Thesis

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MONETARY POLICY SIMULATION WITHIN A MACROECONOMETRIC MODEL OF THE NIGERIAN ECONOMY

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DEDICATION

This thesis is primarily dedicated to the COSMIC - for the gift of LIFE, LIGHT and LOVE. I humbly submit this work and myself for further DIRECTION AND ILLUMINATION.

Secondly, it is dedicated to all those whose dreams are actualized by the completion of this thesis, especially the members of the SOLUDO family: Mgbafor (late), Nwankwo Simeon, Obele, Emma, Ogochukwu, Veronica, Pauline (our most beloved wife), Kenneth; etc, and Peter Okpala (late).

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C. C. Soludo.

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ABSTRACT

The study is motivated by the current overwhelming reliance on monetary policy for Nigeria's economic transformation and the need to provide a macro model within which detailed monetary analysis and forecasts can be carried out. The central objective of the research is, therefore, to investigate the role of monetary policy, with emphasis on when and how it works in the Nigerian economy, using a macroeconometric model.

The macroeconometric simulation technique is employed as the relevant methodology. The model comprises seven sectors, namely, supply, monetary, consumption, investment, Government, prices, and external sectors, and has 62 equations, 36 of which are stochastic. Out of the 69 predetermined variables, 31 are exogeneous policy variables. The model is estimated using the Ordinary Least Squares (OLS) technique, and historically simulated to test its stability, sensitivity and dynamic properties.

The simulation results show that the model is dynamically stable enough to give reliable forecasts of economic behaviour in Nigeria. Indeed, the model's theoretical framework and results recommend it as a useful addition, and an alternative, to the existing

forecasting models for the Nigerian economy. Also, with the numerous exogeneous policy variables apart from the monetary variables, the model can be simulated to shed light on a number of fiscal, exchange rate, external trade and debt, etc policy issues.

In the area of monetary policy, the simulation results help to advance our understanding of a number of issues. For example, the results show, among others, that: (i) Monetary policy, when appropriately applied, impacts powerfully on the real sector, but over a variable time lag; (ii) Neither the Keynesian nor the Monetarist theoretical monetary transmission process works effectively in Nigeria. The model demonstrates the optimal, sectorally homogeneous partitioning of the economy as the relevant policy framework, and the 'credit availability' channel to be the most direct and powerful channel for monetary transmission mechanism. The results therefore provide basis to question the government policies of financial de-regulation, particularly as they concern the aggregation of 'heterogeneous' sectors for the purposes of credit rationing. Furthermore, the results show that for the attainment of balanced development, the pursuit of policy objectives requires a 'satisficing' rather than a 'maximizing' posture.

CHAPTER ONE

1.1 INTRODUCTION

In all modern economies, the process of resource allocation among various factors of production involves several simultaneous, complex interrelationships. Economic management, in this circumstance, becomes equally complex. The government cannot afford to stand akimbo and watch the complex interrelationships sort themselves out. It must intervene, especially for a developing economy, if the fragile economy is to attain a desirable, optimum social welfare function. For Nigeria, the need for an articulate surveillance on the economy is even greater under the present Structural Adjustment Programme (SAP).

However, the nature of government intervention is a function of its understanding of the trends and tendencies in the economy's major macroeconomic aggregates. Such an understanding of a complex system as a developing economy requires systematic frameworks in the forms of macro-econometric, and programming models. In such models, specific sectors may be emphasised or the implications of alternative policy actions investigated, depending on the government's policy thrusts. Under the present SAP in Nigeria, monetary policy is assigned a prominent role. It is therefore necessary and urgent to investigate the

implications of alternative monetary policy scenarios within the framework of a macroeconometric model.

1.2. Statement of the Problem

The debate as to whether or not "money matters" in the conduct of economic affairs is now sterile. Recent evidence shows that monetary policy is a very powerful tool for economic stabilization, and growth. In Nigeria, for instance, the objectives of monetary policy are: promotion of a desirable or sustainable rate of economic growth, price stability, high rate of employment, and the maintenance of balance of payments equilibrium. The recognition of the unique roles of monetary policy has warranted enormous research efforts in understanding its dynamics.

However, inspite of the research findings, particularly in the advanced economies of Western Europe and America, some of the most controversial issues in monetary economics relate to the questions of when and how monetary policy is effective, and the selection of appropriate instruments of policy. No doubt, economic policies are economy-specific, and the structural characteristics of any economy will have much to bear on the nature and outcomes of particular policies. So, the only meaningful basis for informed policy analysis and decisions will be the empirical findings on

the macro-economic relationships in the economy in question.

Familiarity with the Central Bank of Nigeria's Annual Report and Statement of Accounts shows that often, several of the changes in macroaggregates are attributed to the 'restrictive', or 'expansionary' monetary policy pursued during the year, or "increased lending to the productive sectors', etc. These claims are no doubt reflections of the monetary authority's understanding, albeit theoretical, of the workings of monetary policy in Nigeria. Needless to say that often times, perhaps, the magnitudinal and directional effects of these policies contradict the predictions of traditional theory or the findings of partial equilibrium studies. This may be why Willes (1981:94) has cautioned that,

> --- activist policies must be curbed because most of their effects are uncertain. Although we know they don't work the way they are supposed to, we don't know - even approximately - what they really do --- Policy makers need to move more slowly, with smaller steps. They must not try to stimulate economic growth with such massive measures as they have been using, because no one can be sure what these measures will accomplish.

These uncertainties in the effects of policies are the reasons for a trend towards econometric testing and measurement of monetary relationships. This is based "on the sensible grounds that one cannot test and measure the

effects of policy on the economy without a very carefully and correctly specified model (Heller, 1969:66).

Evidence from the experiences of more developed economies, and some developing countries suggests that the relationships in the monetary sector are not only stable and predictable, but are also necessary for an understanding of the behaviour in other sectors. The evidence also shows that a multi-sectoral model, with an elaborately specified monetary sector, has been widely accepted as a standard approach to forecasting and policy simulations.

Despite these developments, very little attention has been devoted to the investigation of the workings of monetary policy within the framework of a macroeconometric model in Nigeria. Most of the earlier researchers concentrated on single-equation econometric studies of the demand for, and, or supply of money, interest rates, or portfolio behaviour of banks, etc. None, known to us, has investigated these monetary behaviours within a macromodel so as to provide evidence, among other things, on the indirect effects of policies, and also, the magnitudinal and directional effects of policies over time. The most comprehensive macroeconometric models of the Nigerian economy known to us are the CEAR-MAC III and MAC IV models (see Olofin 1985), and the others by Ekeoku (1984), and Poloamina (1986) for

policy analysis. In these models, the monetary sector is summarised by the money supply equation. However, Ekeoku, and Poloamina note this rudimentary inclusion of the monetary sector as one of the limitations of their models.

Moreover, it does not appear that the growth of aggregate money supply, per se, is the main target of monetary policy in Nigeria. The Central Bank of Nigeria (CBN) (1979:105) admits that, "Of all the techniques of monetary control available to the CBN, the selective variant of direct credit control methods is the most popular because of its greater relevance to the economic circumstances of Nigeria ---". This implies that the target of policy is not only the magnitude, but also and very importantly, the direction of credit. The sectoral credit rationing is therefore a major policy instrument. However, "one should not lose sight of the fact that the sectoral allocation of credit suffers from the basic defect that funds may be borrowed for one purpose and diverted to other purposes" (CBN, 1979:105). It then appears that even the CBN is not sure of the exact direct and indirect effects of its policies.

Added to this confusion as to the precise effects of policies, there is now a programme of increasing de-regulation of the financial system, and the consequent increased

aggregation of the sectors for credit administration. This approach presupposes a high level of technical sophistication. The question however, remains as to the basis for such a policy in Nigeria.

Furthermore, the state of the art in monetary management in Nigeria suggests that the monetary authority behaves as if monetary policy has instantaneous once-and-for-all effects on the national economy. Friedman (1960:84 - 99) posits that the effects of monetary policy actions on aggregate output are powerful, but occur with a long and highly variable time lag. It stands to reason therefore that policy makers need a framework to understand how much of last year's policies still live with us, and when and how this year's policies will take effect.

The focal problem warranting the research therefore, is the absence of an operational macroeconometric model within which detailed monetary analysis and forcests can be carried out for Nigeria.

1.3. Objectives of the Study

This study is an attempt to construct a macroeconometric model of the Nigerian economy, with an elaborately specified, monetary sector. This is with a view to simulating alternative monetary policy actions in order to understand their direct and indirect effects on the national economy.

Specifically, the central objective of the study is to investigate the role of money, with emphasis on when and how it works in the Nigerian economy, using a macro-econometric model. The other objectives of the research are to:

(a) ascertain whether monetary relationships are indeed stable enough to give a reliable explanation of national income;

(b) identify the nature of time lags and channels through which monetary policy operates on the real sector of the economy;

(c) ascertain the extent to which monetary policy instruments or their combinations are effective in achieving the stated objectives of policy;

(d) provide evidence on what should be the intermediate targets of monetary policy in Nigeria;

(e) provide empirical basis for the promotion or repudiation of the current trend towards the deregulation of the financial system (especially as it concerns the increasing sectoral aggregation for credit rationing);

(f) serve as a useful analytical tool to forecast the behaviour of the Nigerian economy.

1.4. Statement of the Working Hypotheses

The research is guided by the following hypotheses:

1. Monetary relationships are stable enough to give a reliable forecast of the Nigerian economy.
2. The sector-specific policy instruments impact more directly and powerfully on income than the aggregated, sectorally non-discriminating instruments.
3. The 'credit availability' channel is a more direct and powerful transmission mechanism of monetary policy than either the Keynesian or the monetarist channel.
4. The impacts of monetary policy are felt on the economy over a variable time lag.

1.5. Importance of the Study

Monetary policy is assigned a pivotal role in the current economic transformation under the Structural Adjustment Programme in Nigeria. General economic and monetary management under such a programme requires dynamism and sophistication in the tools of policy analysis and forecasting. Such dynamism, no doubt, can only be achieved with a correct, comprehensively specified, and up-to-date macroeconometric model of the Nigerian economy.

In the earlier macroeconometric models of Nigeria, the roles of commercial banks and the credit market as the link

between policy instruments under the control of the monetary authority and the investment and consumption expenditures to be controlled were treated as mechanical and constant. The researchers, in most cases, treated money supply as an exogeneously determined variable. Consequently, the monetary sector was included as a rudimentary appendage of their models. The present study rejects this view, and sees the monetary sector as equally important as the real sector. It stresses the flexibility and variability in the monetary behaviour due to the behavioural relationships underlying the banks' and the public's portfolio management and money supply determination. The behavioural dynamics of the monetary sector are therefore elaborately specified and investigated within a macroeconometric model of the Nigerian economy. Given Nigeria's current economic conditions, there could be no more relevant study in the area of monetary economics than one that provides policy makers with sound empirical bases for monetary policy.

Furthermore, as the first study known to us, that has investigated the workings of monetary policy within such a framework, its benefits are enormous. It enables the policy makers to, among other things, investigate the direct and indirect effects of alternative policy actions. This study

also illuminates the understanding of a number of other policy issues: transmission mechanism and time lags of monetary policy, problems in the choice of policy instruments, interest rate policy, inflation processes, etc.

Besides, as a macro model of the economy, with numerous exogeneous policy variables apart from the monetary variables, the study is a valuable tool in the hands of policy makers for general economic management. For instance, the model can be simulated to shed light on a number of policy problems, such as: the relative effectiveness of monetary and fiscal policies; the implications for the economy of a change in the export price of petroleum; the implications of a change in the national income of Nigeria's major trading partners; the implications of changes in Nigeria's foreign reserves and foreign debts; the feedback effects of alternative policy actions on the monetary sector and the implications for the growth and composition of money supply; etc.

Finally, the model's theoretical framework recommends it as an alternative forecasting model for the economy. In most advanced economies, different models are built and maintained by individuals and institutions. These models are classified on the bases of their different theoretical and methodological perspectives. As the present model can

be distinguished from the existing models in Nigeria on these grounds, it therefore stands out as a unique addition, and an alternative, to the existing models.

1.6. Rationale for the Choice of the Macroeconometric Method

The methodology employed in any quantitative economic research depends on the objectives of the research, the data and computational facilities available, and the requisite expertise of the researcher. In an attempt to analyse and forecast the numerous but complex interrelationships in an economy, three major types of models stand out clearly. These are:

(a) Mathematical Programming Models;

(b) Single equation regression models; and

(c) Macroeconometric simulation models.

The most popular and widely used of all the mathematical programming models is the input-output model. This model, pioneered by Leontief, has provided the starting point for virtually all policy analyses focused on issues

of the structure of production and trade, and their change under different development strategies (Kubo, et al 1983:3). Historically, multi-sector planning models based on Input-Output framework have focused on the real sphere of the economy. Such models have been widely used, because they provide a consistent framework for considering changes that affect a number of productive sectors in an interdependent economy.

A major problem in using simple Input-Output models to analyse development in a mixed market economy is that the models do not contain the incentive or policy instruments that are the major tools for planning in such economies as Nigeria. For example, taxes, tariffs, subsidies, and other instruments such as exchange rate policy, monetary and fiscal policies, that work through the market mechanisms are not explicitly included in such models. While Input-Output models can provide much useful information, they cannot directly capture many of the policy links that are of primary concern to policy makers. This study is concerned mainly with monetary policy simulation. Moreover, the type of micro information required for input-output and other programming models is difficult to obtain, particularly in a less developed economy such as Nigeria. Therefore, to the extent that

existing data are poor and unreliable, there will be limited scope for the more refined type of analysis required by the Input-Output, and other mathematical programming models.

Another kind of models, mainly used in the analysis and forecasting of macroeconomic aggregates, are the single equation regression models. These are those in which the dependent variable is explained in terms of the independent variable(s) by a single function. It could be linear or non-linear. In seeking to understand the simultaneous interaction of a complex system such as the Nigerian economy, the use of a single equation model would appear inappropriate. This is because, the numerous interrelationships which exist between different macro-economic variables and their indirect effects cannot be captured in single equation systems.

Finally, an alternative modelling approach, often regarded as most suitable for policy analysis in an economy-wide framework, is the macroeconometric model. This differs from the other types of models in some respects. First, some of the linear relationships in the programming models are replaced with non-linear functions which incorporate substitution possibilities in both

production and demand. Second, and perhaps more important, the model simulates the workings of the markets for labour, commodities, foreign exchange, etc and so embodies prices and market mechanism as major elements of the economic system and planning. Given certain assumptions, the model endogeneously determines: wages, profits, product prices and the exchange rate; sectoral productions employment, investment, exports, and imports; and the nominal flow of funds including the government, private sector, and foreign trade accounts (Kubo, et al 1983:8 - 9). Thus a macroeconometric model has the capacity to accommodate more features and peculiarities of any particular economy compared with other formal models. This makes for greater capacity for testing and evaluating a wider range of propositions and policies, and usually the estimated coefficients account for the stochastic impulses difficult to capture in other models. The model permits various policy experiments. In this study, whose main objective is the understanding of the nature of the direct and indirect relationships between the monetary and other sectors of the economy, the macro-econometric method appears to be the most appropriate technique.

1.7. Organization of the Thesis

Chapter one is the introductory chapter. Chapter two discusses the structure and performance of the financial system. Nigeria's monetary policies from 1959 - 1988 are also discussed. A review of the role of money in earlier economic models of Nigeria is the concern of chapter three. The theoretical framework is taken up in chapter four, while chapter five focusses on the model specification and estimation procedure. Also, the data sources and problems are discussed in this chapter.

The results of the econometric estimation and simulation are presented in chapter six, where the various validation tests are conducted. The model's stability is confirmed in this chapter. In chapter seven, further policy simulations are undertaken. The empirical and policy implications of all the research simulation results are discussed. Chapter eight concludes the research, by presenting the summary, and the limitations of the study.

CHAPTER TWO

GENERAL BACKGROUND

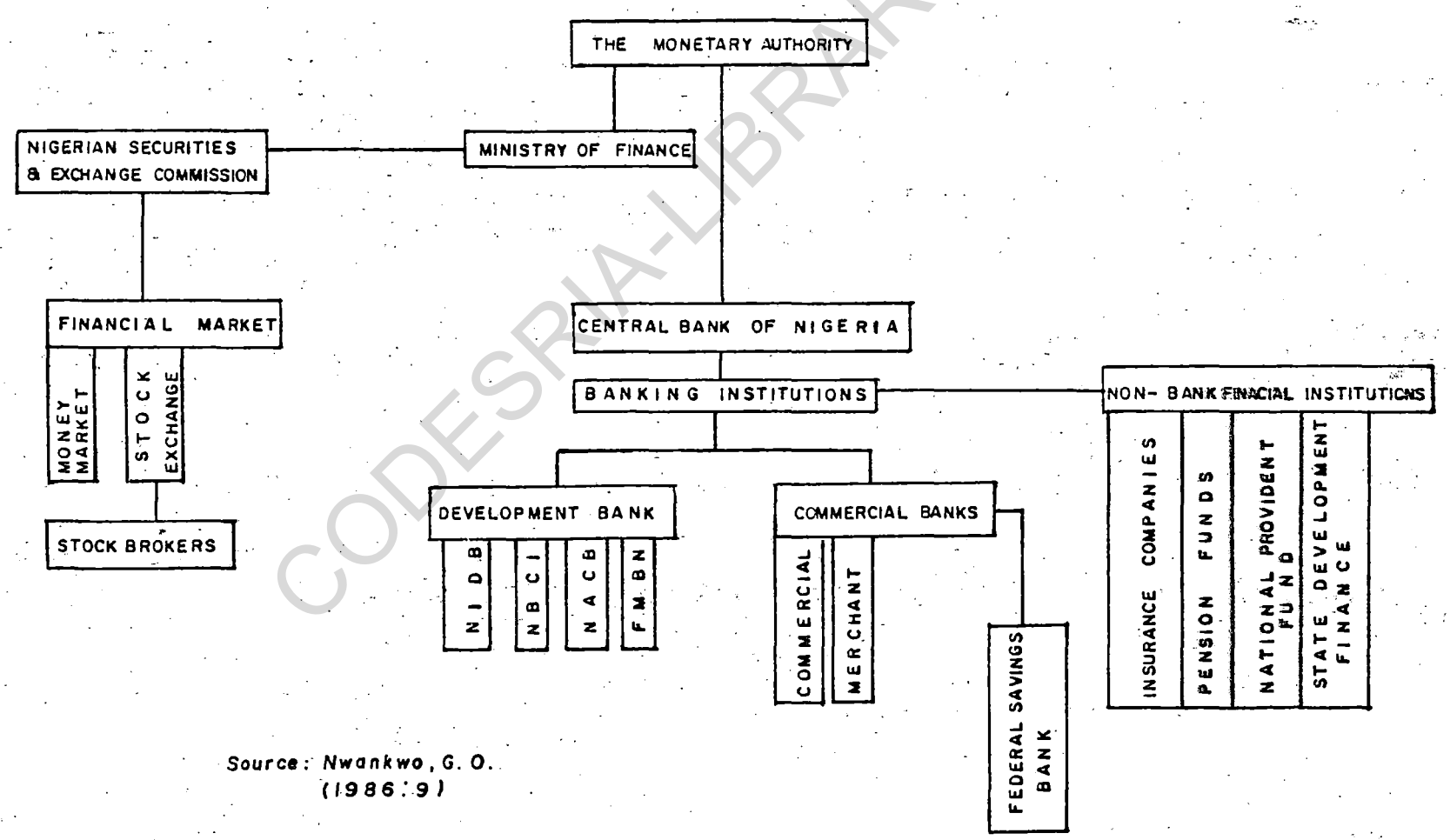
In this chapter, information is provided on some of the characteristics and operations of the financial and monetary system. This is to give insights into the character and maturity of the institutions responsible for monetary management in Nigeria.

