$+ \beta_3 \sum_{i=0}^{n} (r_{t-i} - r^f_{t-i}) + \beta_4 re_{t-1} + V_t \quad \ldots\ldots (5.29)$$

where:

$c_0, \delta_0, \alpha_0, \beta_0$ = constant terms;

$c_1 \ldots c_3, \delta_1 \ldots \delta_3, \alpha_1 \ldots \alpha_4, \beta_1 \ldots \beta_4$ = parameters to be estimated; and

$\sum_{i=0}^{n}$ = Summation over all i, for i = 0, 1 ... n; while other terms remain as previously defined.

The *a priori* expectations of the parameters are as follows:

$c_1, \delta_1, \alpha_1, \beta_1$	=	1
c_1^f	=	-1
$c_2^f, \delta_3, c_3, \alpha_3, \beta_3$	>	0
$c_2, c_3^f, \delta_2, \alpha_2, \beta_2$	<	0
α_4, β_4	≤	1

Specifications (5.26) and (5.27) are, respectively, the unrestricted and restricted versions of the flexible-price monetary model of exchange rate determination derived from equation (5.21). Specification (5.28) is derived from the sticky-price monetary equation (5.23a). Finally, by assuming a finite lag structure (n) that takes into account the full adjustment of the money markets (see Edwards, 1983), specification (5.29) is derived from the short-run monetary equation (5.25a). Based on the traditional test statistics and other economic criteria, the appropriate monetary model of exchange rate determination in Nigeria during the flexible exchange rate regime can be determined.

5.5 Techniques of Model Estimation and Validation

5.5.1 Estimation Techniques

The ordinary least squares (OLS) technique is adopted in estimating the above specified equations, using the micro Time Series Processing (TSP) package. The usual assumptions that the explanatory variables as well as the disturbance terms are not highly correlated are made. To correct for serial correlation of the error terms, the Cochrane-Orcutt method is adopted in estimating all the equations. For the problem of multicollinearity, we adopt the strategy of either dropping some of the variables that tend to be highly correlated, or introducing new ones based on some theoretical and empirical considerations.

5.5.2 Techniques of Model Validation

In validating our regression results, we employ mainly the traditional test statistics such as the coefficient of multiple determination, the Durbin-Watson Statistic, t-ratio, standard error of the regression and the F-ratio. We consider also other economic criteria such as the magnitudes and signs of the parameter estimates. Beyond the use of these traditional test statistics and economic criteria, we compare the actual and fitted (simulated) values of some basic endogenous variables in order to determine the extent to which the model reflects observable facts or tracks the turning points of historical data. This is done by plotting the fitted and actual values of the basic endogenous variables for the sample period against time.

To ascertain the stability of our model estimates, we use the approach suggested by Ajayi (1974, 1976). This approach involves estimating each of the regression equations by including a time drift variable (TDV) as one of the regressors. The time drift variable (TDV) is assigned the value of unity for the first period of observation, two for the second period, and so on till the last period of observation in which the final figure corresponding with the number of observations is assigned. We then test for the significance of the coefficient of the time drift variable (TDV). If the estimated coefficient is statistically significant, the model is said to be unstable. If the coefficient is not statistically significant, the model is believed to be stable.

5.6 Data Description, Notations, and Sources

5.6.1 Data Description and Notations

Two sets of data are employed in estimating the regression equations. For the period of fixed exchange rate in Nigeria (1960-1985), annual data are used. For the period of flexible exchange rate (starting from the last quarter of 1986 to the last quarter of 1993), quarterly data are employed. The use of quarterly data, as explained in chapter one, is due to the relatively short period of floating exchange rate system in Nigeria. The following data and notations are used in the regression analysis:

P, P^f	=	Consumer price indices for domestic and foreign economies respectively
M1, M2	=	Nominal domestic narrow and broader money stocks respectively
D	=	Net domestic credit for domestic economy

R	=	Stock of external reserves for domestic economy
E	=	Nominal exchange rate of the naira (expressed in terms of units of domestic currency per unit of foreign currency)
H	=	Monetary base or reserve money for domestic economy
TDV	=	Time drift variable
Y_1	=	Domestic nominal income, as measured by the gross domestic product (GDP)
y_1	=	log of annual domestic real income, where the annual Gross Domestic Product (GDP) deflated by domestic consumer price index is used as a proxy for annual domestic real income
y_2	=	log of quarterly domestic real income, where the interpolated quarterly real GDP is used as a proxy for quarterly domestic real income.
y_2^f	=	log of quarterly foreign real income, where quarterly foreign index of industrial production is used as a proxy for quarterly foreign real income
π, π^f	=	Rate of inflation for domestic and foreign economies respectively, as measured by the rate of change in the consumer price index.
m1,$m1^f$	=	log of index of narrow stock of money for domestic and foreign economies respectively, where the index is computed with a reference base of 1985.4 = 100 for all countries.

$m2, m2^f$ = log of index of broader money stock for domestic and foreign economies respectively, where the index is computed in the same way as m_1 and m_1^f.

r, r^f = Short-term nominal interest rate (measured as treasury bills rate) for domestic and foreign economies respectively

p, p^f = log of consumer price indices for domestic and foreign economies respectively

e = log of nominal effective exchange rate of the naira, where exchange rate is defined in terms of units of domestic currency per unit of foreign currency, such that higher values of e represent depreciation and lower values represent appreciation of the domestic currency.

re = log of real effective exchange rate of the naira, where the exchange rate is as defined above.

a = Money multiplier, defined as $\frac{M2}{H}$

t = time subscript

f = f superscript denoting foreign variables

g = Symbol for rate of growth of the variable appearing as subscript

ln = Symbol for natural logarithm; while other terms unless otherwise stated, remain as defined in the preceding chapters.

With the exception of foreign interest rate (r^f), data on all other foreign variables are computed as geometric trade-weighted averages of data in nine Nigeria's major trading partners. The nine trading partners are the United States of America, United Kingdom, Germany, Japan, France, The Netherlands, Switzerland, Italy and Spain. They are all industrial countries, whose currencies are convertible and traded in the international markets. The trade figures used are for the period 1981-85 and Nigeria conducts about 75-80 per cent of its total trade with these countries during the period. The weights assigned to these countries are contained in Appendix II. Owing to non-availability of data on treasury bills rate for some of the trading partners, foreign interest rate employed in the study is computed as trade-weighted average of treasury bill rate in only six countries, namely the United States of America, United Kingdom, Germany, Switzerland, Italy and Spain. According to Kidane (1994:4), the choice of weights assigned to trading partners depends on policy objectives. For the monetary approach which deals with the overall balance of payments, trade weights which give an indication of overall trade movement can be considered appropriate.

In estimating the exchange rate equations, we use the foreign index of industrial production (y_2^f) as a proxy for foreign real income, in the absence of any published quarterly GDP series for any of the countries. For the advanced industrial countries which are Nigeria's major trading partners, the use of the index of industrial production as a proxy for real income can be justified on the ground that industrial production constitutes a major component of GDP in these countries. Moreover, a good number of empirical studies conducted in these countries

use the index of industrial production as a measure of real income (see for instance, Macdonald and Taylor, 1993; Odedokun, 1992; and Bernanke, 1983).

For Nigeria, we use the interpolated quarterly GDP deflated by the consumer price index as a proxy for quarterly real income. The quarterly GDP figures are derived by decomposing the annual GDP figures using the technique adopted by Ajakaiye and Odusola (1995). This technique involves the use of exports, whose figures are available on both annual and quarterly bases, in decomposing the annual GDP figures into quarterly series. The formula is expressed as:

$$Y_{it} = Y_t \cdot \frac{X_{it}}{X_t}$$

where,

Y_t = Annual GDP at current period which is known.

Y_{it} = Unknown GDP for quarter i at current period, for i = 1, 2, 3, 4.

X_t = Annual export at current period which is known.

X_{it} = Exports for quarter i at current period which is also known, for i = 1, 2, 3, 4.