2.1. Legal and Institutional Structure of Nigeria's Financial System

The financial sector is the grouping of all financial agents whose transactions determine quantitatively the financial flows in the economy (Okigbo:1981:23). The financial system which embraces the financial sector, is the family of rules and regulations, and the congeries of financial arrangements, institutions, agents and the mechanism whereby they relate to each other within the financial sector and with the rest of the world (Beckhart, 1965:79).

As illustrated in Figure 2.1 below, the Nigerian financial system is comprised of a number of diverse institutions which can be classified either by reference to how they are financed or by the nature of their liabilities. Generally, these institutions readily come into six

Fig. 2·1 : THE NIGERIAN FINANCIAL SYSTEM



Source: Nwankwo, G. O. (1986:9)

groups (Okigbo 1981:24):

(a) Banking system - Central Bank, Commercial, and merchant banks, and in the Nigerian situation, Co-operative banks.

(b) Savings Institutions - Federal savings Bank;

(c) Specialised or development banking institutions - Nigerian Industrial and Development Bank (NIDB), Nigerian Agricultural and Co-operative Bank (NACB), Nigerian Bank for Commerce and Industry (NBCI);

(d) Insurance and Provident Funds - Insurance Companies, the National Provident Fund.

(e) Security Market - Nigerian Stock Exchange;

(f) Public Sector - Federal and State Government and parastatal institutions.

These institutions could be classified by reference to how they are financed, thus:

(i) Institutions Financed by Deposits

(a) Monetary institutions like the commercial banking sector that collect demand and time deposits;

(b) non-monetary institutions like the Federal Savings Bank and Federal Mortgage Bank. They collect savings of depositors and lend to particular groups of customers for specific

purposes. They do not create money as the commercial banks do.

(ii) Institutions Financed Other than by Deposits

These are specialised institutions which can raise funds by subscription by the public either on a contractual basis or on the issue of securities - stocks or bonds, or directly through the Exchequer. Examples of such institutions in Nigeria include the insurance companies, the government and the specialised banks, and several state investment companies and corporations. These institutions operate as executors of public investment policies because of the source of their funds.

One thing however, is common to all these financial institutions: they all deal almost exclusively in financial assets and liabilities. The assets may vary in their term, nature and risk. They are in reality debt instruments of final borrowers (users of funds) or of other intermediaries.

Legal Framework

As Figure 2.1 also shows, the Monetary Authority is the top most in the hierarchy of the financial system. This may be the Supreme Military Council, the Armed Forces Ruling Council or the Federal Executive Council, depending on whether a military or civilian government is in power.

It is the final authority that approves the budget and the final arbiter in any dispute between the Ministry of Finance and the Central Bank. However, for all practical purposes, the monetary authorities are made up of the Ministry of Finance, and the Central Bank which is at the apex of the banking system. Before January 1988, the Central Bank used to be under the Ministry of Finance, and thus reported to the Minister. Since 1988, the Central Bank has been granted autonomy and it now reports directly to the President of Nigeria. Next to the Central Bank are the bank and non-bank financial institutions and the institutional relationships, that is, the reporting and supervisory relationships, are as follows:

Institution	Supervisory Institution
Central Bank	Before 1988 - Ministry of Finance But reports directly to the President as from 1988.
NIDB, NBCI	Ministry of Commerce
NACB	Ministry of Agriculture
FMBN	Ministry of Works
Federal Savings Bank	Ministry of Finance
Commercial and Merchant Banks	Central Bank
Insurance Companies	Ministry of Trade
Nigerian Stock Exchange	Council of the Exchange
National Provident Fund	Ministry of Labour.

Indeed the legal framework for the financial system and particularly the banking system is provided in the Central Bank Act 1958, building on the foundations of the 1952 Banking Ordinance. The period between 1892 - 1952 was a period of laissez-faire banking, without any form of banking regulation. This accounted in no small measure for the high rate of bank failure of the late 1940s and early 1950s resulting in a significant loss to depositors. The collapse of one bank after another caused considerable concern within government circles. Following the report of the G.D Paton Committee in 1948, the Nigerian Banking Ordinance was enacted in 1952 to protect the banks' depositors and restore public confidence in the banks.

Since the Central Bank of Nigeria (CBN) Act of 1958, a number of amendments have been passed which profoundly affect the banking operations in Nigeria. These include: CBN Amendment Act 1962, 1967, CBN Amendment Decree No.2 of 1968, the Banking Act of 1969, Finance Decree 32, Decrees No. 40 and 59 of 1970; Decree No. 46 of 1972, and 38 of 1976, etc. In addition to these, a number of decisions by the Federal Executive Council affecting the CBN Act of 1958 have been made:

(a) The White Paper on the Okigbo Financial System Review Committee, (b) The decisions of the Federal Executive Council on the McKenze Report 1977, and (c) The White Paper on the Onosode Commission on Parastatals 1981.

Also, partly as a result of the Indigeneous Enterprises Promotion Decree 1972 and 1977, and partly in an endeavour on the part of the authorities "to get intimately involved in commercial banking activities so as to guide them to operate to the maximum benefit of the economy," the Federal Government acquired 40% and 60% equity interest in the hitherto foreign banks in 1975 and 1977, respectively.

Prior to the commencement of operations by the CBN in July 1, 1959, the West African currency Board system was in existence in the country.

At that time, Nigeria's currency was backed one hundred percent by sterling reserves, and "the monetary system was neutral, that is, it did not exercise discretionary control over the economy or on the availability of foreign exchange" (Adedeji, 1969:209). Apart from its discretionary monetary control power, the CBN is also entrusted with some other traditional Central Banking functions including that of the

issue of the national currency and the maintenance of external reserves in order to safeguard the international value of that currency. The bank is also charged with the role of banker and financial adviser to the Federal Government. Moreover, the Banking Acts equipped the CBN with powers of control, supervision and direction over the licensed banks whose co-operation it must seek, wherever necessary, and with which it must statutorily cooperate to promote and maintain adequate banking services for the public and ensure high standard of conduct and management throughout the banking system.

All the other financial institutions operate under their respective enabling legislations. For instance, the insurance companies operate under the Insurance Companies Act, 1961, the Insurance Miscellaneous Provisions) Act, 1964, the Insurance Companies Regulations (1968), and the National Insurance Corporation of Nigeria Decree 1969.

Structure

Table 2.1 below presents the kinds and distribution of the major financial institutions in Nigeria.

Table 2.1. The Nigerian Financial Institutions as at December 1987

Type of Institution	Number	Branches
Central Bank of Nigeria	1	14
Commercial banks	33	1,483
Merchant Banks	16	33
Development Banks	4	65
Federal Savings Bank	1	20
Insurance Companies	87	Not available
Nigerian Stock Exchange	1	33 Brokerage Firms
National Provident Fund	1	Not available

Sources: (1) Research and Data Services Ltd, 1985/86 Nigerian Banking Almanac.

(2) CBN, Annual Report and Statement of Accounts, 1987.

An examination of Figure 2.1 and Table 2.1 above shows a general outlook of sophistication, both in terms of the number of financial institutions available and their branch network. As at December 1987, there were 33

commercial banks operating in Nigeria with 1,483 branches. This represents a ratio of one commercial bank office to about 67,431 Nigerians. In 1960, there were 8 banks with 190 branches. Even though the 1987 ratio gives the impression that Nigeria is under-banked, it marks a considerable improvement over the 1960 status. For the merchant banks which, until 1973, were monopolised by only one bank (NAL Merchant Bank) with only one office, the growth has been impressive. As at the end of December 1987, 16 Merchant banks with 33 branches were operating in Nigeria. As at this date, the overall number of rural branches of commercial banks opened in the three phases of the Rural Banking Scheme stood at 529 or 35.7 per cent of the total bank branches in the country. The trend in the growth of number and branches of commercial and merchant banks shows tremendous physical expansion of banking facilities, due largely to the relative attractiveness of returns to investment in the banking industry (CBN, Annual Reports 1987:47). According to the Report,

> total of 36 applications for banking licences were received in 1987 as compared with 18 in 1986.

The development banks (four of them) maintained a total of 65 branches as at the end of December 1987, while those of the Federal Savings Bank stood at 20. As for

other institutions, their number and branches reflect their peculiar nature. As at the end of December 1987, 87 insurance companies with numerous branch offices served the economy while the Nigerian Stock Exchange operated with 33 brokerage firms.

The Nigerian financial system has also undergone considerable changes in its ownership structure. Prior to 1977, a major segment of the financial institutions was owned by foreigners. But since 1977, it has become mandatory for all financial institutions in Nigeria to have majority Nigerian equity participation. This regulation which is enforced under the Nigerian Enterprises Promotion Decrees is designed to promote the Nigerianisation of the economy. The development banks (NIDB, NACB, NBCI), the Federal Mortgage Bank, and the Federal Savings Bank which were owned 100 percent by the Federal Government are now to be partly privatized, with the Federal Government retaining no more than 70 percent equity participation in each of them. This new development is contained in the Privatization and Commercialization of Government Enterprises Decree No. 25 of 1988. The general picture that emerges is that Nigerians are properly in control of the financial institutions operating in Nigeria.

One very important feature of the structure of Nigeria's financial system is the predominance of the banking system, particularly the commercial banks. This is a peculiar feature of most developing financial systems. At the early stages of development, the commercial banks, widely defined, constitute the financial system. But as the economy develops the demand for other financial services increases, leading to the relative decline in importance of the commercial banks.

Table 2.2 below shows the dominant status of the commercial banks in savings mobilization. Even though their percentage share of total savings has declined from 85.9, 88.9 and 88.8 in 1963, 1979 and 1981 respectively, to 80.8 in 1987, the commercial banks still constitute the most important set of institutions in the system. In his analysis of the deposit liabilities of the main institutions in the financial system 1970 - 78, Okigbo (1981:3) observes that about 98% of all deposits come from the commercial banks. According to him, "it follows therefore that if deposits dominate the sources of funds of the system to the extent of over 80% and if commercial banks account for practically all the deposits, then commercial banks constitute the most important set of entities in the system for mobilizing funds."

Table 2.2: Institutional Savings, 1963 - 1987 (₦ million)

Year	Savings and Time Deposits with Commercial Banks (1)	Time Deposits with Merchant Banks (2)	National Provident Fund (3)	Federal Savings Bank (4)	Nigerian Building Society (Federal Mortgage Bank) (5)	Premium Bonds, Savings Certificates etc. (6)	Total (7)	(1) as % of (7) (8)
1963	94.3	-	8.9	5.9	0.5	0.1	109.7	85.9
1965	141.0	-	27.3	5.5	0.9	0.3	175.1	80.5
1967	131.2	-	43.5	4.8	1.4	0.4	181.4	72.4
1969	215.4	-	58.6	5.1	2.0	0.2	281.3	76.5
1971	366.5	3.9	72.4	4.8	4.1	0.1	451.9	81.1
1973	582.3	17.1	109.7	4.5	5.5	1.0	720.2	80.8
1975	1,572.4	63.4	159.9	8.1	11.8	0.9	1,816.1	86.6
1977	2,255.1	82.4	230.4	8.0	20.0	0.9	2,595.9	86.7
1979	3,702.1	117.3	306.7	7.7	27.9	0.1	4,161.8	88.9
1981	6,023.5	328.0	370.1	5.3	57.2	0.1	6,784.2	85.6
1983	8,082.9	783.7	472.3	5.0	89.9	0.1	9,443.9	84.1
1985	10,550.9	1,318.2	543.5	8.1	118.2	0.1	12,539.0	
1987	15,050.4	2,871.1	593.5	16.9	133.8	0.4	18,616.1	80.8

Source: CBN Annual Report and Statement of Accounts (Various Issues).

However, the gradual but steady changes in the structure of the system have to be acknowledged. The relative decline in the commercial banks' share of the institutional savings, for instance, was accompanied by the relative growth in the share of other institutions, particularly the merchant banks, the Federal Mortgage Bank and the National Provident Fund. For example, the Merchant Banks' share of savings rose from about 2% in 1973 to about 15% in 1987. Other institutions experienced minimal but steady growth.

Thus, it could be concluded that the trends in the structure of the financial system appear promising. The commercial banks are getting more sophisticated as evidenced by the size and structure of their assets, deposits, loans and advances, and branch network. The other financial institutions are also growing at a moderate rate.

2.2. Financial Development and Economic Growth in Nigeria

No doubt, financial development, defined as the expansion and elaboration over time of the financial structure (institutions, instruments and activities) is the hub of any economic system. In the literature attempts have been made to gauge the extent of financial intermediation in an economy, and this measures the relationship between

the financial sector and the rest of the economy. That is, a relationship between the financial superstructure (the set of financial institutions, intermediaries and instruments) and the financial infrastructure (national income and wealth). The pervasiveness of financing activities in economic life may be indicated by various ratios. Shaw (1973) introduced the concept of "financial deepening", defined as the ratio of financial assets of financial institutions to Gross National Product (GNP). This ratio corroborates what Goldsmith termed the Financial Interrelations Ratio (FIR). This ratio which measures the financial structure relates the superstructure, measured by a number of indices, to the national income or wealth. The higher the ratio of financial assets to real assets, the more the importance of financial institutions and instruments in the economy.

As the economy grows and develops, financial intermediation tends to increase. In the process of economic development, financial assets get diversified through transformation of maturities from short to long term by financial institutions. The diversification provides opportunities for the development of secondary markets in which long term securities may be traded. The resultant broadening of the financial assets enhances the growth of financial deepening and or intermediation (Omoruyi, 1984:19 - 20).

Financial development, at least in the quantitative sense, is a very modern phenomenon (Drake 1980:28). From his expansive study of the financial development in several countries around the world, Goldsmith (1969:44 - 48) observes some striking historical regularities and these can be summarised thus:

(a) The financial interrelations ratio (financial assets/ national wealth) rises with a country's economic growth, ie, the financial structure grows faster than national wealth (and then national product).

(b) Eventually the FIR levels off, at a value about 1, perhaps up to 1½.

(c) The FIR is lower in less developed than in advanced countries.

(d) The share of financial institutions in the ownership of financial assets increases as economic development proceeds.

(e) Financial development starts with the banking system and depends especially on the diffusion of scriptural money, which the banking system provides. As a corollary, the ratio of money to national wealth first increases with growth but eventually levels off or declines.

(f) As countries become highly developed, the share of the banking system in the assets of the financial sector declines, while that of newer and more specialised institutions - such as building societies, insurance companies, retirement funds and finance companies increases. Thus, in advanced economies, the financial assets of the banking system are of lesser value than the financial assets held by all other institutions, whereas the reverse is true in economically underdeveloped countries.

(g) Foreign financial links - either providing sources of funds or serving as avenues for overseas investment of surpluses have been of substantial importance at some stage in the development of most countries.

(h) Over long periods, there has been in most countries a rough but unmistakable parallel between economic growth and financial development. But the direction of cause and effect in this obvious association is not clearly established.

Needless to say that most of the observed regularities apply to Nigeria. One major problem arising in the use of the financial interrelations ratio (at least from the point of view of a developing economy) is the dearth of reliable

data particularly on national wealth, and total financial assets/liabilities. In estimating the FIR for Nigeria, the Gross Domestic Product at current prices is used as a proxy for national wealth, while the assets of major financial institutions (that is, the Central Bank, Commercial, and Merchant Banks) represent the assets of the financial system. The FIR is computed and presented in Table 2.3.

Table 2.3: Ratio of Assets of Major Financial Institutions to GDP (Percentages)

Year	Ratio (%)
1970	33
1975	55
1980	54
1981	59
1982	66
1983	82
1984	86
1985	71
1986	97
1987	111

The table shows the steady rise of the ratio over the years. By 1986, it had almost levelled up to 100%; it then rose to 111% in 1987. This confirms that Nigeria's

financial structure grows faster than the Gross Domestic Product. This trend is indicative of the maturing structure of the financial system. It must be noted, however, that the growth in the importance of the financial structure in the economy is influenced by the degree of monetization, the extent to which the business units depend on external sources for their finance and how much on internal financing, and the diversification of financial instruments.

Table 2.4 shows the growth trend in the total domestic credit granted by the banking system to the domestic economy over the years.