The use of exports to decompose annual GDP figures into quarterly series is based on a number of factors such as the high correlation coefficient (0.98) estimated between GDP and exports, and the fact that exports accounted for about 95.0 per cent of total changes in GDP during the period, as can be seen from the following regression results (based on annual data between 1986 and 1993):

$$Y_t = \underset{(1.21)}{35136.06} + \underset{(11.43)^*}{2.68X_t}$$

$R^2 = 0.96$, $\bar{R}^2 = 0.95$, SE = 49865.67, DW = 1.65, F = 130.66.

where figures under the parameter estimates are t-ratios and * indicates significant at 5 per cent level or less. The results are similar to those obtained by Ajakaiye and Odusola (1995) who adopted the same technique in decomposing the annual GDP figures into quarterly series.

The choice of the nominal effective exchange rate as the endogenous variable in all the monetary models of exchange rate determination is purposeful. It has been stated that in a world where currency floating is the order of the day, there is no major reason for choosing only one particular bilateral exchange rate. Rather, it is argued that the exchange rate of a particular currency should "reflect the evolving relationship between that currency and all other currencies" (Kidane, 1994). To this end, the nominal effective exchange rate (NEER) is considered more appropriate than using only one bilateral nominal exchange rate. As stated earlier, effective exchange rate indices are devised to measure the average change in the exchange rate of a particular country's currency against all other currencies, mainly the currencies of the country's major trading partners.

5.6.2 Data Sources

The data are collected from the various publications of the Central Bank of Nigeria (CBN), Federal Office of Statistics (FOS), and the International Monetary Fund (IMF). Specifically, data on all foreign variables are collected from the various issues of the IMF's International Financial Statistics (IFS). Data on the domestic money stock, reserve money, price levels and domestic credit are also collected from IFS, while data on domestic interest rate, exports and gross domestic product (GDP) are collected from various issues of the CBN's Statistical Bulletin, and Annual Report and Statement of Accounts. The trade figures used in the computation of weights assigned to Nigeria's major trading partners are taken from the FOS, Annual Abstract of Statistics (Various Issues).

The figures for the nominal effective exchange rate (NEER) of the naira are also got from various issues of the IMF's International Financial Statistics (IFS). Since the NEER figures reported in the IFS are expressed in terms of foreign currency per domestic currency, and are computed using geometric averaging formula, taking the reciprocal expresses the index in terms of domestic currency per unit of foreign currency. The NEER could as well be computed using the formula in chapter 3, but that would require more calculations and might produce less reliable timely data. The real effective exchange rate is computed as the product of nominal effective exchange rate (as derived above) and the ratio of geometric average of trade-weighted bilateral trading partners' consumer price indices to the domestic consumer price index.

CHAPTER SIX

THE EMPIRICAL RESULTS

6.1 Introduction

In the previous chapter, the following five sets of equations were specified to verify the key assumptions and postulates of the monetary approach to balance of payments and exchange rate determination in Nigeria:

(i) Money demand functions;

(ii) Sterilization coefficient;

(iii) Purchasing power parity;

(iv) External reserves flow equation; and

(v) Exchange rate equation.

The estimates of the first three sets of equations are analyzed to test the hypothesis that the basic assumptions underlying the monetary approach such as the existence of a stable money demand function, lack of effective sterilization policy and the fulfillment of the purchasing power parity (PPP) condition are satisfied in Nigeria. The estimates of the last two sets of equations are analyzed to test the hypothesis that the determinants of money demand and money supply play a significant role in the determination of the balance of payments under a fixed exchange rate regime and in the determination of exchange rates under a flexible exchange rate period in

Nigeria. The behaviour of the time drift variable in each of the equations enables us to ascertain the stability of the monetary model of balance of payments and exchange rate determination as well as the money demand functions. The estimates of the various equations are presented and discussed in this chapter.

In all the reported regression estimates, the figures in parentheses below parameter estimates are t-values (with * indicating that the variable is statistically significant at 5 per cent or less, and ** indicating that the variable is significant at 10 per cent or less), DW is the estimated Durbin-Watson statistic, R^2 is the un-adjusted coefficient of determination while $\bar{R}^2$ is the adjusted coefficient of determination, SE is standard error of the regression, and F is F-ratio. All the equations are corrected for autocorrelation using the Cochrane-Orcutt method.

6.2 Analysis of the Regression Estimates

6.2.1 Estimates of Money Demand Functions

To determine the nature of money demand function in Nigeria during the fixed exchange rate period, the long-run money demand equation (5.5) and its variants are estimated. The regression results are reported in Table 6.1. For the period of flexible exchange rates, equations (5.17) and (5.17a), and their variants, are estimated for Nigeria and its trading partners respectively. The results are contained in Table 6.2.

TABLE 6.1

Estimates of Money Demand Equations for Nigeria During the Period of Fixed Exchange Rate: 1960-1985

Equation No.	Dependent Variables	Constant	Explanatory Variables									Test Statistics				
			g_p	LnP	g_{y1}	Ln_{y1}	g_r	Lnr	g_π	π	TDV	R^2	$\bar{R}^2$	SE	DW	F
1.	g_{M2}	0.76 (1.67)	38.01 (3.83)*		62.95 (5.41)*		-2.35 (-1.04)					0.67	0.60	1.40	1.98	9.27
2.	LnM_2	-2.02 (-2.78)*		1.41 (17.88)*		0.89 (7.35)*		-0.06 (-0.43)				0.996	0.995	0.10	1.81	1243.96
3.	g_{M1}	0.42 (0.72)	43.95 (3.44)*		74.03 (4.87)*		-1.56 (0.55)					0.65	0.57	1.69	2.01	8.24
4.	LnM1	-2.40 (-2.70)*		1.34 (15.12)*		0.91 (6.10)*		-0.07 (-0.46)				0.99	0.99	0.12	1.71	939.30
5.	$g_{\frac{M2}{P}}$	2.18 (4.53)*			57.91 (3.32)*		-3.27 (-1.09)		0.05 (0.59)			0.47	0.35	1.78	1.91	3.94
6.	$Ln\frac{M2}{P}$	0.88 (0.48)				0.78 (4.61)*		-0.08 (-0.52)		-0.0001 (-0.004)		0.98	0.97	0.11	2.01	224.81
7.	g_{M2}	0.64 (0.96)	36.79 (3.05)*		63.86 (4.96)*		-2.56 (-1.02)				0.01 (0.22)	0.67	0.58	1.44	1.96	7.04
8.	LnM_2	-1.29 (-1.24)		1.19 (5.26)*		0.81 (5.26)*		-0.09 (-0.64)			0.03 (1.01)	0.996	0.995	0.10	1.77	998.82

Notes: Figures in parentheses below the parameter estimates are t ratios
* Significant at 5 per cent level or less
** Significant at 10 per cent level or less

TABLE 6.2

Estimates of Money Demand Equations for Nigeria and its Trading Partners During the Flexible Exchange Rate Regime: 1986.4 - 1993.4

Equation No.	Dependent Variables	Constant	Explanatory Variables							Test Statistics				
			y_2	y_2^f	r_2	r_2^f	π	π^f	$r_{2(-1)}$	R^2	$\bar{R}^2$	SE	DW	F
1.	$(m1-p)_t$	-1.62 (-2.44)*	0.07 (0.67)		0.006 (0.55)					0.52	0.45	0.11	1.57	7.60
2.	$(m2-p)_t$	-1.38 (-2.60)*	0.05 (0.61)		0.0002 (0.023)					0.49	0.42	0.09	1.52	6.80
3.	$(m1^f-p^f)_t$	-8.19 (-5.12)*		1.74 (5.09)*		-0.03 (-6.32)*				0.78	0.74	0.03	2.33	24.10
4.	$(m2^f-p^f)_t$	-7.23 (-4.21)*		1.52 (4.17)**		-0.02 (-5.62)*				0.94	0.93	0.02	2.49	85.07
5.	$(m1-p)_t$	-1.27 (-2.13)*	0.03 (0.28)				-0.005 (-2.07)*		-0.0003 (-2.06)*	0.60	0.52	0.10	1.87	7.60
6.	$(m2-p)_t$	-1.16 (-2.39)*	0.03 (0.31)				-0.004 (-1.80)**		-0.00002 (-2.14)*	0.57	0.49	0.08	1.76	6.75
7.	$(m1^f-p^f)_t$	-7.77 (-4.50)*		1.66 (4.49)*		-0.03 (-5.84)*		0.02 (1.25)		0.79	0.75	0.03	2.03	18.79
8.	$(m2^f-p^f)_t$	-7.24 (-4.08)*		1.53 (4.04)*		-0.02 (-5.21)*		0.003 (0.34)		0.94	0.92	0.02	2.39	78.58

Notes: Figures in parentheses below the parameter estimates are t ratios

* Significant at 5 per cent level or less

** Significant at 10 per cent level or less

All variables are expressed in natural logarithms, except interest rates.