Table 2.4.: Total Credit to Domestic Economy, 1960-1987

Year	Amount (₦ Million)	Percentage Change
1960	49.9	-
1965	352.2	605.8
1970	1,169.7	232.1
1975	1,156.5	-1.1
1980	10,689.0	242.5
1981	15,746.0	47.3
1982	21,410.0	35.9
1983	27,600.0	28.9
1984	30,423.0	10.2
1985	32,680.3	7.4
1986	36,820.3	12.6
1987	42,082.0	14.3
		Average Annual Change = 44.2

Sources: (i) IMF, International Financial Statistics (Various Issues
(ii) CBN, Annual Report and Statement of Accounts (Various issues)

Total domestic credit grew from a paltry sum of ₦49.9 million in 1960 to about ₦42,082 million in 1987, representing some 84,232 percentage increase, and an annual average percentage change of 44.2 over the twenty-eight year period (1960 - 1987). The magnitudinal changes in the size of domestic credit shows the extent to which the financial system is increasingly meeting the demands of financing the national development process.

However, one contentious issue in the field of finance and development relates to the direction of cause and effect. Ojo (1984:18) reports of his findings that the growth of financial assets which he estimated to be 12.5% consistently led the growth of the GDP which was 8.2%. This implies, according to him, "that the growth of financial institutions significantly mapped out the growth pattern of the economy." A similar computation was done for the period 1960 - 1987, and the results show that the average annual rate of growth of financial assets which was 24.9% consistently led that of the GDP which was 8.4%. These results, though suggestive of a supply leading financial development, do not produce any conclusive evidence on the direction of causation.

To test for causality between finance and economic growth in Nigeria, the method developed by Sims (1972) is used. Using annual data for 1960 - 1987, the results of the analysis show a bidirectional causation. That is, the financial system and the general economic activities are connected by a web of interrelationships, with each causing, and in turn being influenced by, the activities of the other.

The conclusion one draws from the discussion so far is that Nigeria's financial system has experienced overwhelming structural changes over the years. It has also played very crucial roles in financing national economic development. It is the recognition of these growth inducing capability of financial intermediaries that led the CBN to take several measures to develop a sound financial sector. A healthy financial sector is a sine qua non for efficacy in the conduct of monetary policies of the government. In Nigeria as in other countries, the financial intermediaries especially the banking system

constitute the purveyors of the government's monetary policies. And, these monetary policies, by and large, determine the path and pattern of financial development. Therefore, a brief discussion of the content and direction of Nigeria's monetary policies might further illuminate the character of the financial system.

2.3. An Appraisal of Nigeria's Monetary Policy (1959 - 1988)

Monetary Policy consists of discretionary measures by the monetary authorities to control the cost, availability and direction of money and credit in the economy. The main thrust of monetary management lies in the manipulation of total money supply through the control of the cost and availability of aggregate bank credit in the economy. This is because the banks, especially the commercial banks, constitute the dominant source of money and hence credit to the economy.

Monetary Policy in Nigeria aims at ensuring optimum and balanced real growth of the economy as well as achieving a healthy balance of payments. Specifically, these objectives can be grouped into four, namely:

(i) Maintenance of relative stability in domestic prices.

(ii) Attainment of a high rate of employment.

(iii) Achievement of a high and sustainable rate of economic development, and

(v) Maintenance of a good balance of payments position. The emphasis laid on any of these objectives or their variants depends on the economic circumstances and the immediate policy thrust of the government.

In 1987 for instance, the major aim of monetary policy was to "curb excessive demand pressures and stabilize the economy" (Monetary Policy Guidelines, 1988:1). In 1988, the specific objectives of monetary and credit policy as contained in the 1988 credit policy guidlines are: (i) the stimulation of growth in national output; (ii) the promotion of increased financial savings and efficient resource allocation; (iii) Moderation of inflation rate; and (iv) improvement in the balance of payments position.

The formulation of monetary policy is the duty of the Central Bank of Nigeria. The memorandum containing the

policy proposals are sent to the government through the Minister of Finance for approval. In preparing this memorandum, the Bank takes into consideration the views and suggestions of the banking and other business community and interested public groups and individuals. More importantly, the Bank reviews the prevailing economic and financial conditions in the country and makes reasonable predictions regarding the future prospects of the economy. It then outlines the specific objectives of monetary policy to be pursued in the immediate year ahead and selects the relevant monetary policy tools for the implementation. The proposals are discussed first by the management of the Bank, and then finalised by the Board of Directors of the Bank. The proposals are then sent to the Minister of Finance who usually invites the Bank for discussion on the proposals before presenting them to the government. However, during the 1988 Budget announcement, the Central Bank was declared autonomous of the Ministry of Finance. The Bank now reports directly to the President. The final decision of the government is often embodied in a Monetary Policy Circular issued by the Bank to all Commercial and merchant banks as well as insurance companies.

The instruments of monetary policy available to

Nigerian monetary authorities may be classified functionally into the quantitative, the cost, and directional measures. The quantitative tools are open market operations and reserve requirements or reserve ratios; the cost techniques are the rediscount rate and the interest rate structure; and the directional tools are selective credit controls or guidelines. Moral suasion is another instrument, and this can be applied quantitatively, directionally, or on the cost elements.

In general, the application of these tools either in their classical forms or modified forms depends largely on the level of the development and maturity of the financial system. In more advanced economies such as the U.S.A and the U.K the principal tools are quantitative in nature and aim at controlling the cost and quantity of money and credit. The interest rate structure and the direction of credit are very sensitive to market forces. Thus, they are not usually capable of discriminating between different kinds of lending activity or to emphasise particular sectors and de-emphasise others.

Nigeria, on the other hand, is an underdeveloped economy, with underdeveloped money and capital markets. The economy is characterised by structural imbalances and, hence the need for prioritization of sectors in the development

programme. It is this consideration that has made selective or direct controls through annual monetary policy guidelines, exchange rate controls, and supervision and examination of the operations of the licensed banks, the most effective instrument in Nigeria's monetary policy. For example, open market operations, which means buying and selling of government securities with a view to influencing the cash base of the banking system, has never been used in Nigeria. Even though the CBN has powers to employ it, the underdeveloped capital and money markets have not made its application meaningful.

The reserve requirements consist of funds which banks are under statutory or conventional obligation to hold against their deposits from time to time in order to control their credit and liquidity portfolio. These requirements include the cash ratio, liquidity ratio, special deposits and stabilization securities. These reserves have direct impact on the cash base of the banks and hence on their ability to create money. Their effects are also automatic because they can be effected by a stroke of the pen. The cash ratio is applied discriminatingly with the banks grouped into four categories according to size, with the largest banks maintaining the largest ratios. Under the 1988 Monetary Policy Guidelines, the ratios range from 2%

for banks with total deposit liabilities of less than ₦30 million to 5% for those with deposits of ₦300 million or more. The original Acts which gave the CBN the power to prescribe the liquidity ratio for the commercial banks specified a ratio of 25%. This was only raised to 30% in August 1987, but reduced to 27.5% in 1988. This ratio was designed mainly to safeguard the ability of the banks to meet their depositors' cash withdrawals and ensure confidence in the banking system. The 1969 Banking Decree empowered the CBN to require commercial banks to maintain, over and above the legal minimum cash and/or liquid assets some additional reserves in the form of special deposits and stabilization securities. Special deposits requirement was first used in June 1971 and during 1982 - 84 in the form of compulsory advance deposits against specified imports, while stabilization securities was invoked to curb the excess liquid syndrome of the later 1970s.

The other tools employed in the conduct of monetary Policy are the rediscount and interest rate structure. The rediscount rate is the minimum rate at which the Central Bank will discount commercial and merchant banks' first class bills, mainly the Treasury Bills. Since other rates are tied to it, any change in this rate will lead to changes

in other interest rates. The rediscount rate was most actively used between April 1960 when the first Nigerian Treasury bills were issued in 1961. Since then the rediscount rate has been changed as occasion demanded. In Nigeria, the underdeveloped financial markets, coupled with the relative scarcity of capital resources in the economy, are factors which make market determined interest rates incapable of producing the most desirable pattern of resource allocation. Thus the 1969 Banking Decree (Section 14) empowered the CBN to fix the minimum and maximum interest rates chargeable by banks. Interest rate structure has only changed, at times very significantly, in 1968, 1975, 1977, 1978, 1980, 1982, 1984 and 1985; before the deregulation policy introduced in August 1987. This deregulation of interest rates continued in 1988, but with the minimum rediscount rate reduced from the 1987 level of 15% to 12.75%. According to the Credit Policy Guidelines (1988:6), "individual banking institution, guided by the stance of policy and forces of supply and demand in the financial markets, is free to determine its deposit and prime lending rates which shall be displayed in its place of business." Nigeria is still experimenting with the market determined interest rate structure.

The effectiveness of moral suasion is based on the cordial relationship between the commercial banks and the Central Bank. In Nigeria, the major channel for implementing the Central Bank's moral suasive power on the banks is the Bankers' Committee meeting which is presided over by the representative of the Central Bank. The Committee reviews from time to time the monetary and credit conditions as well as policies being pursued. The exchange of views has proved beneficial for ensuring the co-operation of the banks with the monetary authorities.

The next, and perhaps the most important instrument of monetary policy in Nigeria is the direct control system. According to the CBN (1979:105), "of all the techniques of monetary control available to the CBN, the selective variant of the direct credit control methods is the most popular because of its greater relevance to the economic circumstances of Nigeria ---." Consequently, as a supplement to the Federal Government annual budget speech, credit guidelines in the form of Monetary Policy Circulars have been issued by the CBN since 1969 as directives to the banking sector. The main characteristics of these guidelines include:

(a) Ceilings on overall expansion of credit, determined on the basis of specified assumptions on the levels/

expansion of relevant economic variables like domestic prices, reserves, money supply, balance of payments and gross domestic product.

(b) Sectoral and sub-sectoral ceilings for allocation of credit in accordance with desired objectives of policy. For this purpose, sectors/sub-sectors are categorised into 'preferred' and "less preferred" with loans to the preferred sectors being minima and the less preferred sectors being maxima.

(c) Interest rate structure for the system including deposit and lending rates as well as the treasury bill and rediscount rates. Since 1987, the interest rates are fixed by individual banks.

(d) Loans to indigeneous borrowers (90% of total loans) of which 16% must go to small scale manufacturing enterprises; and stipulations that a defined proportion (45% for 1988) of deposits mobilized from the rural areas under the rural banking scheme is invested in those rural areas.

(e) Provision for sanctions and penalties against non-compliance.

(f) Exchange rate policies/controls to be in operation during the year. This was before the commencement

of the Second-Tier Foreign Exchange Market (now Inter-Bank Foreign Exchange Market) in 1986.

A variant of the direct control measures is the examination and supervision of the books and operations of the commercial and merchant banks. The aim is to ensure the compliance of the banks with statutory requirements and other regulations, and provide help and guidance to the banks in appropriate cases.

2.31. Application of Monetary Policy

An analysis of monetary policy since 1960 shows that Nigeria has experienced a rapid monetary expansion in terms of the growth of the money supply. The money supply increased at an average annual rate of 11% during the 1961 - 1970 period, 48.2% in 1973 - 77, 18.45 in 1978 - 81, and 7.5% in 1982 - 87. The highest growth rate of money supply occurred in the 1973 - 77 period due mainly to the easy monetary policy of the period and the rapid monetization of the oil revenue. Over the entire period (1961 - 1987), a dominant proportion of the growth in money supply was accounted for by an expansion of the monetary base. The control of the monetary base in Nigeria, as in many less developed countries, is difficult, when the balance of trade and government budget show persistent deficits, and the country covers these deficits by securing foreign loans,

aids and governmental recourse to credit from the CBN.

Generally, the growth rates of money supply have reflected the nature of monetary policy pursued by the authorities. The monetary policy formulation and implementation experiences of the CBN may be divided, for analytical convenience, into eleven phases of monetary policy,[2] thus:

(i) July 1959 - March 1962: Formative Years of Passive Monetary Policy

This was the formative years of Central Banking in Nigeria. The CBN of necessity directed much of its efforts to reshaping and restructuring the banking system, structurally and functionally, in such a way as to be able to impact favourably and effectively on the banking system and the economy as a whole, and to promote the development of money and capital markets. The most active tools applied were interest rates and moral suasion.

(ii) April 1962 - September 1964: Cheap Monetary Policy

Monetary Policy at this period was designed to enable the government borrow cheaply to finance the First National Development Plan launched in 1962. The major tools of policy were changes in interest rates and the variable liquid assets. The treasury bill rate was reduced from

2. See Ayichi, 1987; and First Bank of Nigeria Ltd (1988).

4½% to 4% in 1962 and further to 3½% in 1963, in line with a reduction in the rediscount rate from 5½% to 4½% in 1962 and further to 4% in 1963. The variable liquid assets were applied by fixing the share of commercial banks' external assets in their liquidity ratios at 7½%. These measures succeeded in accelerating credit expansion and aggravated balance of payments problems.

(iii) October 1964 - October 1966: Credit Restraint Policy

According to the 1964 Annual Report of the CBN, "1964 marked a new stage in monetary management: a year when passive monetary policy in vogue since the days of the West African Currency Board was replaced by a conscious effort on the part of the Central Bank and Government to influence the rate of credit creation and patterns of expenditure. This phase was out to correct the balance of payments disequilibrium occasioned by the preceding phase. Direct credit controls, interest rates, moral suasion and variable liquid assets were the major instruments employed. Commercial banks' aggregate credit expansion was pegged at an annual growth rate of 15%. Interest rates were revised upwards, but the restriction on imports was accompanied by an upsurge in domestic prices. The impact of these policies was the quick correction of the balance of payments problem.

(iv) November 1966 - June 1969
Easy Monetary Policy

This period was dominated by the civil war, and the main thrust of monetary policy was that of meeting the financial needs of a war economy, mainly through deficit financing. The Central Bank was further equipped with additional weapons of monetary control to enable it cope with the problems. The Central Bank of Nigeria Act (Amendment) (No.3) Decree No.50 of 1968 was enacted and the Bank was, among other things empowered to:

(a) set the level of minimum ratios of total loans, advances and discounts which commercial banks must make to indigenes.

(b) Prescribe from time to time the cash reserves which the commercial banks should lodge with the Central Bank.

(c) Call for special deposits from commercial banks

(d) Impose credit ceilings.

(e) Prescribe the structure of specified liquid assets to be held in stipulated ratios to deposit liabilities.

(f) Issue, allocate and repurchase from financial institutions of stabilization securities.

The strategy was to restrict as much as possible the inflationary consequences of the war finace, through the

availability of credit to the private sector for increased goods and services.

(v) July 1969 - March 1972:
Moderate Monetary Restraint

The primary objective of policy was to increase domestic production and curtail inflationary pressures from 15% to 5% per annum. Selective credit control, moral suasion and partial upward revision of interest rates were the instruments used. Ceilings on aggregate credit expansion was restored, while government borrowing was reduced. The outcome of the selective credit control was a rise in the allocation of credit to the preferred sectors, while de-emphasising the less preferred sectors.

(vi) April 1972 - March 1976:
Easy Monetary Policy

This was the period of economic reconstruction and the oil boom. So, the economy experienced excess liquidity resulting from petroleum earnings, increased government expenditures, the reconstruction and rehabilitation of the war ravaged areas, plus the wage increases of 1975. These were accompanied by expansion in bank credit, money supply and increased demand for consumables, thus fuelling inflation. The selective credit controls and variations in interest rates were the major instruments employed.

(vii) April 1976 - Dec. 1981:
Moderate Restraint Policy

The excess liquidity in the economy and the consequent inflationary pressures were the major concern of economic policy. Thus, a number of monetary instruments were combined to curb these ailments. The tools included: direct credit ceilings, cash reserve requirements, stabilization securities and interest rates.

(viii) January 1982 - December 1983: Short term crisis management.

(ix) January 1984 - June 1986: Medium term crisis management with tight monetary policy.

(x) July 1986 - August 1987: Long term crisis management with Structural Adjustment Programme but restrictive monetary policy.

(xi) August 1987 - date: Long term crisis management with Structural Adjustment and more liberal monetary and credit policies.

An important observation from the foregoing analysis of the phases of monetary policy is that monetary policy application in Nigeria has been characterised by an

irregular pattern of tight and easy policies. This is to be expected. Monetary Policy, unlike the fiscal and income policies, enjoys the superiority of being much more flexible, and effective in achieving the desired results. Since independence, monetary and general economic policies were formulated against the background of existing economic problems. Over time, the orientation and magnitude of these problems changed, and so with the nature of monetary policies designed to deal with them. These policies have also achieved the goal of developing and sustaining a sound and ordered financial system.

2.32. The Nature of Money Market and the Rural Banking Scheme

Nigeria's money market, as in most less developed countries is characterised by its dual nature. The unorganised money market, consisting mainly of the money lenders, landlords, merchants, traders, rotating and non-rotating savings and credit associations, caters largely for the needs of the rural or agricultural sector. On the other hand, the organised money market, consisting mainly of the banks, government and semi-government agencies, operates mainly for the benefits of the urban or industrial sector. Some of the loans in the unorganised sector do not

carry money interest. The interest rates, where they exist, vary widely from lender to lender, and are believed to be much higher than the ones charged by the banks in the organised market. Funds in the organised market are loaned by savers to the investors on the basis of personal contract. The interest rate structure does not reflect the market conditions and distorts resource allocation - between the economic sectors. So the benefits of indirect external finance are not maximized in the rural economic transactions.

The size of the organized money market may be approximated by ratios such as the demand deposits to the total money supply, and the ratio of total bank credit to G.D.P. The first ratio represents the liquidity preference approach and the second ratio represents the loanable funds approach. Table 2.5 below shows that both ratios have maintained an upward trend over the years, reflecting the increasing importance of the organized money market. The low ratios, particularly before 1980, may be mainly due to the low banking habits among the people and the relative absence of banking facilities in the rural areas of Nigeria. Accordingly, the size of the organised market or the lack of integration between the two markets gives rise to

Table 2.5: Liquidity Preference and Loanable Funds Ratios

Year	Demand Deposits/M_1 (%)	Commercial banks loans/ GDP (%)
1966	37.0	8.8
1967	33.8	9.9
1969	40.8	6.9
1970	43.7	7.1
75	49.6	9.8
1980	65.5	12.8
82	58.0	18.5
84	60.0	20.3
86	60.5	21.5
87	60.0	24.3

Source: Computed from data from CBN, Economic and Financial Review; and Annual Report and Statement of Accounts (various issues).

certain peculiar characteristics of the money lending units. The use of checking accounts instead of currency as a medium of exchange is very restricted in the large rural areas of Nigeria.

This state of affairs caused much concern to the monetary authorities. In recognition of the need to mobilize the rural financial resources for development,

and as a reaction to the reluctance of the existing banks to extend banking services to the rural sector, the monetary authorities introduced the Rural Banking Scheme in July 1977. The objectives of the scheme were as follows:

(i) Cultivation of banking habits among rural dwellers;

(ii) Mobilization of savings from the rural areas for the purpose of channelling same to profitable ventures;

(iii) Creation of credit by way of equity and loans for small scale industries;

(iv) development of agriculture and agro-allied industries in the rural areas with a view to achieving the national objective of self-sufficiency in food production;

(v) reducing to a comfortable extent, the drift of young men and women from the rural to urban areas.

As at the end of 1987, the overall number of rural bank branches opened in the three phases of the scheme stood at 529 out of the total allocation of 766. However, inspite of this apparent success, it can be observed that the scheme has failed to satisfactorily achieve the primary objective of catalysing the development of the rural areas. The experience so far shows that the banks have functioned strictly as branches of commercial banks

in rural areas, without any orientation or commitment to the development of the rural areas. Thus, what is required to ensure a continuous flow of savings for rural development efforts is not only the development of extensive and diversified network of institutions but also well adapted rural based financial institutions like the co-operative banks and/or unit bank type of rural banks. There must be special orientation, special training and acceptance of the philosophy of rural banking and rural development by the banks (Agu, 1987:15).

In conclusion, it has been observed that Nigeria's financial system has shown considerable growth and maturity. It has grown from the 1960 status of a rudimentary financial structure to a relatively sophisticated system. The trend shows a tendency towards a financial system structured in character and operations after those of the advanced economies. However, behind this veil of maturity, lie the significant features of relatively underdeveloped money and capital markets. The unorganised money markets are significant and persistent. This underdeveloped money market renders the application of several of the traditional instruments of monetary

policy, unreasonable. The nature of the money market, and given the characteristics of our underdeveloped economy, requires continuing, if not greater surveillance of the financial system by the government.

CHAPTER THREE

LITERATURE REVIEW

3.1. Money in Macroeconometric Models of Nigeria

Macroeconomic model building developed in, and has been mostly concerned with, the more developed economies. The earliest models by Tinbergen (1937, 1939, and 1951) found the financial side not to be particularly important.

Following the initiative of Tinbergen, the next stage in the development of economic modelling was the development of Klein-Goldberger model of the U.S economy (Klein and Golberger, 1955; see also Klein, 1968). This model represents the starting point of modern interest in economic model building (Coghlan, 1983:8). The financial sector was more rudimentary than in the Tinbergen models with only the demand for and supply of liquid assets explained (the definition of liquid assets being somewhat wider than conventional definitions - including holdings of US Government securities and a percentage of the private share capital of savings and Loan Associations, in addition to bank deposits, and notes and coins). A few years later, Klein extended his model building activities to the United Kingdom (Klein, et al, 1961). In this model, equations with respect to the supply of and demand

for liquidity were not included, and they were replaced by a single equation to explain the long-term rate of interest. From his studies of the UK economy, Klein (1964:56) concludes that

> --- my theoretical predilections are very much in favour of a theory of the 'real' economy. The monetary economy if in good house-keeping order will not have a dominant influence on real affairs. Nevertheless, I have tried hard over the years in several models, to give the benefit of every doubt to money and interest rates when making statistical estimates. My empirical verdict, thus far, is that little evidence can be found for the actual influence of money or interest rates on real activity.

Klein's studies encouraged an upsurge of econometric model building and by the early 1970s the three main models in regular use in the United Kingdom were those of the London Business School (LBS) which contained sixty-eight behavioural equations; the Treasury model, which contained fifty behavioural equations; and the National Institute of Economic and Social Research (National Institute) model, which contained only eleven behavioural equations. In all of these models, the money supply was taken to be exogeneous. One or two interest rates provided the only potential linkage from financial market conditions to the real economy, and the whole of the financial side of the

economy was summarised within a demand for money function (the National Institute model did not even have that).

Thus, it could be argued that the model builders had concentrated on the Investment-Savings (IS) side of the IS-LM model, paying little attention to the interrelatedness between the 'real' and financial sectors, or to the financial sector itself. In fact, it is the absence of financial linkages, rather than the neglect of a detailed financial sub-sector that is absolutely crucial (Coghlan 1983:11). Goodhart (1978:10) notes that in the United Kingdom, the financial side of the economy remained "little more than a vestigial appendix to the main 'real' forecasts." When discussing the models presented at the 1972 SSRC conferences, Dicks-Mireaux (1975) commented on the lack of monetary influences, noting that, "possibly it is the very Keynesian framework itself which is tending to inhibit the search for monetary effects," adding that "the greatest need now is for a better understanding of the role of monetary factors and their impact on the economy."

This Keynesian dominance has been challenged by the monetarists, mainly by Milton Friedman and the Chicago based economists. They set out in various works (for example, Friedman 1956, 1969, etc) to undermine the

Keynesian position which relegated money to the subsidiary role. In their works, Friedman and Meiselman (1963) provided strong evidence in support of the monetarist position. These studies generated a great deal of controversy and subsequent empirical works.

Additional evidence in favour of a strong, substantial effect of money on the economy was provided by the economists at the Federal Reserve Bank of St. Louis (see for example, Andersen and Jordan, 1968; Andersen and Carlson, 1970). Moreover, these studies found little support for strong effect of autonomous expenditures or fiscal policy on the rest of the economy. However, as Modgliani (1975) notes, this debate has had a much greater influence on macroeconomic model building in the United States than in the United Kingdom. But in UK as in most other countries, money came to be thought increasingly important as inflation accelerated and the main forecasting models failed to provide reasonable predictions or explanations. Even so, in UK and the U.S.A a lively debate has continued as to the correct specification of macroeconomic behaviour and the appropriate linkages between the monetary and the real sectors of the economy.

In Nigeria, and perhaps in response to the trends in the developed economies, a number of macroeconometric models have been constructed (see for example Ojo 1972, UNCTAD 1973, Adamson 1974, Gosh and Kozi 1978, Olofin 1977, Uwujareen 1977, World Bank 1974, NISER 1983, Ekeoku 1984, Poloamina 1986, etc). Most of the models have the limitation of not being solved and not being maintained for policy analysis. The models were mainly of the conventional Keynesian demand determined type, with the total absence, or mere ad hoc inclusions, of the monetary sector.

However, some of these models require further examination because of their relevance to the present study. The Ojo model deserves attention because it is one of the few models that were solved and used for policy simulation studies. It is a medium term planning model of the Nigerian economy and is made up of fifteen (15) equations (9 behavioural and 6 identities) and 17 exogeneous or predetermined variables estimated over the period 1951 - 1965 using the Two-stage and Three stage least squares techniques. No monetary sector equations were specified whatsoever and there was no explicit price equation. Of all the models, the one with the most

elaborate specification of the monetary sector is the NISER model. Consisting of seven blocks and seventy one (71) equations, the money block is specified by five (5) equations: 3 money demand equations and 2 identities. Recent attempts at the model's solution have not produced the expected results.

The most disaggregated macroeconometric model of the Nigerian economy known to us is "The CEAR model MAC-IV", (see Olofin, 1985). This model was perhaps predicated on the conclusion by Klein (1966) that the standard Keynesian model is not appropriate for developing economies. The model subdivided the economy into eight major analytical blocks or sectors viz: Supply, Consumption, Capital formation, population and employment, wages and prices, financial, taxes and transfers (government), and the external sector. However, according to the model builders (see Olofin, 1985:183), "the economy is viewed for modelling purpose as consisting of two major sectors, the supply or production sector, and the external or foreign trade sector." This shows the model's areas of emphasis, and explains why in a model of 137 equations, only 6 stochastic and 2 definitional equations were used to explain the entire 'financial sector'. Out of the 6

behavioural equations, 3 were devoted to modelling the determinants of interest rates. The remaining three equations explained the money demand function, cash supply equation, and the public's holding of government securities equation. No doubt, the nature of peculiarities of any model, as usual, depends on the model builder's perception of the economy being modelled. Besides the rudimentary inclusion of the monetary sector in this model, we are not aware that the exogeneous variables of the sector (if any) have been simulated for policy analysis. The other two models (Ekeoku, and Poloamina) are modifications of the CEAR's model. The model builders however acknowledged the rudimentary specification of the monetary sector as a major limitation of their studies.

Beside the macro models, a number of studies have also been devoted to investigating monetary relationships in Nigeria. However, a dominant proportion of these has been devoted to the money demand function.

As a deviation from this trend, Ajayi (1973, 1974, 1978) among others, devoted considerable research efforts to investigating the money supply relationships. It is in fact Ajayi's (1978) study which represents a first attempt at constructing a monetary model of the Nigerian

economy. But, since the study was devoted to "A Portfolio Approach to Money Supply Determination in Nigeria," it failed to address certain issues relating to the monetary linkages with the real sector of the economy. The study comprised of single equation estimates and could not be called a macro monetary model of Nigeria because "there is a lot more to building a comprehensive macromodel for a developing country than merely putting together a set of individually estimated equations, no matter how good their estimates might be, and calling such a collection of equations a macro model" (Olofin, 1985:40).

Thus, there is a big research lacunae to be filled in the area of an elaborate study of monetary relationships within a macro-econometric model of the Nigerian economy.

3.2. Demand for Money in Developing Countries, and Nigeria

As observed earlier in this chapter, most of the studies of monetary relationships in Nigeria have centred on the demand for money function. It is therefore necessary to review the state of knowledge in that area, in order to understand generally the issues and controversies concerning 'Money and the Economy' in Nigeria.

Given the controversial evidence on the role of money in developed countries, and considering the peculiar

characteristics of underdeveloped economies such as Nigeria, some basic analytic questions may be posed. First, is it possible that the theoretical relationships developed to explain monetary behaviour in the developed economies are applicable to developing economies? If so, how far is the monetary theory of developed economies applicable to developing economies?

A good deal of the controversy between monetarists and fiscalists has centred on the particular form of the demand for money function, whether this function was stable and predictable, and whether the interest elasticity of the demand for money was high or low and the likely size of the income elasticity of demand for money. From a monetary analysis point of view, many economists (Myint 1965; Park 1973; Polak 1957) have questioned the applicability of Keynesian liquidity Preference theory in developing countries. It has been argued that Keynesian theory is irrelevant to the monetary problems of developing countries because it is geared to the preoccupations of developed countries. This argument stresses the under-developed nature of the financial sector of developing countries, particularly the primitive state of the money and capital markets. In most developing countries, the

variety of financial assets is extremely limited, and the markets for these assets are narrow. Thus, the financial assets that form the transition between money and real assets in countries with fully developed financial markets play a very minor role in the asset structure of developing countries.

Moreover, the quoted interest rates in many developing countries do not reflect money market conditions because they are exogeneously determined by institutional arrangements. In these circumstances, it is argued that the desired holdings of money are predominantly transactions balances which are likely to be inelastic with the interest rates on financial assets. Accordingly, many economists (for example, Wong 1977, Wai 1956; Park 1973) contend that the unsophisticated classical quantity theory may well be applicable to developing countries.

However, whether the quantity theory is relevant to the monetary conditions of developing countries depends upon the following fundamental empirical issues: (1) the most appropriate definition of money; (ii) the variables that enter the demand for money function in a manner so as to maintain a stable demand for money over time; and (iii) the use of varying interest rate structure and

whether real or nominal values of the relevant economic variables are used. These issues remain largely unresolved by monetary economists (Nemedia, 1981:12); and perhaps, no area of economic research has generated more heated debate than this aspect.

The first published work on the demand for money in Nigeria was done by Tomori:(1972). The debate generated by this article (Known in Monetary economists circles as the 'TATOO Debate'[3]) on the pages of the Nigerian Journal of Economic and Social Studies, has further illuminated the study. The subsequent studies (for example, Ojo 1974; Teriba 1974; Ajayi 1974; 1978; Odama 1974; Akinnifesi and Phillips 1978, etc) are either in reaction to Tomori's work or extensions of it. Several of the issues in dispute are either theoretical, definitional, interpretational or methodological in nature.

One area of great controversy is the correct definition of money. There are disagreements as to whether the narrow concept of money (currency plus demand deposits) or the broader definition, including savings and time deposits is a better definition. Johnson (1976:47) views the debate over the appropriate definition of money as being caused by "--- the transition from the conception of money as a

3. TATOO is derived from the first letters of the surnames of the principal debaters - Tomori, Ajayi, Teriba, Ojo and Odama.

medium of exchange to money as a store of value." This transition results from a wide recognition of substitutability between money and the financial assets. However, the debate as to what to include in, and what to exclude from a definition of money is a problem of empirical evidence rather than a direct counterpart of the theoretical concept (Kaufman, 1969; Laidler 1969). Tomori finds out that the narrow definition of money (M_1) performs better than a wider definition (M_2) and goes on to conclude that M_1 is a better definition of money. Ajayi (1974:167)contends that "savings deposits are themselves a means of payment while time deposits (given the constraints on their type) are easily converted into a means of payment." According to him, "most savers tend to use their savings account as current accounts." Consequently, he favours the use of the broader definition of money. This derives from the results of his empirical research which show that 'the wider definition of real balances (M_2) performs better than the narrow definition of real balances (M_1).'

Teriba (1974) discovers that 'it certainly makes more sense to study the demand for money by studying the demand for its components, --- and of the assets included in the study, time deposits are the closest substitutes

for money defined as currency and demand deposits.' Ojo (1978:92) concludes that "this paper has confirmed that there is a high degree of substitution between money (narrowly defined) and savings deposits on the one hand and money and the sum of savings and time deposits on the other. Using a wider definition of money (which this paper has identified as a more appropriate one) would improve the quality of research in monetary theory and in the formulation of monetary policy."

The above conclusion accords with the results obtained by Selden (1956:230 - 31). He argues that the definition of money which includes time deposits is more appropriate. This is due to his finding that the long trend of velocity in the United States has been one of secular decline as income has grown. He explains this phenomenon by indicating that money is a luxury good with an income elasticity. Also Meltzer (1963:219 - 246) has documented various results concerning the definition of money. His findings strongly indicate that the demand to hold currency plus demand deposits is at least as stable as in alternative demand functions. Thus, there appears to be no reason for broadening the definition of money to include time deposits or liabilities of financial intermediaries.

However, there are reasons to suspect the suitability of the broader definition of money in a developing country. First, the role of interest rates and the speculative motive for holding money are very weak, and the quoted interest rates do not change in response to market forces. Furthermore, the money market in most developing countries is characterised by its dual nature. This makes it possible for a large part of the population to deal with bank balances. However, since currency constitutes a significant part of money holdings, and currency and demand deposits are not used interchangeably in most developing countries, it is quite appropriate to specify separate functions for currency and demand deposits. Also, it is necessary to know the behaviour of time and savings deposits because every monetary analysis must rely on the movement of funds among the components with resultant variations in the supply of money.

The other major controversy relates to the definition and nature of interest rate variables to be used. As a matter of fact, enquiry into the demand for money function is motivated by the need to understand the transmission mechanism of, and how monetary policy affects people's decision to spend. This is done by examining the interest elasticity of the demand for money function, ie, how the

quantity of money demanded varies in response to changes in the interest rates of money substitutes (Akinnifesi and Phillips 1978:31). Thus interest rate or structure of interest rates should be included in the demand for money function.

Friedman, however, found that there is no significant empirical relation between the demand for money and the rate of interest. But this is contrary to his theoretical work, in which he includes interest rate as a determinant of the demand for money. On the contrary, when a similar study was carried out by Laidler (1966:545 - 55), the interest rate was included in the cycle average regression, and this inclusion was found to confirm the importance of the interest rate as a determinant of the demand for money. Also, Meltzer found that demand function for money is a stable function for the long term interest rate and non-human wealth. They are of almost equal importance in explaining the demand for real cash balances. Another strong result related to interest rates was conducted by Laidler (1969:97). He concludes that,

> Whether one thinks of the demand for money function as being constrained by income, wealth or expected income, whether one cares to define money to include time deposits or exclude them, whether one chooses to ignore the identification problem or deal with it, whether one uses a short rate of interest, a long one, the return on financial

> intermediaries' liabilities or the yield on corporate equities, there is an overwhelming body of evidence in favour of the proposition that the demand for money is stable and negatively related to the rate of interest.

Unlike the developed countries, there is no conclusive evidence as to whether the demand for money is affected by either short or long term interest rates in developing countries. Empirical studies made by Biswas (1962), Gujarati (1968), and Singh (1970) show that the demand for money is not sensitive to either short-term or long term interest rates. On the other hand, Gupta (1970), and Sastry (1962) found that the elasticity of the demand for money with respect to long term interest rates is statistically significant. On the basis of these studies, it may be difficult to determine the interest rate effects on the demand for money in developing countries.