The results in Table 6.1 reveal that the coefficients of all the explanatory variables obtain correct signs, except that of inflation rate which appears with wrong (positive) sign as in equation (5). Apart from possessing wrong (positive) sign, inflation rate (either in growth terms or level of natural logarithm) is statistically insignificant in all the estimated equations that have it as one of the explanatory variables. Moreover, the inclusion of inflation rate variable tends to reduce, rather than improve, the explanatory power of the model as can be seen from equations (5) and (6). Thus, the findings do not suggest any evidence of substitution between money and physical assets during the period of the study.

Similarly, the coefficient of interest rate, as represented by treasury bills rate, appears with correct (small negative) numbers as expected, but is insignificant in all the equations. The insignificance of interest rate variable in all the equations is not unexpected as interest rate was administratively fixed during the period. The low and insignificant coefficient of interest rate in money demand function has some implications for the use of indirect monetary instruments, like the open market operation (OMO), in monetary management. As Ajayi (1974) points out, this will make the Central Bank's control over money supply through open market operations in treasury bills difficult since large changes in interest rate will be required to induce asset holders to change their portfolios. Large changes in interest rate are not considered an acceptable policy in view of the adverse effects such a policy could have on investment and growth.

Real domestic income and price level (either in logarithm or growth terms) appear to be highly significant in the demand for nominal money function in Nigeria. However, in all the equations where the variables are expressed in growth terms, the two variables come out with very large positive coefficients that are substantially above unity. In equations where the variables are expressed in natural logarithms, the coefficients of the two variables are much closer to what would be expected. In terms of the goodness of fit, as measured by the adjusted coefficient of determination and other traditional test statistics, equations expressed in logarithm perform better than those expressed in growth terms. The relatively low performance of the latter set of equations is not unexpected for equations of rate of growth (see Aghevli and Khan, 1977 and Bhatia, 1982). The broader money stock performs better than the narrow money stock, thus confirming earlier findings by scholars like Ajayi (1974), Akinnifessi and Phillip (1978), and Obioma (1987) that the broader money stock is a better measure for money demand function in Nigeria.

From Table 6.2 which contains the estimates of real money demand specifications (5.17) and (5.17a) for domestic and foreign economies respectively, we discover that equations (3) and (4) which relate to the foreign demand for (real) narrow and broader stocks of money respectively perform better than their corresponding equations (1) and (2) that relate to the domestic demand for (real) narrow and broader money stocks respectively. In the former set of equations which relate to foreign countries, all the explanatory variables obtain coefficients that have the expected signs and are statistically significant. For equations (1) and (2) which

relate to Nigeria, real income and interest rate do not appear as significant factors in the demand for money during the period. When we introduce some other explanatory variables such as inflation rate and lagged values of interest rate into the original specifications, we notice some improvement in the real money demand function for Nigeria. The inflation rate and one-period lagged interest rate now appear statistically significant, and both have the hypothesised (small negative) coefficients irrespective of whether the narrow or broader money stock is used. The results are reported as equations (5) and (6) in Table 6.2. The income variable continues to be statistically insignificant, but the general fit of the model, in terms of the reported traditional test statistics, improves tremendously when compared with the results in equations (1) and (2). For the foreign money demand function, the foreign rate of inflation appears with wrong (positive) coefficient and is statistically insignificant, as could be seen from equations (7) and (8). However, equations (7) and (8) appear to be an improvement over equations (3) and (4), as they show no evidence of serial correlation.

The statistical significance of the lagged interest rate in the domestic demand for money indicates that interest rate has lagged impact on money demand, while the negative coefficient obtained by the variable indicates that substitution takes place between money and financial assets in Nigeria during the period. There is also evidence of substitution between money and physical assets during the period as indicated by the significance of inflation rate. These results are not surprising, because people might have preferred to invest in financial and physical assets rather than holding cash whose value erodes rapidly with the prevalent high rates of inflation.

As we observed in Table 2.7, inflation rate reached a peak of 57.2 per cent during the period under study. The deregulation of interest rate and the rapid growth of the financial sector during the period must have contributed to the significant role of interest rate in money demand during the period. The insignificant influence of the real income on money demand function in Nigeria during the period could be due to some reasons. Firstly, during the period (i.e. the SAP era), real income of majority of the Nigerian populace was, as we observed in chapter 2, more or less stagnant and even deteriorated, with a good number of people earning their means of living through informal activities which are not adequately reflected in the national income statistics. Secondly, as observed by Ajakaiye and Odusola (1995:66), the high rate of insecurity prevalent during the period could have made people quite averse to holding cash unless for some exigencies.

Using Ajayi's approach, as discussed in the previous chapter, we test for structural stability of the money demand function for each of the two exchange rate regimes covered by the study, by including a time drift variable (TDV) as one of the regressors in the money demand function. Some of the results for the fixed exchange rate period are reported as equations (7) and (8) in Table 6.1, while the results for the flexible exchange rate period are presented in Table 6.3. The time drift variable appears statistically insignificant in all the equations that relate to Nigeria. Thus, for the two periods covered by the study, one of the crucial assumptions of the monetary approach, that is the existence of a stable money demand function for the domestic economy, is satisfied. However, the test produces mixed results for

TABLE 6.3

Stability Tests of Money Demand Functions During the period of Flexible Exchange Rate: 1986.4 - 1993.4

Equation No.	Dependent Variables	Constant	Explanatory Variables						Test Statistics				
			y_2	y_2^f	$r_{2(-1)}$	r_2^f	π	TDV	R^2	$\bar{R}^2$	SE	DW	F
1.	$(m1-p)_t$	-1.45 (-2.41)*	0.04 (0.38)		-0.01 (-0.61)		-0.004 (-1.63)	0.02 (1.53)	0.64	0.54	0.10	1.59	6.62
2.	$(m2-p)_t$	-2.24 (-2.45)*	0.03 (0.34)		-0.01 (-0.52)		-0.003 (-1.59)	0.01 (0.64)	0.58	0.47	0.08	1.45	5.31
3.	$(m1^f-p^f)_t$	1.96 (0.79)		-0.50 (-0.92)		0.005 (0.607)		0.01 (4.94)*	0.85	0.82	0.02	1.89	28.73
4.	$(m2^f-p^f)_t$	-5.96 (-3.08)*		1.24 (2.94)*		-0.014 (-2.32)*		0.002 (1.33)	0.94	0.93	0.02	2.64	85.07

Notes: Figures in parentheses below the parameter estimates are t ratios

* Significant at 5 per cent level or less

** Significant at 10 per cent level or less

All variables are expressed in natural logarithms, except interest rates and time drift variable.

the foreign money demand function during the flexible exchange rate period. The foreign money demand function is found to be unstable when the narrow stock of foreign money is used as against when the broader stock of money is used as could be seen from equations (3) and (4) in Table 6.3.

6.2.2 Estimates of Sterilization Coefficient

To test whether or not effective sterilization policy was adopted during the period of fixed exchange rate regime, equation (5.15) was estimated. The results are reported in equation (6.1):

$$\bar{g}_D = \underset{(4.61)^*}{0.08} - \underset{(-1.73)^{**}}{0.09}\,\bar{g}_R \qquad \ldots\ldots \quad (6.1)$$

$R^2 = 20$, $\bar{R}^2 = 0.12$, SE = 0.05, DW = 1.74, F = 2.51

The estimated sterilization coefficient lies between zero and unity in the equation. The coefficient is 0.09 in absolute term. Since the coefficient is significantly less than unity, the results could be interpreted to mean, as suggested by Melvin (1984:99), that the monetary authorities are able to sterilize a fraction of external reserve flows in the short run. In other words, the Central Bank of Nigeria can independently choose the growth rate of money supply in the short- run, but the long-run money growth must be consistent with purchasing power parity requirements.