Even more difficult is the choice of a representative rate of interest from a wide range of interest rates. Tomori (1972) uses the official discount rate of interest for Nigeria. Teriba (1974:154), disagrees with Tomori and suggests that several interest rates should be used. According to him, "the main reason why different interest rates should be used individually and in combinations (rather than just one rate or a weighted average of rates)

in an empirical work on the demand for money is to throw light on the degree of substitutability between money and other financial assets, and to identify the closest substitute for money." Accordingly, he used the Central Bank short term interest rate (RG), Federal Government long term interest rate (R_L), Time deposit interest rate (RM), savings deposit interest rate (Rs), and found that "the time deposit interest rate (Rm) was the only interest rate variable with consistent right sign and non-significant in all the equations tested." Unlike Teriba, Akinnifesi and Phillips use a 'representative' interest rate and the variable is entered as 'expected' rate of interest. This was informed by the poor performance of the model when multiple interest rates were included. Contrary to Teriba's finding about time deposits, Akinnifesi and Phillips consider saving deposit to be a good proxy for money. Considering their discussion on interest rates, they note that "the implication of all these is that for the demand for money, there are some crucial significant rates, the average lending rates, the minimum rediscount rate, and the treasury rate which the monetary authorities could focus on for policy purposes while for the components of money it is the post office

rate." Even though they observed that "interest rate turned out to be relatively ineffective policy instrument," they also concluded that 'expected or permanent income and expected rate of interest are significant arguments in the demand for money function in aggregate and component forms."

Generally, empirical evidence shows interest rate to be non-significant in determining the demand for money in Nigeria. The reason for the statistical insignificance of the interest rate, according to Ajayi (1974:171)"may be due to the fact that in a developing country like Nigeria with underdeveloped money market, perfect information about the level of and fluctuations in interest rates are non-existent. Also, interest rates in Nigeria have not necessarily reflected situations in the Nigerian economy ---." Ojo (1974:150) then notes that "it is precisely the insignificance of the interest rate that led me to the idea that in an underdeveloped money market, characterised by the absence of adequate financial assets, adjustment to a position of equilibrium (in the wake of a monetary disturbance) would probably take place, not by way of purchase of money substitutes in the form of financial assets, but rather by way of purchase of physical assets." He therefore argues for a model that excludes interest rate but utilizes

instead an expectations hypothesis about the rate of inflation. Fakiyesi (1980) agrees with Ojo, "not because we are convinced that the rate of interest has no role to play in the demand for money in the country, but mainly because preliminary and unpublished work carried out with the rate of interest were not enouraging, --- secondly, the structure of interest in Nigeria is greatly determined by institutional factors." Moreover, it appears that one important factor inhibiting the use of interest rate in developing countries is the dearth of relevant data on interest rates. As Bain (1970:82) sums up "the choice of interest is dictated partly by availability of suitable statistics and partly by the investigator's theoretical approach. --- Since theory gives no clear-cut answer on the choice of interest rates, empirical studies usually try out a variety of interest rates and see which contributes most to the explanation of the demand for money."

However, whatever interest rates are chosen, and however they are measured, a very important statistic is the interest elasticity of the demand for money. This helps to ascertain the degree of substitution between money and other financial assets.

The other issue in the demand for money function is the role and nature of income or wealth as one of the explanatory variables in the demand for money function. Johnson (1971:125) points out that,

> In principle one can regard current income as corresponding to transactions demand for money. This is to be contrasted with wealth which can be measured either by the value of people's assets or by the permanent income concept. In principle one could expect to bring **both into the analysis.**

Meltzer (1963) finds that the inclusion of income in the demand for money equation does little to improve the explanatory ability of the function. Also he concludes that the demand for money function is more stable when wealth rather than income constraint is used. On the other side of the spectrum, Goldfeld (1976:217 - 219) finds that the wealth variable is unimportant when used with income variable alone, while the latter retains its significance. He suggests that the explanatory ability of the demand function for money would be improved by using the income variable.

Unlike in developed countries, the choice between income or wealth is ruled out because of the absence of estimates of total wealth in developing countries. But it could be said that, if wealth is an appropriate variable, and income is properly considered as the return

on wealth, then as Johnson indicates, income is an appropriate variable also. However, most of the empirical studies in leass developed countries show that income is the most important determinant of the demand for money function (see, for example, Trescott 1971; Park 1973; Wong 1977). For Nigeria, the works by Tomori (1972); Teriba (1974); Ajayi (1974), (1978); Fakiyesi (1980); Akinnifesi and Phillips (1978); etc show that income is the most important explanatory variable. In fact, according to Ajayi (1974:170) "income alone explains about 81% of the demand for money when the narrow definition is used as opposed to 85 - 86% when the wider definition is used:" Income elasticity of the demand for money is found to be high (greater than unity) thus confirming the monetarist position. Most of the researchers (enumerated above) on Nigeria differ with regards to the nature of the income data to be used. Different measures of income - permanent income, real income, nominal income, etc are used. These differences reflect the researchers' different perceptions as to the nature of the economic relationships involved.

Other areas of differences relate to the types, and measurements of the variables to be included, the nature

and magnitude of the income and interest rate elasticities, the stock adjustment processes, model stability, the functional forms of the model and estimation procedures. Differences in these issues reflect the researchers' theoretical and methodological approaches.

An Extension

The evidence, as observed earlier, shows that income is, to a considerable extent, the explanatory variable for money demand function. This implies that the Nigerian economy functions under the tenets of a quantity theory equation. But the simple version of the quantity theory, which includes income as the only variable in explaining the demand for money, would become inapplicable to the developing economies if the income velocity is unstable over time. It has been observed by Park (1970:620 - 36) that the income velocity of money is subject to short run decline in most less developed countries. This is certainly expected in the light of progressive monetization of the economy. It is therefore, very important to take into account the degree of monetization in specifying the demand for money function in Nigeria as well as in other developing countries. This has been a major shortcoming of all the earlier researchers for Nigeria. In summary,

it could be said that the controversy surrounding the specification of money demand function for Nigeria is still largely unsettled. There is still scope for modifications and extensions. The money demand functions to be specified in this study will benefit from the controversies, but more importantly, the degree of monetization of the economy will be incorporated as an explanatory variable.

CHAPTER FOUR

THEORETICAL FRAMEWORK

In this chapter, the failures of the mainstream theoretical framework are summarised; the modified frameworks for analysis in less developed countries are reviewed; and finally, an alternative theoretical framework, consistent with the dynamics of Nigeria's underdeveloped economy, is developed.

4.1. Inadequacy of the Mainstream Theoretical Framework

Indeed, "there is probably no field of economics in which the writings of economists are so strongly influenced by both current fashions in opinion and current problems of economic policy as the field of monetary economics" (Johnson, 1969:51). This is particularly so in the volatile area of the precise role of money, because "the most basic issue in monetary theory is the extent to which fluctuations in general economic activity are the result of fluctuations in the money supply" (Friedman and Heller, 1969:10). The controversies between the Keynesians and the monetarists on the role and transmission mechanism of monetary policy relate to such issues as the form, stability, predictability, interest and income elasticities of the

demand for money function, etc. But, inspite of the controversies, it can be shown that both schools of thought present a unified theory of monetary policy (Ghatak, 1981:26). Both schools of thought believe that monetary policy is an effective instrument of economic management. The effectiveness is enhanced when the interest rate sensitivities of the demand for and supply of money are low.

However, from the mainstream theories (monetarism and Keynesianism) and their various refinements and extensions, a number of observations could be made. First, they assume that monetary impulses are transmitted into the real sector through changes in interest rate or the realignment of relative prices. Second, there is the implicit assumption of mature, efficient and competitively functioning goods and money markets. It can also be observed, judging from the implicit targets and instruments of policy, that the mainstream theories are primarily concerned with short term demand management or stabilization programmes.

But, it is to be recognised that in a system with non zero but finite interest elasticities of the demand for and/or supply of money, and a non zero interest

elasticity of demand for investment, the efficacy of monetary policy depends on the structure of both the real sector (i.e; the markets for goods and services) and the monetary sector. For Nigeria, it can easily be shown that the structure of both markets, and the peculiar requirements of economic development would seriously question the validity of those assumptions. For instance, Nigeria's money and capital markets are grossly underdeveloped. Interest rates charged to borrowers by commercial banks are institutionally determined, and not by market forces. Thus, the interest rate channel as the relevant transmission mechanism is questionable. Secondly, with the imperfections and rigidities that characterise the money and factor markets, it is not likely that a change in money supply will quickly lead to a realignment in relative prices in the economy. Also, for an economy eager to escape from the throes of poverty, and lay the foundations for long term economic development, preoccupation with demand management may not be the main thrust of economic policy. Recent experiences bear out these observations.

During the post World War II period, attention began to focus on the economic growth of the less developed countries, and the Keynesian economics was the dominant framework for analysing monetary policy. Unemployment in the midst of economic depression was treated synonymously with underdevelopment of resources in LDCs. The suggestion followed naturally that expanding money supply and lower interest rates might be a good policy. This view prevailed for quite some time until the inflationary and other undesirable consequences of it forced several governments into interventionist policies (artificially low interest rates, exchange and capital controls, etc). The result was the repression of the financial sector and hence the underdevelopment of its potential contribution to the development process. These developments triggered interest in the monetarist panacea to stabilize LDCs' economies. The monetarist policy was directed at regulating the quantity of money and ensuring free play of demand and supply forces. It was primarily concerned with the stabilization aspect (with little success), and hence addressed the issue

of economic development only in a limited way. The dissatisfaction with both frameworks has raised the need to search for an alternative framework for monetary policy analysis in LDCs.

4.2. Structure of the Economy as a Determinant of the Relevant Theoretical Framework

The structural and institutional characteristics of any economy determine the content and character of any policy framework. Therefore, the starting point for the search for an appropriate policy framework for LDCs is the survey of their salient characteristics.

Generally, an LDC is characterised by a dual economic structure - an urban, monetized sector; and the rural and often unmonetized sector. The per capita income and capital stock are small. There exists a considerable amount of unemployment and/or underutilization of the labour force. There is a concentration of production in the primary sector, which implies that neither domestic output nor exports are likely to be sensitive to demand fluctuations. Output in the short-run (that is, a year or two) is dominated by climatic factors. The manufacturing

sector is rudimentary and contributes little to national income. Exports consist largely of primary commodities, the demand for which is determined by world markets. The financial markets are in an inchoate stage and are dominated mainly by the commercial banking system. The main financial assets are bank deposits and currency, and the only other available assets, such as bonds and shares are held mainly by the financial institutions rather than by the saving public. The main alternative to money as an investment asset is goods. As a consequence, there is no free market activity in domestic securities and the holding of government debt by the non-bank public is generally negligible. Because of this, interest rates are not determined freely by market forces, but by the government.

A final characteristic of most LDCs of interest in assessing money's role in the development process is the limited sources of government finance and the relatively large role the government plays in the economy of most LDCs. As a result there is often a large budget deficit which is wholly financed by borrowing from either the Central Bank, Commercial banks, or from abroad, since there is no well developed market in financial assets. In the first and

third cases, base money will be raised, leading to a multiple expansion of deposits. In the case of borrowing from the commercial banks, the monetary base will not be affected, but the money supply may expand if the banks possess excess reserves to start with. For all these reasons the distinction between fiscal and monetary policies in LDCs is almost non-existent.

4.21. Formalization of the Theoretical Model

Handa (1970) has formalized these characteristics into a theoretical framework for the study of monetary and fiscal analysis in LDCs. He concentrates on constructing the most viable framework for studying the shortrun macroeconomic interrelationships in these economies and deriving the implications for the need and scope for monetary and fiscal policies. The domestic economy is subdivided into the monetary and the non-monetary sectors. Using a set of equations, he derives the following implications for the effectiveness of monetary policy in an LDC.

The complete model consists of four endogeneous variables and five equations.

The additional variable relevant in models with developed financial markets and missing in underdeveloped economies is the rate of interest. The model then brings out the inherent dearth of market mechanisms or equilibrating variables in an underdeveloped economy. Such a scarcity is an absolute one from the point of view of the proper functioning of the economy.

The proper functioning of the economy then requires an additional endogeneous variable. This may be provided by making one of the exogeneous (policy) variables an endogeneous one. Thus, either the money supply or the budget deficit must become an endogeneous variable determined by the model. Both cannot play an independent role. Further, assuming fiscal policy to be an independent variable, the appropriate change in the money supply is not that given by the size of the fiscal deficit but that implied by the structure of the economy, given the size of the fiscal deficit. In this model therefore, fiscal policy used as direct instrument of development is more truly a policy variable than the money supply, the latter leaving an indirect and questionable impact on development.

Furthermore, the budget is a cumbersome and inflexible tool for assisting in continuous adjustments in the economy while monetary policy is both variable in amount and timing. It seems, then, that even if a choice were to exist, the money supply rather than budgetary deficits would tend to become the relevant endogeneous variable. The scarcity of policy instruments in the face of goals, the low degree of emphasis put on achieving price stability through fiscal measures and the errors in conducting an endogeneous monetary policy imply that governments would have the tendency to use direct controls on various variables and especially on prices - almost an ever-present fact in underdeveloped economies.

In conclusion therefore, Handa (1970:333) regrets that "unfortunately, the appropriate models do not leave room for governmental discretion in money supply and its very efficacy would ensure that a discretionary monetary policy would result in immediate and severe disequilibria in the economy." It then appears that given the structure of an LDC and the nature of money supply, monetary policy is not a dependable instrument for economic stabilization.

4.22. Evidence from Nigeria

There is evidence from Nigeria to corroborate the implications of Handa's framework. Some studies,

particularly that by Okah (1985), have shown that the conduct of monetary policy through the orthodox manipulation of money supply by the Central bank is at best an uphill task if not actually achievable only by a fluke. This is particularly so in the circumstance of Nigeria's economic and social underdevelopment in which the parameters of the system are almost unknown and the public sector deficit is significant. The major conclusions of Okah are summarised below.

On interest rates, Froyen, et al (1983) have noted that interest rate instability varies inversely with instability of the money stock irrespective of the institutional setting. This of course assumes a free-play of market mechanism which equilibrates investors' portfolio adjustment behaviours such that there exists, at any point in time, a market clearing vector of rates. But where rates are administered, as in many LDCs including Nigeria, the prevailing level of interest rates ceases to be an indicator of market trends and therefore a false guide to a central bank that may contemplate intervention in the financial markets. Based on this, Okah calls to question the efficacy of open market operations as a tool for controlling the stock of money in a regime of administered rates and relatively immature money and capital markets.

In Nigeria, the money stock is the result of the portfolio behaviours of the banks (central and commercial) and the public. This corroborates the empirical findings by Ajayi (1978). Since the individuals are the major holders of currency, it implies that parameters of their portfolio adjustment processes have serious implications for the ability of the Central Bank to control the money stock. Any noteworthy modelling of an investor's behaviour at the micro level will most certainly specify a role for either current interest rates, or expected rates, or both; usually both. Thus, the interest rate inflexibility handicap on the Central Bank of Nigeria's ability to control the stock of money reaches to the deep recesses of the micro foundations of macro behaviours.

Again, under a regime of fixed exchange rates (such as Nigeria had been practising up to 1986), and where foreign capital flows are sensitive to interest rates, the autonomy of the monetary authorities to undertake independent financial policy is limited. But even in a system of flexible exchange rates (e.g a managed float) the factors which enter into the determination of an optimum exchange rate, particularly in an LDC such as Nigeria, cut across real and financial variables and can

hardly be built routinely and systematically into the adjustment process of portfolio management of the Central Bank.

Furthermore, given a monocultural export-oriented economic base in which export earnings accrue in the first place to the government, and in the absence of a foreign exchange sterilization policy, fiscal factors will become very important in determining the intensity and character of monetary movements. The Central Bank in this case also has no control over government deficits. In such a special case, such as in Nigeria, controlling money supply tantamounts to controlling government behaviour itself. The Central Bank of Nigeria is not known to be doing that.

Therefore, the implication of the foregoing discussion is that in a situation where the conventional tools do not work and the fiscal activities of the government are dominant but cannot be controlled, the efficacy of the traditional monetary policy in Nigeria becomes questionable. Thus, Okah corroborates Handa's view that in an LDC such as Nigeria, fiscal rather than monetary policy should be the major exogeneous policy instrument. But the point has to be noted that Handa's model is for an analysis of short-run macroeconomic interrelationships. Okah analysed the

difficulties facing the Central Bank in achieving its traditional role of "maintaining monetary stability." But whether or not a particular policy achieves set objectives depends on the nature of the objectives and the instruments of policy. The relevant question therefore is whether short-run macroeconomic stabilization (with the traditional instruments of money supply management) can be taken as the appropriate thrust of monetary policy in an LDC.

4.3. Stabilizing Versus Developmental Monetary Policy

4.31. Stabilizing Monetary Policy

Admittedly, the principal preoccupation of the LDC is to attain rapid economic growth from a very low level of income and employment. But the concern for growth of output and change in its composition are not always independent of the concern for price stability and balance in the external position of the LDC (Aghevli and Khan 1977; Coats 1980; KhatKhate 1972; McKinnon 1973; Thirwall 1974; Coats and KhatKhate 1984, etc). Inflationary pressures can and do emerge during the process of development.

More generally, inflation produces inefficiences in production activity because inflationary forces render economic calculation over time difficult due to "money illusion." Closely related to the control of inflation is

the need to maintain a stable balance of payments position. If there is a faster rate of inflation in one country than in another with whose currency it maintains a fixed exchange rate and with which it has trading relations, that country loses its competitiveness in regard to its exportables with the result that its balance of payments tends to worsen. It is thus clear that the objectives of stable prices and the balance of payments position, and that of economic development are intertwined. So long as there is harmoney between these sets of objectives, the policy instruments used do not pose any serious difficulties in their implementation. However, more often than not, conflicts do arise between the objectives of price stability and balance of payments equilibrium on the one hand, and the objective of faster economic growth on the other hand. The question naturally is which one should claim the greater attention of the policy makers.

The traditional stabilization role of monetary policy tends to focus more on maintaining international balance of payments in LDCs than on demand management per se, as that term is understood in the developed market economies. In an important sense, independent control of exchange rates and the money stock are mutually exclusive alternatives. The price relationships that must exist between any economy

and the rest of the world, and which are thus an important policy objective, can be achieved with any exchange rate by making appropriate adjustments in the domestic price level (i.e; money stock), or with any price level by making appropriate adjustments in exchange rates. The LDCs are accustomed to the fixed exchange rate regime. Under this regime, actions by the monetary authorities to alter the nominal money stock relative to the public's demand for it at prevailing internationally determined prices ultimately lead to self-defeating balance of payments surpluses or deficits (Aghevli and Khan 1976).

But even with market determined exchange rates the scope for demand management in LDCs is limited for several reasons: (a) The non-policy economic disturbances in which monetary policy must respond invariably originate on the supply side or abroad so that policy efforts to change domestic demand are of little consequence for output and employment. Meaningful employment in LDCs is more closely related to the pace and nature of economic development than to the state of aggregate demand (b) Coordinating supply and demand (equating savings and investment, etc) is the central task of markets. The more sophisticated and complex an economy becomes (i.e; the more indirect are the economic relationships between members of the society), the

more difficult this coordinating task is, and the more sensitive these relationships are to disturbances. As discussed earlier in this chapter, the economies of LDCs are relatively uncomplex in this sense. Therefore "fine tuning" types of demand management by the authorities are of little avail.

While many will disagree with this negative assessment of the prospects for active stabilization policies to do very much good, their potential to do great harm are more familiar and better documented (Coats 1976, Coats and KhatKhate, 1984, etc). We need not over stress the importance for economic growth of a broadly stable environment, to which monetary policy can contribute best by not disrupting. But even this seemingly passive stabilization role has proved difficult to achieve.

Indeed, the activities of Central Banks in most LDCs have made possible domestic monetary behaviour that no longer reflects balance of payments developments. This then has precipitated more frequent foreign exchange crises, devaluations, trade and exchange controls, and inflation (Harberger, 1978). More than anything else it has eased the access of finance ministries to the printing presses of their central banks and fostered previously unknown

rates of inflation (Aghevli and Khan 1977, 1978). Where the moral aversion to such monetization of government debts is lost, monetary and price stability will not be easily re-established. This political problem raises grave doubts about the wisdom of monetary discretion in the first place (Coats, 1980).

Furthermore, while the notion that countercyclical monetary policy can successfully fine tune aggregate demand and economic activity has more often than not turned loose damaging inflationary forces, even in the developed countries, there is an additional question of whether short term stabilizing monetary policy is relevant in the context of LDCs. Stabilizing monetary policy, assumes that money's major function is as a means of payment, the regulation of which is required to moderate fluctuations in aggregate expenditure. If therefore long term growth and development is the objective, monetary policy should be directed toward eradication of obstacles endemic in the institutional and economic situations existing in LDCs. In that case, the role of money and the instruments of monetary policy must be perceived differently. This brings to mind the concept of developmental monetary policy.

4.32. Developmental Monetary Policy

Several economists (KhatKhate 1972; McKinnon 1973; Shaw 1973, Gurley and Shaw 1955, 1956, 1960; Thirwall 1974, Coats and KhatKhate 1984; etc) have stressed the need to view the role of monetary policy in LDCs more from the developmental than the stabilization functions. It is recognised that the individual economic units endowed with entrepreneural talents and drive are not generally the same units with surplus resources to invest. What matters crucially from the point of view of the development process is the existence of channels through which the resources of surplus units are transmitted to those in greatest need of those resources (Gurley and Shaw, 1955, 1956, 1960). In the absence of such channels economic growth fails to reach feasible rates as savings either remain sterile or are misallocated. It is in establishing such a channel, and in improving its efficiency, that developmental monetary policy comes into its own.

A convincingly logical basis for developmental monetary policy has been provided by the Shaw-McKinnon theoretical framework, which was devised following dissatisfaction with the stabilizing emphasis of traditional (Keynesian and Monetarist) monetary policy. They start

start with the premise that the fragmentation of money and capital markets in LDCs, and consequent dispersal of rates of return in these economies, inhibit the growth process. Therefore, priority should be assigned to the development of money and capital markets, thereby unifying them and ensuring a common denominator for an economy-wide rate of return on the investment. 'Low interest rate' policies, intended to project investment and growth in fact have tended to retard the development of financial instruments and markets and to impede the efficiency with which resources were allocated. The policy prescription, following from the Shaw-McKinnon approach implies raising the real rates of return on money and other financial assets found in the 'organised' sectors of an economy to the marginal return on investment. The implications of this policy are that maximum growth requires the highest possible return on financial assets - without pushing borrowing costs to the point of choking off investment below the level of savings, to encourage the development of a wider range of financial assets (or contribute to an environment conducive to such development) and to foster maximum efficiency in the production of financial services so as, in part, to minimize the spread between return to savers on financial

instrument and cost to borrowers.

As money as a store of wealth competes primarily with goods in many LDCs, its characteristics, including yield, should compare favourably with those of goods as they relate to this motivation. In particular, the nominal yield on money should, as a minimum, exceed the explicit return from holding goods, which is the increase in their purchasing power. For goods in general, this return is measured by the rate of return on money adjusted for the rate of inflation, i.e; the real rate of return or the real interest rate should at least be positive. In fact, it should be higher depending on the marginal productivity of investment.

Though maintenance of a positive real yield on financial assets constitutes the main plank of the policy package following McKinnon's theoretical frame, its main thrust is toward complete liberalization of those LDC economies highly repressed by pervasive government intervention. However, complete liberalization is not easily achieved, nor without cost to society, especially when a fiscal deficit financed by borrowing from the Central Bank continues to be the glaring feature of the LDCs' financial systems. The liberalization scheme presupposes a high level of technical sophistication and political discipline.

Both assumptions are likely to be naive.

What emerges strikingly from the skeletal review of some of the main issues in the debate on the role of monetary policy in LDCs, is that the importance of money in the development process should by no means be underestimated. The skepticism about the efficacy of monetary policy in developing countries was due to a narrow view of monetary policy. If monetary policy is construed as no more than merely "a technique of monetary management," then it follows that in the absence of an institutional setting conducive for active stabilization or demand management policies, there is little scope for it to operate. But if, on the other hand, monetary policy is considered in its broader aspects, not only in relation to its institutional mechanics but also in terms of interaction between it and the real economy, it would have to have some "content of theory." There have to be certain broad principles, derived from generalised experience, that constitute a relevant theory. Techniques then become no more than an appendage to relevant economic theory (KhatKhate, 1972:535). If therefore monetary policy cannot be analysed outside a given structural and institutional setting, the crucial issue for this study

would then be the formulation of the relevant theoretical framework.

4.4. A Theoretical Framework for Nigeria: The Structuralist-Developmental Model

The framework adopted for this research is what can be called, the Structuralist-Developmental Model. It is a blend of the structuralist's approach to economic analysis, and the propositions of the developmental monetary economists.

The model recognises the peculiar characteristics of Nigeria's typically underdeveloped economy as discussed in section 4.2 of this chapter. One fundamental feature of the economy which is germane to this framework is that it is characterised by several forms of structural rigidities which tend to constrain the supply side of the economy. These rigidities and distortions make it possible for there to exist excess demand or supply in some sectors, and inadequate demand or supply in others. While prices are rising in some sectors, they are falling in others. The level of sectoral interdependence is very low. Productive resources are not very mobile. In fact, disequilibrium is the normal state of the economy. Market forces, in this circumstance, cannot be relied upon for efficient resource allocation.

Given these characteristics, and assuming that population is determined exogeneously, this implies a certain rate of growth of aggregate gross national product. Given the inflow of foreign resources, and also that output per unit of investment remains unchanged, national output would grow at the same rate as domestic savings, and policy should be directed towards sharply raising the rate of savings. The expansion of output as a result of technological change also involves a larger amount of savings, as it is now generally accepted that the technological change itself depends on accretion to investment (Kaldor and Mirrlees, 1962). The real difficulty lies in sustaining the additional investment without too much disturbance to the economy (KhatKhate, 1972). Thus, given the poor per capita income in Nigeria, the crucial issue, from a monetary policy point of view, is how to raise the necessary savings, and the strategies to channel the available resources to their most socially desirable and efficient uses. From the discussion above, three broad issues have been raised: (i) The supply, rather than the demand side of the economy is the major bottleneck to economic growth in an LDC such as Nigeria. (ii) The major constraint on investment and hence, the elimination of supply bottlenecks is the dearth of

necessary resource inputs (and financial input is a major one). (iii) The use to which the available savings is put also has implications for development.

However, given the peculiar structural imperfections, the targeting of such macroaggregates as investment, domestic credit, money supply, GNP, etc without regard to their composition may produce uncertain and often undesirable results. For instance, if aggregate investment increases, the total output as measured by GDP may increase, and significantly too, but the other objectives of reducing unemployment, maintaining stable prices and healthy balance of payments account may worsen. In the face of low sectoral interaction and market imperfections, the effect of policies may depend on which sectors are affected. This is because, in such circumstance, the distributional effects of macro policies are uncertain and there are tendencies for there to be "concentration effects" in some sectors while other sectors stagnate. Thus, the composition of output or the directional effects of alternative policies rather than the magnitude should be the better focus for policy.

Therefore, for purposes of general economic policy, we agree with Meier (1984:724) that:

> The growth of poor countries depends at least as much on their ability to reallocate resources to new uses and thus to change their economic structures as on an increase in total investment and other resource inputs. The instruments of development policy are more likely to be specific to particular sectors of the economy than is typically the case in advanced countries, where less change is needed and resources move more freely in response to market forces.

Specifically, from a monetary policy point of view, the direction or the distributional effects of money supply is very crucial. When money as an asset is desired for channelling savings, whether between economic units within the same sector or between different sectors, the monetary authorities are justified in meeting that demand through the creation of additional money stock. However, the money demand of asset holding units does not rise steadily; it fluctuates, and at times markedly, thereby causing disturbance to the investment process, which the initial money creation is designed to sustain. To take care of such oscillation in money demand, direct regulation of the availability of credit and money as an instrument of policy seems to be ineluctable (Khatkhate, 1972:554). The direct regulation of credit is therefore crucial. But even more important is the need for a carefully phased sectoral distribution of credit. For example, it

can easily be shown that an increase in money supply, occasioned by the financing of government deficit through the printing of new money, and spent on the transport and communication or the building and construction sector, would certainly produce different effects from the alternative of spending the money on, say, agriculture or manufacturing sector. Even with the agricultural sector, it may make a difference as to whether credit is directed towards food production, forestry, poultry or fishery (Soludo, 1987).

This framework also explains the monetary transmission process. In the face of poorly developed money and capital markets and general price distortions, the monetary transmission in either the Keynesian or the monetarist framework becomes unrealistic. A more realistic link between the monetary sector and the real sector is the "availability of credit" mechanism (see, Goldfeld 1966:351 - 2). As Modgliani (1963:98) points out, the demand for credit is limited "not by the borrowers' willingness to borrow at the given rate but the lenders' willingness to lend, or more precisely, by the funds available to them to be rationed out among the would-be borrowers." Therefore, the effectiveness of monetary policy in affecting expenditure outlays depends upon the

availability and rationing decision of credit rather than its cost. The evidence from Nigeria confirms this hypothesis (Soludo, 1987). Thus, variations in the volume of bank credit, depending on which sectors are affected, transmit the effects of monetary policy changes to the real sector.

The model therefore reiterates the fact that the structural constraints on the supply side of the economy and the dearth of necessary resource inputs into the various sectors are the foremost impediments to the economic transformation of Nigeria. The role of monetary policy in the circumstance is seen in terms of its ability to channel the available financial resources to the preferred sectors so as to ensure that the composition of output satisfies the society's welfare function. Therefore, the central thesis of the model is that an optimal, sectorally homogeneous partitioning of the economy of an LDC (in this case, Nigeria) is the most effective framework for monetary policy analysis. Tangential to this is the hypothesis that the credit availability channel, (that is, directing desired amount of credit to these optimally partitioned sectors as need arises) is the most direct and most powerful means of using monetary policy to attain the macroeconomic objectives.

The consistency of this framework with the stabilization and developmental objectives of monetary policy cannot be over stressed. First, in the face of the non-workability of the traditional tools of monetary control, the direct regulation of the magnitude and direction of bank credit is the only viable alternative open to the monetary authorities. Second, it can be shown that it is the composition of output rather than its level that has implications for the attainment of the macro objectives of policy. For example, if the composition of output favours the productive sectors (e.g; agriculture and manufacturing sectors), no doubt there will be reduced pressure on imports to satisfy local consumption and this has implications for the balance of payments position. It will also generate demand for labour services. Besides, it has been shown (see Nwankwo, A.E. 1985) that whereas the increased output of some sectors (agriculture, for example) dampens the inflationary pressure, the output of others (construction, transport, etc) accentuates it. Therefore, the relative share of the agricultural output to others, has implications for government's anti-inflationary policies. Thus, by selectively regulating the volume and timing of credit to certain sectors, the objectives of short-term economic

stabilization and long term growth can be stimultaneously achieved.

However, one major issue that has been neglected so far in the discussion relates to the determinants of the volume of credit that banks will be willing to ration. It has been implicitly assumed that the demand for bank credit by the public is interest rate inelastic. Hence, credit availability rather than its cost is what matters more for policy. Can the same interest rate insensitivity be said also to hold for the depositors and commercial banks? Ajayi (1978:25) stresses that "the truth of the matter is that the scale of bank deposits and assets is affected by depositors' preferences and by the lending and investing opportunities available to the banks." Even though he later argues that "the reasons for savings deposits at commercial banks are therefore not due primarily to interest rates but to other service factors" (see, Ajayi 1978:68), the sensitivity of bank deposits to interest rate cannot be denied. More fundamental and widely documented is the fact that commercial banks are sensitive to the returns on alternative investments in their portfolio management. Therefore, a principal factor that determines the volume of available deposits that banks would ration is their risk-return analysis.

Given also that a major obstacle to development in Nigeria is the paucity of savings, it may be instructive to consider the Gurley-Shaw-McKinnon notion of "developmental interest rate policy."

As the Nigerian economy matures, the asset preference of the saving/investment units diversifies, and financial assets other than money are desired. However, the development of financial assets should not be left only to the voluntary decisions of the economic units. It must be fostered by pursuing appropriate policies. The demand for such assets can be induced through offering attractive rates of return, so that aversions of the economic units to hold financial assets in preference to real assets, such as goods, or even currency hoards, can be overcome.

The nature of the interest rate policy implied above needs some clarification. It may connote any policy that is directed toward influencing the level and pattern of money rates of interest. It may take the form of either market intervention through discount rate changes or open market operations or, alternatively, direct regulation of interest rates on certain types of financial asset, such as savings and time deposits as was the case in Nigeria until 1987. At times, it may mean a release

of the financial institutions from the ceiling requirements on interest rates. As the credit market organization is not sufficiently advanced in Nigeria, the direct control of interest rates or removal of such controls has to be relied upon to achieve the financialization of personal savings.

Once the demand for varied types of financial asset is generated, there may be an automatic response from the supply of new financial assets. Only when the response to the stimulus of a high interest rate is weak or inadequate are monetary authorities required to intervene through the creation of different types of financial intermediary. This has been the case in Nigeria. Often, it is contended that the monetary policy instruments that are common in the developed countries can be introduced in the developing countries only after the capital and money markets are built. This view, however, assumes independence rather than interdependence between the instruments of monetary policy, on the one hand, and institutional development, on the other. In fact, interaction between the two is mutually reinforcing (Khatkhate, 1972). Monetary policy instruments, such as the interest rate, if vigorously and purposively adapted to the conditions in the developing countries, can themselves

become the agent to promote the money and capital markets, which, in turn, create further favourable conditions for the effective exercise of a broader range of instruments of monetary policy.

It is this exposure to market mechanism and active use of interest rate policy as a dynamic instrument of monetary policy that is the central thesis of the financial liberalization hypothesis. It is argued that although the direct impact of interest rate on total savings may be uncertain, its indirect effects may be advantageous: (i) The wealth effects arising from a high interest rate policy may bring about a reduction in consumption; (ii) as the decision to save and to invest will be exposed to the price mechanism via financial intermediation, the overall efficiency of investment may increase. However, given the distortions in the market structure, interest rate determined by the pervasive market forces may stifle investments. Thus, in order to elicit the required responses from savers, banks, and the investing public, a selectively liberalized interest rate policy is a sine qua non.

This framework, therefore, recognises the volume and composition of aggregate private sector credit as the major intermediate targets of monetary policy in Nigeria.

As the Central Bank of Nigeria (1979:105) admits "Of all the techniques of monetary control available to the CBN, the selective raviant of direct credit control methods is the most popular because of its greater relevance to the economic circumstances of Nigeria ---." The interest rate channel is also recognised but it plays a secondary role. Therefore, money is introduced into the model mainly through the credit availability and interest rate channels. In this sense, the framework is consistent with the policy thrust of the Central Bank of Nigeria under the Structural Adjustment Programme. However, it queries the policy of aggregating rather non homogeneous sectors for the purposes of sectoral credit allocation. For instance, the aggregation of the entire economy into the "productive sectors", and "the others" assumes homogeneity and high competitive characteristics on the part of certain sectors. On the contrary, this framework argues that given Nigeria's peculiar structural distortions, such an assumption is doubtful and may be a potential source of policy ineffectiveness. The credit directed to a specific sector often has a "concentration effect" on it and only very slowly, if at all, diffuses to other sectors. Therefore, the directional and magnitudinal effects of specific policies must be important considerations for policy effectiveness.

CHAPTER FIVE

THE MODEL

5.1 General Characteristics of the Model

The purpose of any study determines, perforce, the nature of the analytical model to be developed. This is because "models and to whatever use they are being put, cannot be divorced from their builders, if they are to be applied meaningfully" (Olofin, 1985:17).

The specification of the model reflects the theoretical framework developed in chapter four of this research. Also, some of the recent developments in modelling the Nigerian economy (see NISER 1983, Ekeoku 1984, Olofin 1985, Poloamina 1986) will be adapted, where necessary. The specification also reflects, as much as possible, the peculiar circumstances of an underdeveloped economy. This is because, "in the final analysis, the model builder in a developing economy relative to his counterpart in a developed economy, may be practising more of an art than a science" (Olofin, 1985:11). Besides, it is known to the practitioners that "the problem of which variables are to be included in a regression equation is a major problem in applied econometrics. Rules are helpful, but they cannot make decisions for the applied econometrician" (Rao and Miller, 1971:52).