6.2.3 Estimates of Purchasing Power Parity Equation

To verify whether the PPP condition is satisfied during the period of flexible exchange rates, equation (5.21) was estimated. The estimates are presented hereunder.

$$re_t = \underset{(3.28)^*}{4.03} + \underset{(2.05)^*}{0.39re_{(t-1)}} \quad \ldots\ldots (6.2)$$

$R^2 = 0.16$, $\bar{R}^2 = 0.12$, SE = 0.18, DW = 2.16, F = 4.22

In equation (6.2), the coefficient of the previous real effective exchange rate (in logarithm) or deviation from PPP lies between zero and unity, and is significant. This suggests that there are some short-run deviations from the PPP condition during the period of the study, but these deviations tend to disappear in the long run since the sterilization coefficient is significantly less than unity. In addition to some of the reasons earlier given on why there might be deviations from PPP in the short-run, it should be noted that PPP is meant to deal with relatively free market (Komolafe, 1993:187) but in Nigeria, the market is characterised by several imperfections and distortions. Hence deviations from PPP condition are expected at least in the short-run.

6.2.4 Estimates of External Reserve Flow Equations

The estimates of the external reserves flow equation (5.14) and its variants are presented in Table 6.4. In the Table, the coefficients of all the explanatory variables (all in growth terms) have the expected signs. The coefficient of real domestic income is above unity and significant at 5 per cent level or less in all the equations. The size of the coefficient of real income variable

TABLE 6.4

Estimates of External Reserve Flow Equations for Nigeria: 1960-1985 (Dependent Variable = $\bar{g}_R$)

Equation No.	Constant	Explanatory Variables							Test Statistics				
		g_p	g_p^f	g_{y1}	g_r	g_π	g_a	$\bar{g}_D$	R^2	$\bar{R}^2$	SE	DW	F
1.	0.06 (1.16)	0.86 (1.00)		2.72 (2.40)*	-0.17 (-0.81)	0.01 (0.94)	-1.01 (-3.52)*	-0.14 (-0.25)	0.70	0.56	0.13	2.31	5.01
2.	-0.004 (-0.064)		6.43 (1.79)**	2.06 (1.87)**	-0.25 (-1.25)	0.002 (0.363)	-0.81 (-2.68)*	-0.50 (-0.84)	0.74	0.61	0.12	2.28	5.98
3.	0.07 (1.23)	1.00 (1.23)		2.23 (2.24)*	-0.17 (-0.85)		-1.09 (-3.96)*	-0.34 (-0.64)	0.68	0.56	0.13	2.38	5.68
4.	-0.01 (-0.10)		6.99 (2.23)*	1.86 (2.05)*	-0.27 (-1.37)		-0.81 (-2.76)*	-0.60 (-1.21)	0.73	0.63	0.12	2.30	7.34
5.	0.05 (1.39)	0.77 (1.07)		2.17 (2.25)*	-0.12 (-0.65)		-1.17 (4.79)*		0.67	0.58	0.13	2.47	6.97
6.	-0.016 (-0.29)		5.07 (1.86)**	1.90 (2.12)*	-0.15 (-0.89)		-1.00 (-3.90)*		0.71	0.62	0.12	2.44	8.29
7.	0.05 (0.66)	2.12 (1.73)**		4.28 (2.63)*	-0.23 (-0.71)			-1.24 (-1.60)**	0.44	0.27	0.17	2.00	2.66
8.	-0.08 (-1.15)		12.59 (3.84)*	2.62 (2.16)*	-0.37 (-1.46)			-1.32 (-2.37)*	0.62	0.50	0.14	2.09	5.48
9.	0.45 (1.30)	0.082 (1.16)		2.30 (2.47)*			-1.18 (-4.93)*		0.66	0.59	0.13	2.43	8.90
10.	-0.02 (-0.35)		5.02 (1.84)**	2.07 (2.34)*			-1.01 (-3.99)*		0.70	0.63	0.12	2.33	10.29
11.	0.03 (0.39)	2.10 (1.71)**		4.53 (2.92)*				-1.06 (-1.32)	0.42	0.29	0.16	2.00	3.29
12.	-0.11 (-1.48)		12.59 (3.29)*	3.11 (2.49)*				-1.06 (-1.75)**	0.57	0.48	0.14	2.00	6.01

Notes: Figures in parentheses below the parameter estimates are t-ratios
* Significant at 5 per cent level or less
** Significant at 10 per cent level or less.

is slightly above 2.00 in most of the equations. The size of the coefficient of the rate of growth in interest rates is small and negative as expected, but not significant in any of the equations. The values of adjusted coefficient of multiple determination, $\bar{R}^2$, which lies mainly within the range of 50 and 63, are quite respectable for equations expressed in growth terms. The figures are also comparable to those obtained by Bhatia (1982) for the Indian economy and Aghevli and Khan (1977) for a group of 39 developing countries. There is no evidence of serious serial correlation of the error terms in all the regression equations, except in some equations that include money multiplier as one of the explanatory variables. In these equations, the values of the estimated DW fall into the inconclusive region. The use of Cochrane-Orcutt method to correct for the serial correlation does not entirely solve the problem.

One important observation from the results in Table 6.4 is that all the explanatory variables, with the exception of rate of growth in inflation, are important in the monetary model of balance of payments, as the exclusion of any one of the variables tends to reduce the overall performance of the model. Another observation is that when domestic credit and money multiplier are included in the same equation, the former, apart from obtaining coefficients that are less than the hypothesised value of -1, will not appear significant though the coefficients appear with the expected signs. In the Table, the domestic credit appears significant only when money multiplier is not included. This is an evidence of multicollinearity between the growth rates of domestic credit and money multiplier, since any change in the former will, by definition, be reflected in a change in the latter. From the results in Table 6.4, the model performs better

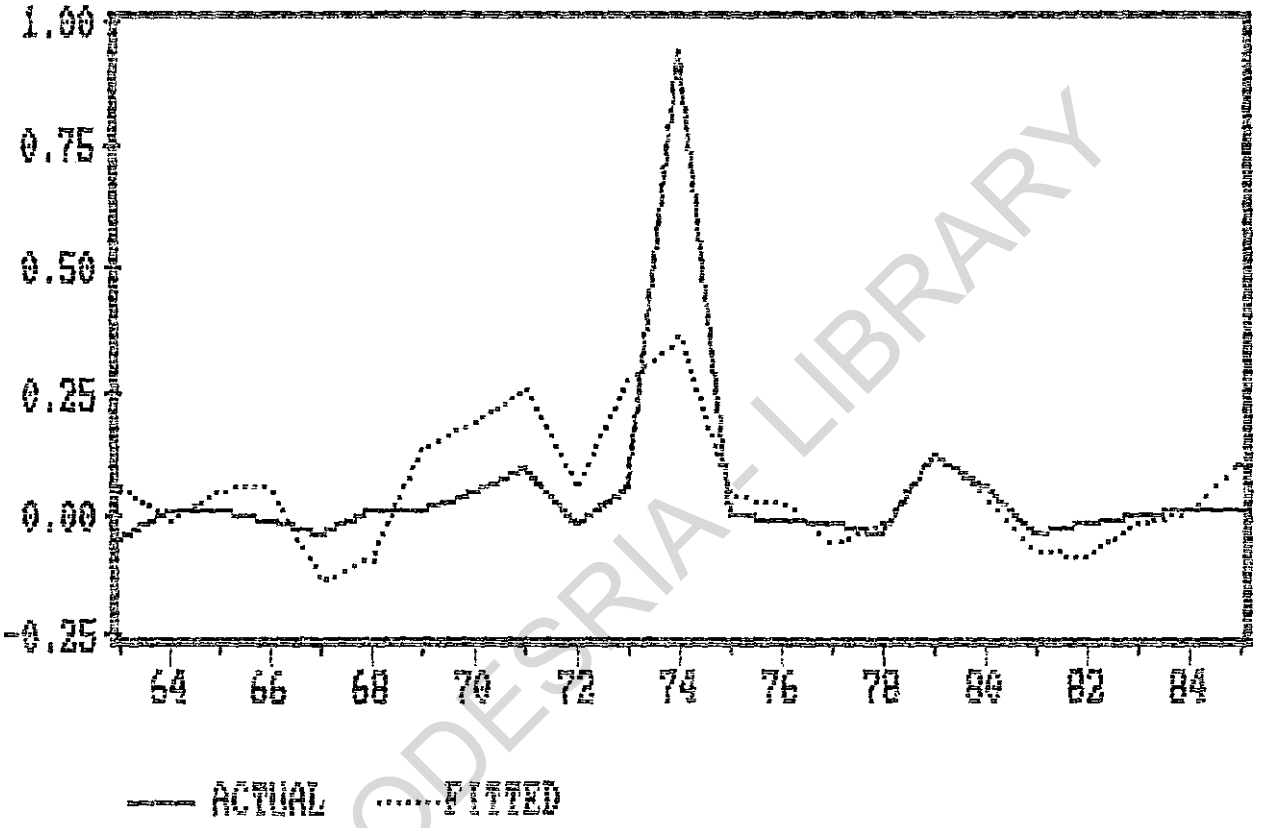
when only the rates of growth in real income, price level, interest rate and domestic credit are used as the explanatory variables. This could be observed from equations (7) and (8). To ascertain how well the model tracks the historical data, the actual and fitted (simulated) values of the endogenous variables in these two equations are plotted.

Figures 6.1 and 6.2 show graphs of the actual and fitted (simulated) values of the rate of growth of external reserves derived from equations (7) and (8), respectively. Both graphs reveal that the estimated models track the actual growth rates of external reserves fairly well during the period, 1960-85. The graphs also reveal that the growth of external reserves in Nigeria has been dictated by economic trends in the country. For instance, it was fairly stable between 1960 and early 1970s, rose rapidly between 1973 and 1976 (i.e. the oil boom era), before declining to a very low level in 1978 when the present economic crisis first manifested. Since then, it has been fluctuating at a lower level than the level recorded during the oil boom era.

Using the same approach adopted in testing for stability of money demand equations, we also test for stability of the reserve flow equations over the period. The estimates with respect to the two selected equations are presented in Table 6.5. The time drift variable (TDV) appears statistically insignificant in both equations, suggesting that the model is stable over time. In general, our empirical findings suggest that the monetary approach to the balance of payments with fixed exchange rates is, to a large extent, relevant and applicable to Nigeria, as most of the postulates of the model are confirmed. The model is also stable enough for projection and decision making.

FIGURE 6.1

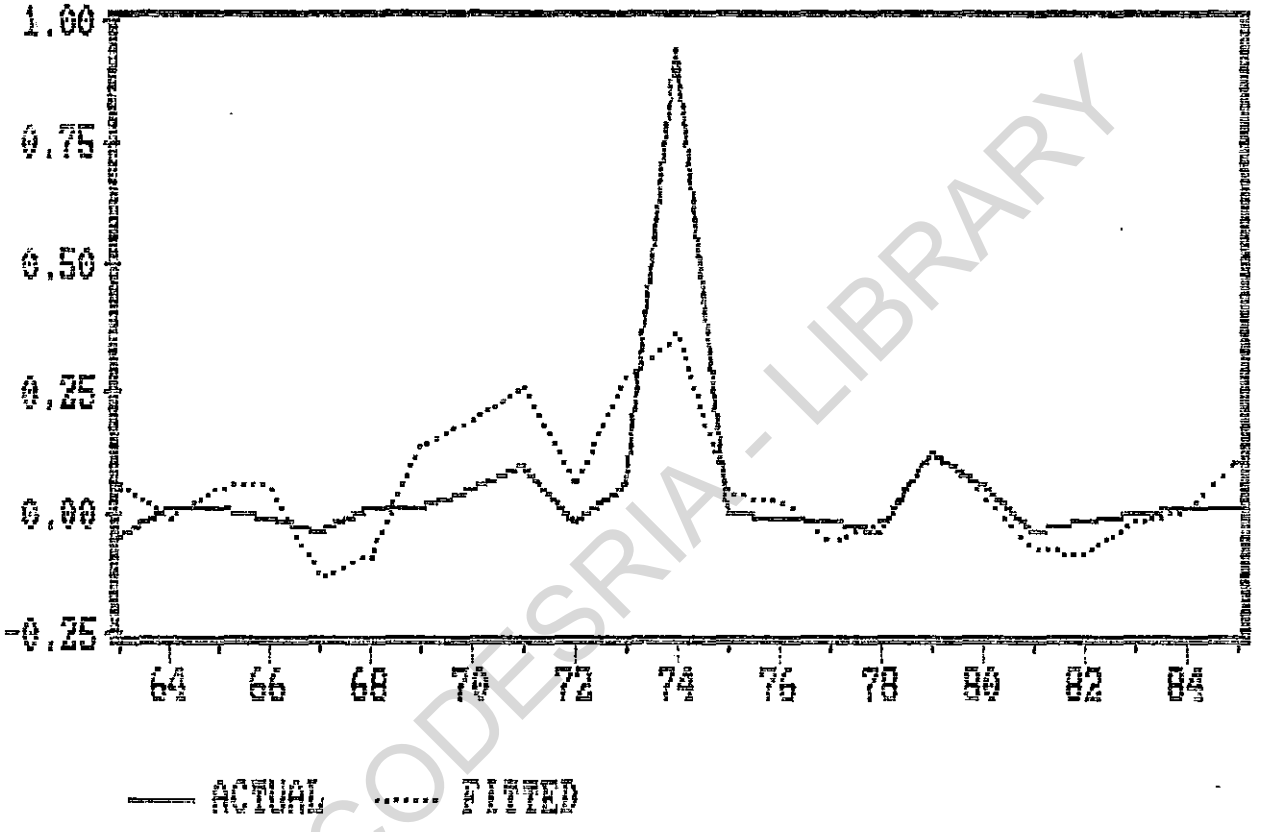
Rate of Growth of External Reserves (1960-1985)



Source: Derived from Equation (7) of Table 6.4

FIGURE 6.2

Rate of Growth of External Reserves (1960-1985)



Source: Derived from Equation (8) of Table 6.4

TABLE 6.5

Stability Tests of External Reserve Flow Equations for Nigeria: 1960 - 1985

Equation No.	Dependent Variables	Constant	Explanatory Variables						Test Statistics				
			g_p	g_p^f	g_{y1}	g_r	$\bar{g}_D$	TDV	R^2	$\bar{R}^2$	SE	DW	F
1.	$\bar{g}_R$	-0.01 (-0.06)	1.59 (1.13)		4.60 (2.69)*	-0.32 (-0.93)	-1.11 (-1.44)	0.004 (0.77)	0.46	0.26	0.17	1.98	2.26
2.	$\bar{g}_R$	-0.08 (-1.08)		12.15 (2.98)*	2.74 (1.90)**	-0.39 (-1.44)	-1.30 (-2.24)*	0.001 (0.18)	0.62	0.47	0.14	2.10	4.31

Notes: Figures in parentheses below the parameter estimates are t ratios
* Significant at 5 per cent level or less
** Significant at 10 per cent level or less

6.2.5 Estimates of Exchange Rate equations

The estimates of alternative specifications of the monetary models of exchange rate determination, as shown in equations (5.27) to (5.29) in the previous chapter, are reported in Tables 6.6 and 6.7. The estimates of the flexible-price monetary model, specifications (5.26) and (5.27), are reported as equations (1) to (4) in Table 6.6. While equations (1) and (2) relate to the unrestricted flexible price monetary model, equations (3) and (4) relate to the restricted version of the model where the coefficients of the respective domestic and foreign variables are constrained to be equal, but having opposite signs.