Based on the theoretical framework, the model's major emphasis is on the supply sector. The demand side is not completely left out as aggregate demand oriented consumption and investment equations are included in the model. It has an inbuilt circular flow system which gives it the character of a general equilibrium macro model.

The model recognises that the major targets of monetary policy in Nigeria are the rate of growth of bank credit and the interest rate. The monetary authorities statutorily determined the magnitude and direction of these variables during the study period. However, following our theoretical framework, money is introduced into the model, principally, through the credit availability channel. Interest rate plays a secondary role. Thus, the sectoral credits, statutorily prescribed growth rate of credit to the private sector, and the various interest rate variables are exogenised in the model. Through changes in the magnitude and direction of credit, sectoral and aggregate output are affected. The changes in various output components impact directly or indirectly on other macro variables - consumption, Government taxes, prices, etc. The feedback effects into the monetary sector are most powerfully transmitted through the income level.

Also, in modelling the monetary sector, we agree with Ajayi (1978:140) that "the total money supply is the result of the interaction of the portfolio behaviour of the non-bank public sector, the commercial banks and the Central bank." Therefore, money supply is demand determined. The money demand functions are thus specified. The portfolio behaviour of banks is also incorporated. The volume of private sector credit as a function of the simultaneous interaction of the demand and supply factors is explicitly specified. These are to investigate the impacts of the portfolio preferences of these sectors on the effectiveness of monetary policy.

Generally, the model is a medium sized one. The economy is modelled under seven sectors, namely: supply, monetary, consumption, Investment, Prices, Government, and the External sectors. In all, the model consists of thirty-six (36) stochastic equations and twenty-six (26) identities/definitional equations, giving a total of sixty-two (62) equations/endogeneous variables. It has thirty-eight (38) exogeneous variables and thirty-one (31) lagged endogeneous variables, making a total of sixty-nine (69) predetermined variables. Dynamic features are thus incorporated into the model system through the lagged

endogeneous and a rate of change variables. However, it must be observed that out of the thirty-eight (38) exogeneous variables, thirty-one (31) are policy variables, thus bringing the non-policy exogeneous variables to just seven. Therefore, the model is well spiced with adequate exogeneous policy variables for various policy simulations.

5.2. Specification of the Model

According to Pindyck and Rubinfeld (1981:128) "--- applied researchers usually examine more than one possible specification, attempting to find the specification which best describes the process under study." What is presented below are therefore the best of the alternative specifications tried out. The model is specified under seven sectors, namely: monetary, supply, Consumption, Investment, Government, Prices, and the External sectors.

5.21. The Monetary Sector

The specification of the monetary sector is done under the following sub-sections.

(i) Money demand equations;

(ii) Equation for total credit to the private sector.

(iii) Equations for the commercial banks' portfolio behaviour; and

(iv) Identities.

(i) Money Demand Functions

The controversies and concensus regarding the definition of money, and the specification of the relevant explanatory variables in the demand for money function have been extensively reviewed under section 3.2 of this research. Apart from any further extensions, the functions have been presented without further justifications. For instance, the wider definition of money (that is, the sum of currency, demand, savings and time deposits) is adopted for this research. These various components of the money supply are specified separately. Also, the income variable as measured by the Gross Domestic Product (Y) is included as a positive determinant of each of the components of money supply.

As noted in section 3.2, one worrisome issue in specifying a money demand function for a developing economy is the stability of the income velocity of money over time. It has been observed that the income velocity of money is subject to short run decline in most less developed countries (Park, 1970). This is obviously expected in the light of progressive monetization of the economy. In Nigeria, as in most developing countries, a sizeable proportion of income originates from non-monetary transactions and barter trade. This proportion

generally declines with economic development. Therefore, the demand for money increases partly because of the income growth and partly because of a rise in the degree of monetization. This variable (degree of monetization) is therefore specified as a determinant of the demand for narrow money.

But, what would be the most relevant measure of this variable? This variable could have been best represented by the marketed portion of the national income. But most developing countries, including Nigeria, do not have data on that breakdown. Thus a proxy variable must be employed. Some writers, (Bhattachary 1974; Chandavarker 1977), proposed the ratio of value added of non-agricultural sector to total value added of national product. But Nigeria as well as most developing countries does not have data on that separately. Since there is no exact measure available, the ratio of demand deposits to money stock (currency plus demand deposits) is used as a proxy measure of degree of monetization (Ojo, 1984). An increase in this ratio indicates an increase in banking activity and monetization.

Perhaps, the most controversial variable in the specification of money demand function for developing

countries is the interest rate. Evidence on the necessity, choice and definition of the interest rate variable is overwhelming and highly controversial. For Nigeria, the studies by Tomori (1972), Teriba (1974), Ajayi (1974, 1978), Ojo (1974, 1978), Odama (1974), Akinnifesi and Phillips (1978) have produced no conclusive evidence on the issue. It needs to be noted that much of the controversy derives from the inconclusive evidence on the nature of substitutability between money and other financial assets. Ojo (1978) finds out that the savings deposit rather than the time deposit (as found out by Teriba 1974), is the closest substitute for money. This would therefore mean that the interest rate on savings deposits could be specified as the appropriate proxy for the cost of holding money. Further evidence on this rate has not been encouraging. For instance, Ajayi (1978:67 - 69) has shown that savings deposits as a component of money supply is not even sensitive to its own rate.

However, it is doubtful if a representative interest rate will be useful in an economy characterised by highly underdeveloped money and capital markets, limited financial assets, and institutionally determined interest rates. It is expected that in such an economy, the

real choice is not between money (narrowly defined) and other financial assets, but between money and the tangible assets (Ojo, 1978). In an economy characterised by pervasive inflationary pressures, the rate of inflation, may, after all, be the real cost of holding money. But it is to be expected that in an inflationary situation, (with a given income level) the demand for money for transactions purposes will increase. Thus inflation, rather than act as a cost of holding money, induces greater demand for money. The rate of inflation as measured by the consumer price index is specified as positive determinant of the demand for currency and demand deposits. In Nigeria, savings deposits account is operated like demand deposits. If it is agreed that money cannot be held at zero cost, then a proxy for the cost of holding money (narrowly defined) should be the interest rate on savings deposits. This rate is therefore specified as the cost of the demand for currency and demand deposits.

Furthermore, interest rates on savings and time deposits are included in their separate demand equations respectively. This is because, even though the real motives for saving in Nigeria cannot be attributed to

the desire to earn interest only, it is still to be expected that part of the reason for saving is to earn returns. However, while conscious of the interest on their deposits, rational savers are also mindful of the eroding influence of inflation on the value of their deposits over time. Therefore, investors in savings and time deposits tend to be influenced by considerations both to reap interest, and the alternatives available in investing in real assets, whose value appreciates significantly over time as a consequence of inflation. The consumer price index is therefore specified as a proxy for returns on competing assets. Its coefficient is expected to be negative. Finally, following the partial stock adjustment process, we introduce the lagged dependent variables as explanatory variables. The demand equations for the monetary assets are presented below:

Demand for Currency

$$CH_t = b_o + b_1 Y_t + b_2 Z_t + b_3 CPI_t + b_4 RS_t + b_5 CH_{t-1} + U_t$$

$$0 < b_1, b_5 < 1;\ b_2, b_4 < 0;\ b_3 > 0 \quad \text{----------(1)}$$

Demand for Demand Deposits

$$DD_t = b_o + b_1 Y_t + b_2 Z_t + b_3 CPI_t + b_4 RS_t + b_5 DD_{t-1} + U_t$$

$$0 < b_1, b_5, < 1;\ b_4 < 0;\ b_2, b_3, > 0. \quad \text{----------(2)}$$

Demand for Savings Deposits

$$SD_t = b_o + b_1 Y_t + b_2 Rs_t + b_3 CPI_t + b_4 SD_{t-1} \quad \text{---- (3)}$$

$$0 < b_1, b_4 < 1; \; b_2 > 0; \; b_3 < 0.$$

Demand for Time Deposits

$$TD_t = b_o + b_1 Y_t + b_2 RT_t + b_3 CPI_t + b_4 TD_{t-1} + Ut \quad \text{---(4)}$$

$$0 < b_1, b_4 < 1; \; b_2 > 0; \; b_3 < 0.$$

where,

CH_t = Currency in circulation outside the banks

DD_t = Demand deposits held by the public

SD_t = Savings deposits held by the public

TD_t = Time deposits held by the public

Y_t == Gross Domestic Product (Nominal).

Zt = Proxy for degree of monetization, defined as the ratio of demand deposits to money stock (M_1).

RS_t = Interest rate on savings deposits

RT_t = Interest rate on time deposits

CPI_t = Consumer price index as a measure of inflation.

CH_{t-1}, DD_{t-1}, SD_{t-1} TD_{t-1} = lagged dependent variables

(ii) Domestic Credit to the Private Sector

The total credit to the private sector at any time is a function of the demand and supply conditions existing for it. The following variables are specified to account for the private sector demand for commercial bank credit:

(a) The Gross Domestic Product, (Y_t); This measures the economy's overall productivity. During an economic boom, the private sector investments rise to take advantage of new opportunities for investment. Since the GDP is a measure of the productivity of the economy, the private sector demand for credit is expected to vary directly with it and (b) The prime lending rate (RP) is specified as a cost of credit, and the expected sign of its coefficient is negative. On the supply side, it is postulated that the major determinant of the volume of credit banks are willing to grant to the private sector is the statutorily prescribed ceiling on the growth rate of private sector credit. The higher is this ceiling, ceteris paribus, the higher would be the volume of credit to the private sector, and so its coefficient is expected to be positive. In summary, the Domestic credit to the private sector equation is given as:

$$DCP_t = b_o + b_1 Y_t + b_2 RP_t + b_3 GDCP_t + b_4 DCP_{t-1} + U_t \text{---(5)}$$

$$b_1,\ b_3 > 0;\ b_2 < 0;\ 0 < b_4 < 1.$$

where,

DCP_t = Domestic Credit to the Private sector

Y_t = Gross Domestic Product

RP_t = Prime lending rate

$GDCP_t$ = Statutorily prescribed Growth rate of Domestic Credit to the Private Sector.

DCP_{t-1} = Lagged dependent variable, to account for partial stock adjustment process.

(iii) Commercial Banks' Portfolio Behaviour

The analysis of the commercial banks' behaviour is essentially a study of their asset portfolio. A typical commercial bank holds a large number of different assets in its portfolio. Each asset has a unique set of characteristics, for example, its liquidity, reversibility, predictability of return, risk, taxability, etc. Loans are the most important assets in the commercial banks' portfolio, and we have hypothesised that the amount of loans outstanding at any time is a function of the interaction between demand and supply factors. The equations of the banks' behaviour are presented below.

(a) Demand for Vault Cash (VC)

This is defined as cash held in the vaults of commercial banks plus deposits in the Central Bank. Holding an asset in the form of vault cash implies a return foregone, but it is necessary in order to meet the requirements of day to day normal withdrawals. Thus, cash held by the banks depends mainly upon the amount of banks' deposits. The second explanatory

variable is the previous period's vault cash. A related interpretation of one period lag of vault cash is that there is normally a discrepancy between actual and desired stocks outstanding, ie, a stock adjustment model. Also, the lending rate ought to be incorporated as an explanatory variable. This is because a rise in the lending rate may lead the banks to economise on their cash holdings which do not earn any interest. This may not hold for Nigeria. The ability of banks to expand credit in Nigeria is not necessarily constrained by the volume of vault cash, as it is constrained by the statutorily prescribed ceiling on the growth of credit. However, it is to be expected that the actual growth rate of credit may or may not be equal to the statutory prescription. But the real constraint on the holding of vault cash is the actual growth rate of bank credit rather than the prescribed rate. Thus, the actual growth rate (AGDCP) is postulated as being negatively related to the volume of cash held by banks. The demand for vault cash is therefore stated as follows:

$$VC_t = b_o + b_1 D_t + b_2 AGDCP_t + b_3 VC_{t-1} + U_t \text{ ---- (6)}$$

$$b_2 < 0;\ 0 < b_1,\ b_3 < 1.$$

where

VC_t = Total Vault cash held by commercial banks

D_t = Total Deposit liabilities of commercial banks.

VC_{t-1} = Vault cash lagged one period.

$AGDCP_t$ = Actual growth rate of private sector bank credit.

(b) Demand for Excess Liquid Assets (ELQA)

The demand for total liquid assets is determined as the sum of required liquid assets and excess liquid assets. Liquid assets in Nigeria consist of Nigerian currency, balances held with the Central Bank of Nigeria, net credit balances with banks both inside and outside the country, and domestic and foreign government bills. Excess liquid assets play a substantial role in determining the commercial banks' portfolio. Often there is a difference between legal reserves and liquidity reserves required by the Central Bank on the one hand and those actually maintained by the commercial banks on the other.

Theoretically, there are two major determinants of banks' demand for excess liquid assets. First, since banks act as risk averting profit maximizers, expected alternative net yields of various banks' assets are considered among the main determinants of the banks' demand for those liquid assets. Goldfeld (1966:69 - 71) employs a similar assumption. He argues that preferences for assets are assumed to be consistent with rational maximizing behaviour by banks, ie, banks' demand for

liquid assets depends positively on their own yield and negatively on all other yields.

The second important determinant is the deposit liabilities of the commercial banks. Meltzer (1959:278) argues that there is a close relationship between banks' demand for excess liquid reserves and deposits even in a banking system without legal reserves. He maintains that,

> Given the distribution of deposits the amount of precautionary reserves held is based on a probability distribution for the expected drain. All reserves above the amount required on the basis of the probability distribution are excess reserves. That is, there is a relation between the change in reserves and the change in deposits for any given assumption about this distribution.

Given the above, the formulation of the demand for excess liquid assets is as follows:

$$ELQA_t = b_o + b_1 r_t^a + b_2 r_t^b + b_3 r_t^c + b_4 D_t + U_t$$

$$b_1 > 0;\ b_2 < 0;\ b_3 < 0;\ 0 < b_4 < 1.$$

where $ELQA_t$ = Excess liquid assets

r_t^a = an implicit own rate

r_t^b = the loan rate

r^c = rate on other assets such as investment abroad and government bonds;

and D = total deposit liabilities of commercial banks.

However, owing to the perculiar structure of the money and capital markets in a developing country such as Nigeria, the role of interest rates on the banks' demand for excess liquid assets becomes uncertain. It is believed that banks might be constrained to keep excess liquid assets because of the actual ceiling on the growth of bank loans. Also, the other investment outlets such as in government bonds, and investments abroad, are not infinitely available. It is therefore hypothesised that banks demand for excess liquid assets is a function of banks total deposit liabilities and the actual growth rate of bank loans.

That is;

$$ELQA_t = b_o + b_1 D_t + b_2 AGDCP_t + b_3 ELQA_{t-1} + U_t \quad \text{---- (7)}$$

$$0 < b_1, b_3 < 1; \; b_2 < 0.$$

where

ELQA = Excess liquid assets

D_t = Total deposit liabilities of Commercial banks

$AGDCP_t$ = Actual growth rate of bank credit to the private sector.

$ELQA_{t-1}$ = Lagged dependent variable.

(c) Demand for Government Securities (GS)

The government securities held in the asset portfolio of Commercial banks include:

(i) Treasury bills, (ii) Treasury certificates, and (iii) Government Development stocks. The first two above, however, dominate banks' investments in these assets. The share of Development stocks in the banks' securities portfolio is insignificant, and it is therefore ignored. We have lumped the other securities together (Treasury bills, and certificates) and specified one function for them.

It is postulated that the banks' demand for these assets is a function of (i) their total deposit liabilities; (ii) considerations for rates of return on the assets; and (iii) considerations for returns on alternative investments. The lending rate would have been considered as proxy for return on alternative investment. But in Nigeria, it appears that investments in these securities yield economic rent to the bank as the funds employed in them scarcely have alternative profitable uses. This is because there is a statutory ceiling on the capacity of banks to expand credit, and the banks almost always fully utilize this quota. Besides, there is often a statutory requirement for banks to hold government securities as part of their liquid assets. So, rather than the lending rate, the real constraint on investments in government securities is the (AGDCP) actual growth rate of bank credit to the private sector and the required liquid assets. The demand for these

securities can therefore be stated as follows:

$$GS_t = b_o + b_1 TBR_t + b_2 TCR_t + b_3 RLA_t + b_4 AGDCP_t + b_5 GS_{t-1} + U_t \quad \text{---------- (8)}$$

where;

$b_1, b_2, b_3 > 0$; $b_4 < 0$; $0 < b_5 < 1$.

GS_t = Government Securities defined as the sum of Treasury bills and Treasury certificates.

TBR_t = Treasury bill rate

TCR_t = Treasury certificate rate

RLA_t = Required liquid assets

$AGDCP_t$ = Actual growth rate of bank credit to the private sector.

GS_{t-1} = Lagged dependent variable.

Identities of the Monetary sector

The following identities are stated to close the system in the monetary sector:

Required Liquid Assets: These are defined as:

$$RLA = r\,(DD + SD + TD)$$

i.e; $RLA = r(D)$

where, RLA = Required liquid assets

r = legal liquid asset ratio on total deposit liabilities (D)

It should be mentioned that required liquid asset ratio never varied since the establishment of the Central Bank of Nigeria in 1958 until August 1987. It had been 25 per cent of total deposits for the period 1958-1986. This covers the period for the study, 1970 - 1985. Consequently, the required liquid asset identity can be written as:

$$RLA_t = 0.25(D) \quad \text{---------- (9)}$$

$$MI_t = CH_t + DD_t \quad \text{----------(10)}$$

This shows that money supply (MI), narrowly defined, is the sum of currency held by the public (CH) and demand deposits held by the non-bank public at the commercial banks (DD).