One striking feature of the estimates of equations (1) to (2) is the fact that the coefficients of the logarithm (i.e. the elasticities) of domestic money stock (however defined) are significant and appear with the expected signs in all the equations. Their values do not differ significantly from their hypothetical values of unity, suggesting that an increase (decrease) in the domestic money stock depreciates (appreciates), on about equiproportional basis, the domestic currency (i.e. the Naira). This is in support of the prediction of the monetary approach to exchange rate determination. The coefficient of the logarithm (or the elasticity) of foreign money stock appears with the expected (negative) sign, but is insignificant in both equations. The domestic real income is statistically insignificant and wrongly signed in all the equations. The domestic interest rate is correctly signed, but is only statistically significant in equation (1). The foreign income and interest rates are statistically significant in all the equations, but they obtain

TABLE 6.6

Estimates of Flexible-Price Monetary Model of Exchange Rate Determination in Nigeria: 1986.4 - 1993.4 (Dependent Variable = e_t)

Explanatory Variable	Equation No.							
	1	2	3	4	5	6	7	8
Constant	33.82 (4.43)*	26.47 (3.49)*	7.00 (60.60)*	7.03 (60.13)*	52.76 (4.43)*	33.55 (2.45)*	6.90 (21.59)*	6.88 (22.38)*
$m1_t$	1.12 (7.04)*				0.74 (2.77)*			
$m1_t^f$	-1.28 (-1.45)				-1.85 (-2.12)*			
$(m1-m1^f)_t$			0.81 (6.54)*				0.72 (2.76)*	
$m2_t$		1.15 (8.08)*				1.01 (3.46)*		
$m2_t^f$		-0.68 (-0.93)				-0.91 (-1.06)		
$(m2-m2^f)_t$				0.98 (6.24)*				0.87 (3.01)*
y_{2t}	0.10 (0.96)	0.16 (1.73)**			0.02 (0.21)	0.13 (1.12)		
y_{2t}^f	-5.85 (-3.04)*	-4.99 (-2.43)*			-9.07 (-3.68)*	-6.16 (-2.23)*		
$(y_2-y_2^f)_t$			0.11 (1.25)	0.12 (1.48)			0.11 (1.21)	0.12 (1.39)
r_t	0.01 (1.70)**	0.006 (1.01)			0.005 (0.62)	0.003 (0.41)		
r_t^f	0.11 (3.89)*	0.12 (5.01)*			0.14 (4.67)*	0.13 (4.52)*		
$(r-r_t^f)_t$			0.005 (0.51)	-0.004 (-0.42)			0.004 (0.34)	-0.01 (-0.58)
TDV					0.06 (1.93)*	0.02 (0.59)	0.01 (0.34)	0.01 (0.55)
R^2	0.98	0.98	0.97	0.97	0.98	0.98	0.97	0.97
$\bar{R}^2$	0.97	0.97	0.97	0.97	0.97	0.97	0.96	0.97
SE	0.08	0.07	0.08	0.08	0.07	0.07	0.09	0.08
DW	1.53	1.66	1.90	1.99	1.42	1.58	1.86	1.90
F	106.68	142.71	168.30	189.38	109.31	119.96	128.7	148.17

Notes: Figures in parentheses below the parameter estimates are t-ratios
* Significant at 5 per cent level or less
** Significant at 10 per cent level or less
All variables are expressed in natural logarithms, except interest rate and time drift variable.

TABLE 6.7

Estimates of Sticky-Price and Short-Run Monetary Models of Exchange Rate Determination in Nigeria: 1986.4 - 1993.4 (Dependent Variable = e_t)

Explanatory Variable	Equation No.							
	1	2	3	4	5	6	7	8
Constant	5.81 (4.57)*	5.76 (4.92)*	6.43 (5.05)*	6.31 (5.43)*	6.02 (4.74)*	6.38 (5.39)*	6.07 (4.32)*	6.06 (4.10)*
$(m1-m1^f)_t$	0.78 (6.18)*		0.83 (6.51)*		0.86 (7.32)*			
$(m2-m2^f)_t$		0.93 (5.66)*		1.00 (5.82)*		1.11 (7.41)*	0.88 (2.72)*	0.97 (2.77)*
$(y_2-y_2^f)_t$	0.12 (1.27)	0.13 (1.56)						
$\sum_{i=0}^{2} (y_{2t-i} - y^f_{2t-i})$			0.13 (1.63)	0.12 (1.57)			0.11 (1.38)	
$\sum_{i=0}^{4} (y_{2t-i} - y^f_{2t-i})$					0.11 (1.49)	0.07 ((0.97)		0.70 (0.99)
$(r-r^f)_t$	0.01 (0.82)	-0.01 (-0.01)						
$\sum_{i=0}^{2} (r_{t-i} - r^f_{t-i})$			0.001 (0.24)	-0.003 (-0.55)			-0.003 (-0.68)	
$\sum_{i=0}^{4} (r_{t-i} - r^f_{t-i})$					-0.001 (-0.344)	-0.004 (-1.46)		-0.004 (-1.30)
re_{t-1}	0.19 (0.94)	0.20 (1.09)	0.06 (0.29)	0.09 (0.48)	0.12 (0.57)	0.09 (0.51)	0.11 (0.51)	0.12 (0.59)
TDV							0.01 (8.55)*	0.01 (0.43)
$\bar{R}^2$	0.97	0.98	0.97	0.98	0.97	0.97	0.98	0.97
R^2	0.97	0.97	0.97	0.97	0.96	0.97	0.97	0.97
SE	0.08	0.08	0.08	0.08	0.09	0.08	0.08	0.08
DW	2.03	2.22	1.90	2.08	2.04	2.18	1.96	2.10
F	134.34	153.34	139.45	155.83	107.55	136.15	125.1	108.56

Notes: Figures in parentheses below the parameter estimates are t-ratios
* Significant at 5 per cent level or less
** Significant at 10 per cent level or less
All variables are expressed in natural logarithms, except interest rate and time drift variable.

coefficients (or elasticities) that are wrongly signed; negative for income variable and positive for interest rate, instead of the reverse. This is not in conformity with the prediction of the monetary approach.

In equations (3) and (4) where the coefficients of respective domestic and foreign variables are constrained to be equal but having opposite signs, relative money stocks appears statistically significant with its coefficient equal or very close to the hypothetical value of +1. This also conforms with the prediction of the monetary approach which states that an increase in relative money stocks leads to equiproportional depreciation of the nominal exchange rate, while a decrease leads to exchange rate appreciation. The coefficient of relative real income is wrongly signed and statistically insignificant, while that of interest rate differential appears with a perverse sign in equation (4), but is statistically insignificant in all the equations. The positive sign obtained by the coefficient of relative real income is not in conformity with *a priori* expectation. The inability to establish any significant relationship between real income and exchange rate could be due to similar reasons given in the case of money demand during the same period. The role of interest rate in the monetary approach has, however, been a subject of empirical debate.

From the results presented in Table 6.6, there is no material difference between the estimates of the unrestricted flexible price monetary equations (1) and (2), and the restricted flexible price monetary equations (3) and (4). Constraining the coefficients of the respective domestic and foreign variables to be equal does not improve the results significantly, except that

the regression results of the restricted monetary equations are completely free of the problem of serial correlation, as the value of the DW in each of equations (3) and (4) is very close to 2.00.

The estimates of specifications (5.28) and (5.29) and their variants, relating respectively to the sticky-price and short-run monetary models of exchange rate determination are contained in Table 6.7. In the Table, equations (1) and (2) relate to the sticky-price monetary model, while equations (3) - (6) relate to the short-run monetary model. For the short-run monetary model, we estimate several equations with up to four lag lengths, but all the results, which do not differ very much from those of the restricted flexible-price and sticky-price monetary models, point to the same conclusions. The coefficient of relative money stock continues to appear very significant with the expected positive sign and its value is very close to unity in all the equations particularly in equations that use the broad money supply (m_2). The coefficient of previous real exchange rate is positive and less than unity, but insignificant in all the equations. This also confirms our earlier findings that there are short-run deviations from PPP condition. Judging by the traditional test statistics, the inclusion of the previous real exchange rate tends to worsen the performance of the monetary model when compared with equations (3) and (4) in Table 6.6 that do not include the variable. While the sum of the coefficient of the current and past values of relative real income continues to appear with the wrong (positive) sign in all the equations, that of the sum of the current and past values of nominal interest rate differential appears with perverse sign in all the equations except in equation (3) where it

appears with the hypothetical positive value. In all, the two variables obtain insignificant coefficients.

Several other specifications of the monetary model of exchange rate determination were estimated, but the results do not make any material difference from the ones already reported. In all the estimated exchange rate equations, the constant term is found to be positive and highly significant at 1 per cent or less. This is an indication that there are factors, independent of the ones included in the model, that tend to significantly depreciate the naira exchange rate over the period. Some of the factors include the unstable economic and political environment, and the high rate of insecurity (as manifested by series of cases of armed robbery, arrest and detention, and assassinations), all of which have the tendency of heightening speculation and capital flight, and consequently exchange rate depreciation. Another factor is the attitude of an average Nigerian to prefer assets denominated in foreign currency, particularly since the regime of exchange rate deregulation. One should therefore look beyond the monetary model in order to properly explain exchange rate behaviour during the flexible exchange rate period in Nigeria.

The various models of exchange rate determination are tested for stability, using the usual approach of including a time drift variable in the regression equation. The results are reported as equations (5) - (8) and (7) - (8) in Tables 6.6 and 6.7, respectively. The unrestricted flexible-price model is found to be unstable when narrow as against broader money stock is used. This could be seen from equations (5) and (6) in Table 6.6 where the time drift variable (TDV) appears statistically significant in the former as against the latter equation. While, the restricted

flexible price and sticky price models appear stable, the short-run monetary model shows signs of instability in equations where we include two-period lagged values of relative real income and nominal interest rate differential. This could be seen from equation (7) of Table 6.7 where the time drift variable (TDV) appears statistically significant, thus suggesting that the model is not stable. From the foregoing, there is no clear evidence of stability of monetary model of exchange rate determination during the period. This is not surprising given the series of metamorphosis in which the foreign exchange market had undergone, coupled with frequent intervention of the Central Bank of Nigeria in the market and the high degree of economic and political instability in Nigeria during the period under study.

CHAPTER SEVEN

SUMMARY OF FINDINGS AND CONCLUSION

This study examines, among other things, the relevance and applicability of the monetary approach to balance of payments and exchange rate determination, using Nigeria as a case study. In the course of the study, we also review the economic setting in Nigeria and analyze Nigeria's experience in the balance of payments and exchange rate management in the post independence era. Various indices to measure the extent of exchange rate misalignment in Nigeria are also computed and analyzed.

The empirical findings of the study and their policy implications can not be effectively summarised without repeating much of what has been said earlier. Nevertheless, in this chapter we attempt to highlight the major findings, from which some significant policy recommendations are drawn. We also draw attention to some major limitations of the study and suggest areas for further study.

7.1 Summary of Findings

The four hypotheses set out in chapter one of this thesis were carefully examined. The major empirical findings are as follows:

(i) Evidence based on various exchange rate indices computed in the course of this study reveals that the Nigeria's domestic currency, the Naira, was on the average

overvalued in real terms by about 80 per cent between 1980 and 1984, and by about 60 per cent between 1980 and 1985. The reverse has however been the case since the exchange rate deregulation of 1986. The real effective exchange rate has, on the average, depreciated by about 73 - 83 per cent between 1980 and 1990. In nominal terms, the rate of depreciation is higher, about 86 per cent on the average. With the accelerated depreciation of the naira in the foreign exchange market in which the exchange rate is currently about ₦85 = $1, the trend has continued. Similarly, an analysis of the developments in the country's balance of payments position also indicates that the balance of payments has been in crisis since 1978 when the level of external reserves rapidly declined, following the adverse price shocks in the international oil market. There are some indications that the balance of payments surpluses recorded in some years prior to the introduction of SAP were just possible due to such factors as large depletion of foreign exchange reserves, huge accumulation of trade arrears and stringent exchange control measures. All these findings confirm our first hypothesis that the balance of payments disequilibrium and exchange rate misalignment have been recurring policy problems in Nigeria in the recent decades. These developments have serious implications for economic growth and development, and therefore need to be adequately addressed.

(ii) With respect to our second hypothesis, empirical findings in this study indicate that most of the basic assumptions underlying the monetary approach to balance of payments are, to a large extent, satisfied in Nigeria during the period of fixed exchange rates. For instance, the estimates of various specifications of money demand function strongly confirm the assumption of existence of a stable demand for money function in Nigeria during the period. The money demand in this period is found to be dependent on the level of domestic prices, real income and nominal interest rate, though the last variable is statistically insignificant.

There is no evidence of complete sterilization during the period of fixed exchange rate, as the value of estimated sterilization coefficient lies between zero and unity. The value is significantly different from zero, but not equal to unity. The small value (0.09) does not establish any strong evidence of feedback from international reserves to domestic credit that could either totally halt the adjustment process of the monetary approach with fixed exchange rate, or introduce a serious simultaneity bias in the use of ordinary least squares (OLS) to estimate the external reserve flow equations. The findings, however, suggest that the Central Bank can independently choose the growth of money supply at least in the short-run, but in the long-run the growth of money supply must be consistent with the PPP requirements.

(iii) During the flexible exchange rate regime, there is only modest support for some of the basic assumptions of the monetary approach to exchange rate determination. For instance, the estimates obtained during the period of flexible exchange rates do not give a strong convincing evidence that there are stable money demand functions particularly for the foreign economy. During the period, most of the explanatory variables in the domestic demand for money, like real income and interest rate, appear statistically insignificant. Interest rate appears statistically significant in the domestic demand for money function only when its previous values are used. One major factor responsible for the failure to establish a significant relationship between income and money demand during the period is the adverse economic situation in Nigeria since the inception of SAP. This has resulted in the real income of the majority of the Nigerians being stagnant or even falling, with a significant number of people earning their means of living through informal activities which are not adequately captured by national income statistics. In addition, the high levels of inflationary pressures and insecurity prevailing in the economy since the SAP era must have made people averse to holding cash for transactions purposes, except for some exigencies. The foreign money demand function is found to be highly dependent on foreign real income and nominal interest rate (with the two explanatory variables appearing very significant), but it shows some evidence of instability when the logarithm of

real narrow stock of foreign money is used as the dependent variable. Thus, there is no conclusive evidence of stability of foreign money demand function during the period.

Our estimates show some evidence of short-run deviations from PPP condition during the period of flexible exchange rates, but these deviations tend to disappear in the long run. The factors that could cause the short-run deviations from the PPP condition have earlier been discussed. Suffice it to say that short-run deviations from PPP condition are inevitable in the real world, particularly in a developing economy like Nigeria, where there are departures from free market competition.

(iv) The findings in this study strongly support the hypothesis that the determinants of money demand and money supply play a significant role in the determination of the balance of payments or external reserve flows during a fixed exchange rate regime. The coefficients of the determinants of money demand and money supply in all the estimated external reserve flow equations are found to possess the expected signs, except the rate of growth in inflation which has a wrongly signed coefficient. With the exception of interest rate, they all exert significant influence on the balance of payments or external reserve flows. For instance, an increase in the rate of growth of domestic credit is found to lead to equiproportional reserve outflow, while growth in real income is found to have a highly significant

positive influence on external reserves. The high significance of income is expected as many people hold greater part of their wealth in cash or liquid form due to limited access to financial assets resulting from the relatively underdeveloped money and capital markets in Nigeria. There is evidence that an increase in either the rate of growth in the domestic or foreign price level increases the rate of growth of external reserves, while a decrease in either of the variables results in reserves loss. All the above findings are in line with the predictions of the monetary approach to balance of payments. The insignificant role played by interest rate in the balance of payments determination is attributed to the fixing of interest rate at low level administratively by government during the period, but its negative coefficient is in line with the prediction of the monetary approach. In essence, a rise in interest rate has the tendency of resulting in external reserve loss, while a decrease leads to the opposite direction, as predicted by the monetary approach. These findings suggest that the monetary approach is relevant for analyzing the balance of payments in Nigeria during the fixed exchange rate period. Our findings, however, suggest that the appropriate external reserves flow function for Nigeria should not include both the rates of growth in money multiplier and domestic credit in the same equation as this gives rise to a serious multicollinearity problem.

(v) For the period of flexible exchange rate, the predictions of the monetary approach to exchange rate determination are only partially validated. Though the domestic or relative money stock exerts a significant (positive) influence on nominal exchange rate, with its coefficient being close or equal to unity in most cases as predicted by the monetary approach, other explanatory variables appear statistically insignificant, and often obtain wrong coefficients where they are significant.

The relatively poor performance of the monetary model of exchange rate determination is attributed to a number of factors. Firstly, the model assumes a freely floating exchange rate system, while in reality the exchange system that has emerged in Nigeria since the deregulation of the foreign exchange market in 1986 could not be described as a purely free float since the Central Bank of Nigeria occasionally and deliberately intervenes in the market for one reason or the other. The intervention has taken various forms such as changing the bidding system as well as other rules and regulations governing the operations of the foreign exchange market. Secondly, economic and political instability prevalent in the economy in recent years have introduced some significant elements of uncertainty, and consequently, speculations and risks, in the foreign exchange market. All this makes it difficult for the exchange rate to adequately respond to some of its fundamentals like income and interest rate. Thirdly, the use of quarterly data to

test a long-run equilibrium model like the monetary model of exchange rate determination is controversial. According to Humphrey (1983:167), quarterly data are short-run data that could be dominated by transitory dynamic adjustment phenomena that are absent in long-run static equilibrium. Unfortunately, the period of flexible exchange rates in Nigeria is very short and annual observations for the period are too few to generate meaningful econometric results. Our attempt to augment the model by including the lagged values of some of the explanatory variables to represent dynamic adjustment process could not produce better results than the simple long-run static model. Again, given the limited number of quarterly observations of the variables used in the regression, there is a limit to which one could complicate the simple long-run monetary model. In spite of these limitations, our empirical findings provide some support for the monetary model of exchange rate determination in Nigeria. The findings are not substantially different from those of other researchers (see Odedokun, 1992) who also find support for the monetary model in some selected African countries, including Nigeria. At least, the significant role of money in exchange rate determination, as predicted by the monetary approach, is confirmed by our findings.

(vi) With respect to our fourth hypothesis, our empirical findings strongly confirm that the monetary approach to balance of payments determination under the fixed exchange rate period, as tested in this study, is reasonably stable and applicable to the Nigerian economy. However, for the period of flexible exchange rate, stability tests of various monetary models of exchange rate determination produced mixed results. While the unrestricted flexible price model that includes the narrow stock of money and the short-run model that includes two-period lagged of some explanatory variables show signs of instability, other models such as the restricted flexible price and sticky price models are found to be stable over the period. The findings suggest that the monetary model could serve, to a large extent, as a useful framework for analyzing the balance of payments and, to some extent, exchange rate problems in Nigeria.

(vii) The estimated constant term is positive and highly significant at less than one per cent in all the estimated monetary models of exchange rate determination. This suggests that, notwithstanding the effect of a change in any of the explanatory variables included in the model, there is a significantly inherent tendency for the exchange rate of the naira to depreciate during the period of floating exchange rates. To this end, the current government policy of guided exchange rate deregulation can be justified in order to prevent excessive depreciation of the naira.

7.2 Conclusion and Policy Recommendations

The general conclusion that emerges from the above findings is that the monetary approach to balance of payments has some empirical relevance and applicability in the Nigerian economy in both the fixed and flexible exchange rate periods. As such, the model provides a useful framework for specifying some of the conditions necessary to attain sustainable balance of payments and exchange rate stability. Despite its restrictive assumptions, some of which are difficult to be satisfied even in the advanced industrial economies, the monetary model of balance of payments and exchange rate determination still provides some plausible results for the periods of fixed and flexible exchange rates in Nigeria. At least, there is a strong evidence that an increase in domestic credit or money stock leads to reserves outflow (or adverse balance of payments) and exchange rate depreciation. This, as Aghveli and Khan (1977) point out, is an indication of the robustness of the model. The relatively poor performance of the monetary model of exchange rate determination is an indication that one should look beyond the monetary model in order to properly explain exchange rate behaviour in Nigeria during the flexible exchange rate period.

The policy recommendations that can be drawn from the empirical findings of this study include:

(i) With the significant role of domestic credit and money stock in the balance of payments and exchange rate determination, government should be cautious about actions and policies that tend to increase domestic credit and money stock, while

the Central Bank of Nigeria should establish adequate mechanisms for proper coordination, harmonization and control of monetary and credit policy in the country. All this will ensure that the rate of monetary and credit expansion is consistent with the rates existing in the major trading partners and with the current objectives of attainment of sustainable balance of payments and exchange rate stability, since excessive growth in domestic credit and money stock leads to reserves loss and exchange rate depreciation. The Central Bank of Nigeria will not be able to achieve much in this respect if it does not have adequate autonomy to perform its professional roles.

(ii) The finding that money demand function is fairly stable in Nigeria suggests that monetary policy, if properly coordinated and harmonised with other macroeconomic policies like fiscal policy, can serve as an effective instrument for managing the economy. However, the use of indirect instruments of monetary policy like the open market operation (OMO) in monetary management will be limited or at best have lagged impact in view of the evidence that interest rate, measured by treasury bills rate, is generally insignificant and appears only statistically significant in the domestic money demand during the flexible exchange rate period when its lagged value is used.

(iii) Given the evidence that short-run deviations from PPP condition tend to disappear in the long-run and the emerging consensus that real exchange rate matters in maintaining price competitiveness (Beng, 1989:12), efforts should be made to ensure that the domestic price level does not diverge widely from the rates existing in the partner countries. Appropriate targeting of inflation rate is therefore important for achieving real exchange rate stability and maintenance of competitiveness with the trading partners. This is necessary to prevent serious exchange rate misalignment that usually occurs when the domestic inflation rate widely diverges from the rates existing in the major trading partners.

(iv) The evidence of significantly inherent tendency of exchange rate of the naira to depreciate during the flexible exchange rate period suggests that the exchange rate of the naira should not be entirely left for the market to determine. In other words, the present government policy of guided exchange rate deregulation should be continued.

7.3 Limitations of the Study and Areas for Further Research

Though this study lends some support to the monetary approach to balance of payments and exchange rate determination in the Nigerian context, some of its findings and the policy recommendations that emerge from them are likely to generate some controversy. This will be a good development since more research work will still be needed to establish conclusive

evidence on the validity or otherwise of the monetary approach to balance of payments and exchange rate determination in Nigeria. There is no doubt that our results, particularly with respect to the monetary model of exchange rate determination, must have been influenced by the restrictive assumptions underlying our model, most of which are disputable. Nevertheless, we believe that the results are still better than one might expect, considering the number of observations used in the regression analysis due to short period of flexible exchange rates, the frequent intervention in the supposedly free foreign exchange market, the economic and political instability prevalent in the country during the period under study, and the fact that quarterly data, instead of annual data, are used to test a monetary model that is based on the assumptions of PPP condition, interest rate parity, monetary equilibrium, real income exogeneity, and unidirectional causality between money and exchange rates - all of which, according to Humphrey (1983), are propositions about long-run equilibrium. Moreover, we should also recognise that the monetary model of exchange rate determination and the PPP condition on which it greatly relies upon, as stated earlier, deal with a free market economy, whereas the Nigerian economy could not be regarded as a good representative of a free market economy.

Our findings suggest some areas for further study. First, since we could not completely rule out the possibility of some reverse causality running from either external reserves or exchange rates to money supply and other explanatory variables, we suggest that future studies should consider examining the validity of the monetary approach within the framework of a macroeconometric model in order to see the interaction among the variables. Secondly, with

additional experience in floating exchange rates, future studies could also consider the application of a more sophisticated econometric technique than those used in this study. We could not do this in the present study due to the limited number of observations employed in estimating both the external reserve flow and exchange rate equations, and the costs in terms of time and resources involved which might not justify the results.

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APPENDIX I

Weights for Nigeria's Eleven Major Trading Partners (Using Average Trade Figures for 1981-85)

S/N.	Trading Partner	Import Weights	Export Weights	Trade Weights
1.	United States of America (USA	0.1481	0.3087	0.2382
2.	France	0.1202	0.1939	0.1615
3.	Germany	0.1629	0.1059	0.1309
4.	United Kingdom (U.K)	0.2351	0.0282	0.1190
5.	Italy	0.0579	0.1494	0.1092
6.	Netherlands	0.0505	0.1328	0.0967
7.	Japan	0.1374	0.0047	0.0629
8.	Spain	0.0279	0.0478	0.0391
9.	Sweden	0.0112	0.0212	0.0168
10.	Belgium	0.0252	0.0059	0.0144
11.	Switzerland	0.0235	0.0016	0.0112
Total*		0.9999	1.0001	0.9999

* Any divergence from 1.0000 is due to rounding of figures.

Source: Computed from Federal Office of Statistics, Annual Abstract of Statistics, (Various Issues).

APPENDIX II

Trade Weights for Nine of Nigeria's Major Trading Partners (Using Average Trade Figures for 1981-85)

S/N.	Trading Partners	Trade Weights
1.	United States of America (USA	0.244
2.	France	0.166
3.	Germany	0.134
4.	United Kingdom (U.K)	0.129
5.	Italy	0.112
6.	Netherlands	0.099
7.	Japan	0.064
8.	Spain	0.040
9.	Switzerland	0.012
Total		1.000

Source: Computed from Federal Office of Statistics, Annual Abstract of Statistics (Various Issues).