Also,

$$M2_t = CH_t + DD_t + SD_t + TD_t \quad \text{---------- (11)}$$

This is the wider definition of money supply

$$D_t = DD_t + SD_t + TD_t \quad \text{----------(12)}$$

This shows that the total deposit liabilities of commercial banks are the sum of demand deposits (DD), savings deposits (SD), and Time deposits (TD). This identity is only a balancing equation on the liabilities side of the commercial banks' portfolio.

$TLA_t = RLA_t + ELQA_t$ ---------- (13)

where TLA_t = Total liquid assets. It is the sum of the required liquid assets and the excess liquid assets of the commercial banks.

$AGDCP_t = DCP_t - DCP_{t-1}/DCP_{t-1}$ X100 ---------- (14)

where,

$AGDCP_t$ = Actual growth rate of commercial bank credit to the private sector.

$DCP2_t = DCP_t - DCP_{t-1}$ ---------- (15)

where, $DCP2_t$ = Change in domestic commercial bank credit to the private sector.

$GM2_t = M2_t - M2_{t-1}/M2_{t-1}$ x 100 ---------- (16)

where, $GM2_t$ = Growth rate of wider money supply M2.

$Z_t = DD_t/MI_t$ ---------- (17)

where Z_t = proxy for degree of monetization.

5.22. The Supply Sector

This sector is divided into nine (9) sub-sectors, namely: Agriculture, Manufacturing, Building and Construction, Mining and Quarying, Transport and Communication, General Commerce, General Government, Utilities, and Others. The classification follows the standard approach used by the monetary authorities in the

analysis of the banking system's credit to the economy.

As observed under the Theoretical Framework of this research, the interaction among the sectors is very low. Also, the supply sector is not necessarily constrained by demand. Besides, a major constraint on the supply sector of an underdeveloped economy is the lack of input variables especially capital. Data limitation particularly on the factors of production, rule out any of the standard production function specification. The fact also that supply appears not to be constrained by demand, and the low interactions between sectors argue a case against the application of the input-output framework. An indirect method is adopted in which it is assumed that the output of each sector is a function of an index of productive capacity of the sector, an index of input variables and the price index.

As a composite index of the productive capacity of the sectors, the volume of output in each sector lagged one period, is used. The aggregate commercial bank credit disbursed to each sector, and the federal government capital expenditure on each sector, are taken as proxies for inputs in that sector. Finally, following Ojo (1973), the implicit deflator of gross domestic

product for each sector is included as the relevant price variable. However, for the agricultural sector, a cobweb behavioural relationship is assumed. That is, the farmers' decision with regards to output in the current period is influenced by the prices they received in the last period. A one period lag in the price index is specified for the sector. Thus, for the nine sub-sectors, the supply equations are given as:

(i) Agricultural Sector:

$$YA_t = b_o + b_1 YA_{t-1} + b_2 CA_t + b_3 GA_t + b_4 PA_{t-1} + U_t \text{--(18)}$$

(ii) Manufacturing Sector:

$$YM_t = b_o + b_1 YM_{t-1} + b_2 CM_t + b_3 GM_t + b_4 PM_t + U_t \text{ ---(19)}$$

(iii) Building and Construction:

$$YBC_t = b_o + b_1 YBC_{t-1} + b_2 CBC_t + b_3 GBC_t + b_4 PBC_t + U_t \text{--(20)}$$

(iv) Mining and Quarying:

$$YMQ_t = b_o + b_1 YM^{Q}_{t-1} + b_2 CMQ_t + b_3 GMQ_t + b_4 PMQ_t + U_t \text{---(21)}$$

(v) Transport and Communication:

$$YTC_t = b_o + b_1 YTC_{t-1} + b_2 CTC_t + b_3 GTC_t + b_4 PTC_t + U_t \text{--(22)}$$

(vi) General Commerce:

$$YGC_t = b_o + b_1 YGC_{t-1} + b_2 CGC_t + b_3 GGC_t + b_4 PGC_t + U_t \text{--(23)}$$

(vii) Government Sector:

$$YG_t = b_o + b_1 YG_{t-1} + b_2 CG_t + b_3 GG_t + b_4 PG_t + U_t \text{---(24)}$$

(viii) Utilities:

$$YU_t = b_o + b_1 YU_{t-1} + b_2 CU_t + b_3 GU_t + b_4 PU_t + U_t \quad --(25)$$

(ix) Others:

$$YO_t = b_o + b_1 YO_{t-1} + b_2 CO_t + b_3 GO_t + b_4 PO_t + U_t \quad --(26)$$

where;

YA,YM, ----- YO = Output of the various sectors

CA,CM, ------CO = Total commercial bank credit allocated to the various sectors.

GA,GM, ----- GO = Total federal government capital expenditures on the various sectors.

PA,PM, ----- PO = The price deflators for the various sectors.

YA_{t-1}, YM_{t-1} ---- YO_{t-1} = lagged dependent variables.

All the coefficients of the explanatory variables are expected to be positively signed.

5.23. The Consumption Function

The consumption expenditures can be divided into the private, and the government consumption. Both of them are specified separately in this study.

(a) Private Consumption

The consumption function is essentially a Keynesian contribution. Keynes argued that consumption is a stable function of current income, and that the marginal

propensity to consume is less than one and greater than zero. Other economists, namely Friedman, Ando and Modgliani, Duesenberry, etc have made significant contributions to the consumption function theory.

However, empirical evidence has made it almost conventional to specify the private consumption as a function of current disposable income and the previous level of consumption expenditure. Such a previous level may refer to consumption spending in the immediately past period, or peak consumption spending among a set of previous periods' consumption. The immediately past consumption expenditure is specified as the relevant variable. Also, the commercial bank credit to the private sector is specified as an explanatory variable. It is expected that part of the credit to the private sector is used to finance consumption expenditures. Thus, the private consumption function is specified as follows:

$$CP_t = bo + b_1 YD_t + b_2 DCP_t + b_3 CP_{t-1} + U_t \quad \text{---- (27)}$$

$$0 < b_1, b_2, b_3 < 1.$$

where, CP_t,=private consumption expenditures,

YD_t = Disposable income, defined as GNP minus net taxes.

DCP_t = Commercial bank credit to the private sector

CP_{t-1} = lagged dependent variable.

(b) Government Consumption

The government consumption expenditure is specified as a function of government revenue and the government sector liquidity, that is, domestic credit to the government sector. It needs to be stressed that the government sector here refers to the Federal Government of Nigeria. The government consumption expenditure is thus expressed as:

$$GCON_t = b_o + b_1 GR_t + b_2 DCG_t + U_t \text{ -------- (28)}$$

$$b_1;\ b_2 > 0.$$

where,

$GCON_t$ = Government Consumption expenditure

GR_t = Government total revenue

DCG_t = Total Domestic credit to the government sector by commercial banks.

5.24. Investment Function

Investment is one of the most difficult areas for empirical study in developing countries. The difficulties of getting a satisfactory model of investment activities in the rural sector, and the lack of adequate and

comprehensive data prevent disagregating the investment function according to various types of investment. However, only two investment functions, representing the private, and government sector investments are specified.

(a) Private Sector Investment

Following Ojo (1973:133) "our investment equation is a quasi-accelevator model, specified in terms of adaptive expectations hypothesis and incorporating Hirschman's theory of development via excess or shortage of social overhead capital". Private investment behaviour is postulated to be a function of expected level of economic activities, as measured by the GDP, that is, (Y). The current expectation is derived by modifying previous expectations. Applying Koyck transformation, the investment function becomes:

$$INVP_t = b_o + b_1 Y_t + b_2 INVP_{t-1} + U_t$$

However, it is to be expected that in an under-developed economy such as Nigeria, the impact of social capital on investment cannot be overemphasised. This is an index of external economies provided in the form of basic facilities. This variable can be represented by government capital expenditure lagged one period. The lag structure is important because it is assumed that

at least one year elapses before government expenditure on fixed capital begins to have impact on investment decisions. Also, the change in the total credit available to the private sector by commercial banks is included as an explanatory variable. This is because, the more funds are available, the more investment is undertaken. The private sector investment equation is therefore given as:

$$INVP_t = b_o + b_1 Y_t + b_2 GC_{t-1} + b_3 DCP_{2t} + b_4 INVP_{t-1} + U_t \quad --(29)$$

$$0 < b_1, b_4 < 1; b_2, b_3 > 0.$$

where,

$INVP_t$ = Private sector total investment expenditure.

Y_t = Gross Domestic Product

GC_{t-1} = Government capital expenditure lagged one period.

DCP_{2t} = Change in Domestic credit to the private sector.

$INVP_{t-1}$ = lagged dependent variable.

(b) Government Investment

Government investment, following the NISER model (1983:13), is specified as a function of government surplus (or deficit), medium and long-term foreign borrowing, domestic credit to the government and the lagged dependent variable. That is;

$$INVG_t = b_o + b_1 GCR_t + b_2 FDB_t + b_3 DCG_t + b_4 INVC_{t-1} + U_t \quad --(30)$$

$$b_1, b_2, b_3 > 0; \quad 0 < b_4 < 1$$

where;

$INVG_t$ = Government investment

GCR_t = Government capital reserves

FDB_t = Medium and long term federal government external debt.

DCG_t = Commercial bank Credit to the federal government

$INVG_{t-1}$ = lagged dependent variable

5.25. Government (Taxes)

The total taxes are disaggregated into direct and indirect taxes.

(a) Direct taxes

It is postulated that the current level of GDP is a composite index of the economy's taxable capacity (tax base). Total direct taxes (tax yield) is therefore specified as a simple linear function of the tax base (GDP). Thus;

$$DT_t = b_o + b_1 Y_t + U_t \quad \text{---------- (31)}$$

$$0 < b_1 < 1$$

where,

DT_t = Total direct taxes

Y_t = GDP at current prices.

(b) Indirect Taxes

The explanatory variables specified here are the private consumer expenditures, and total imports. Thus;

$$IDT_t = b_o + b_1 CP_t + b_2 IM_t + U_t \text{ ---------- (32)}$$

$$0 < b_1, b_2 < 1$$

where,

IDT = Total indirect taxes

CP_t = Total private consumption expenditures

IM_t = Total imports.

5.26. External Sector

(i) Imports

The basic assumption that underlies import demand relation is that variation in imports is primarily caused by variations in income and relative prices. Gross Domestic Product (Y), and the ratio of import price index to the price index of GDP are specified to account for the income and relative price variables. Also, the level of foreign reserves, and change in external debt are also included as explanatory variables. This is because, the level of foreign reserves is an index of foreign exchange availability. And, where the reserves are low, the authorities either resort to drastic import restrictions or engage in external borrowing.

The change in external debt in any year is, therefore, a measure of the willingness of the government to accommodate extra imports financed out of borrowing. Finally, it is recognised that Nigeria's external trade sector depends heavily on commercial banks' loans. The total credit to the private sector by the commercial banks is specified as another explanatory variable. The import function therefore becomes:

$$IM_t = b_o + b_1 Y_t + b_2 IMP_t + b_3 FRSV_t + b_4 FDB2_t + b_5 DCP_t + U_t \quad --(33)$$

$$0 < b_1 < 1;\ b_3,\ b_4,\ b_5 > 0;\ b_2 < 0.$$

where;

IM_t = Total imports

Y_t = Gross Domestic Product

IMP_t = Ratio of import price index to price index of GDP.

$FRSV_t$ = Foreign reserves

$FDB2_t$ = Change in foreign debt

DCP_t = Total commercial bank credit to the private sector.

(ii) Exports

The export sector presents a peculiar problem in terms of aggregative modelling. This is because, since the early 1970s, the sector has been dominated by the

petroleum subsector, to the extent that the export sector can reasonably be explained in terms of petroleum exports. However, other exports cannot be neglected. We therefore, disaggregate the export sector into two sub-sectors:

(a) the petroleum and (b) Others.

(a) Petroleum Export

Crude petroleum export, especially since Nigeria joined OPEC, has been determined by the OPEC quota. The sector is an "enclave economy", and its dependence on credit financing is minimal. It is also known that the quantity and price of crude petroleum depend on the level of external demand for it. The EEC countries and the U.S.A are Nigeria's major trading partners. It is therefore hypothesised that as a proxy for the external demand, the average per capita income of the EEC countries and America is appropriate. Also, the oil export is specified as a function of the quantity of crude petroleum produced and the export price per barrel of petroleum.

Thus;

$$XP_t = b_o + b_1 QP_t + b_2 XPP_t + b_3 YUSEEC_t + U_t \quad \text{--- (34)}$$

$$b_1, b_2, b_3 > 0.$$

where,

XP_t = Value of petroleum export in millions of naira.

QP_t = Quantity of crude petroleum produced in millions of barrels.

XPP_t = Unit export price of petroleum (per barrel).

YUSEEC = Average per capita income of U.S.A and the EEC countries.

(b) Other Exports

The explanatory variables specified to explain the export of other goods are:

(i) the total output of the other sectors, as measured by their gross domestic product; (ii) the ratio of export price index to GDP price index as a measure of relative prices, (iii) proxy for external demand, which is measured by the average per capita income of the U.S.A and the EEC countries, (iv) lagged dependent variable, showing the influence of previous exports on current export behaviour, and (v) the total credit to the private sector which aids export financing. The export equation for other sectors thus becomes.

$$XO_t = b_o + b_1 YOTH_t + b_2 PEX_t + b_3 YUSEEC_t + b_4 XO_{t-1} + b_5 DCP_t + U_t \quad \text{---------- (35)}$$

$$b_1, b_2, b_3, b_5 > 0; \; 0 < b_4 < 1$$

where;

XO_t = Export of other sectors, apart from the petroleum sector.

$YOTH_t$ = Gross Domestic output of other sectors, apart from the petroleum sector.

PEX_t = Ratio of export price index to GDP price index, as a measure of price relatives.

$YUSEEC_t$ = Average per capita income of U.S.A and the EEC countries.

XO_{t-1} = lagged dependent variable.

DCP_t = Total Domestic credit to the private sector.

5.27. Prices

Ten equations are specified under this section. Nine equations are specified to explain the implicit deflators for each of the supply sub-sectors. The implicit deflator for any sector is hypothesised to be a function of change in the output of that sector, and the implicit deflator lagged one period. Changes in output will impact on the prices of the particular sub-sector, and the lagged deflator reflects the stickiness of prices downwards. Thus, the price equations for the nine sub-sectors are:

(i) Deflator for the Agricultural Sector:

$$PA_t = b_o + b_1 YA2_t + b_2 PA_{t-1} + U_t \text{ --------- (36)}$$

(ii) Manufacturing sector deflator:

$$PM_t = b_o + b_1 YM2_t + b_2 PM_{t-1} + U_t \text{ --------- (37)}$$

(iii) Deflator for the Building and Construction Sector:

$$PBC_t = b_o + b_1 YBC2_t + b_2 PBC_{t-1} + U_t \text{ ------ (38)}$$

(iv) Deflator for Mining and Quarying:

$$PMQ_t = b_o + b_1 YMQ2_t + b_2 PMQ_{t-1} + U_t \text{ -------(39)}$$

(v) Deflator for Transport and Communication:

$$PTC_t = b_o + b_1 YTC2_t + b_2 PTC_{t-1} + U_t \text{ ------ (40)}$$

(vi) Deflator for General Commerce:

$$PGC_t = b_o + b_1 YGC2_t + b_2 PGC_{t-1} + U_t \text{ ------ (41)}$$

(vii) Government Sector Deflator:

$$PG_t = b_o + b_1 YG2_t + b_2 PG_{t-1} + U_t \text{ --------- (42)}$$

(viii) Deflator for the Utilities Sector:

$$PU_t = b_o + b_1 YU2_t + b_2 PU_{t-1} + U_t \text{ --------- (43)}$$

(ix) Deflator for Other Sectors:

$$PO_t = b_o + b_1 YO2_t + b_2 PO_{t-1} + U_t \text{ --------- (44)}$$

where;

PA_t, PM_t, ---, PO_t = Price deflator for the various sectors.

$YA2_t$, $YM2_t$, ---, $YO2_t$ = Change in the output of the various sectors, and its coefficient could be less or greater than zero depending on whether the particular output has a dampening or accentuating effect on its price.

PA_{t-1}, PM_{t-1}, --- PO_{t-1} = lagged dependent variables and their coefficients are greater than zero but less than one.

The other price variable is the cost of living or consumer price index, which is a proxy for the rate of inflation. The specification of explanatory variables for this function has been very troublesome to empirical researchers in Nigeria (see Poloamina 1986, NISER 1983). We resorted to several experiments and the variables that can reasonably explain the dependent variable include: (a) the growth rate of broad definition of money supply in the present, and the immediate past period; (b) the demand pressure (or supply gap), as measured by the ratio of private consumption expenditure to the sum of agricultural and manufacturing output; (c) the import price index is specified as proxy for imported inflation, and (d) the change in the Gross

Domestic product. Thus, the equation for the cost of living index is given as:

$$CPI_t = b_o + b_1 GM2_t + b_2 GM2_{t-1} + b_3 DP_t + b_4 Y2_t + b_5 IMPX_t + b_6 CPI_{t-1} + U_t \quad \text{---------- (45)}$$

The lagged dependent variable is included to account for the stickiness of prices downwards.

$$b_1, b_2, b_3, b_5 > 0; \quad b_4 < 0; \quad 0 < b_6 < 1.$$

where;

CPI_t = Consumer price index

$GM2_t$ = Growth rate of the broad definition of money supply.

DP_t = Demand pressure or supply gap, measured by the ratio of private consumption expenditure to the sum of agricultural and manufacturing output.

$Y2_t$ = Change in GDP

IMPX = Import-price index

CPI_{t-1} = lagged dependent variable.

Identities of the Real Sector:

These identities are specified to close the real sector model.

$$Y_t = YA_t + YM_t + YMQ_t + YBC_t + YGC_t + YTC_t + YG_t + YU_t + YO_t \quad \text{----------(46)}$$

This shows that the Gross domestic product (Y) is the sum of the various sectoral output.

$$Y2_t = Y_t - Y_{t-1} \quad \text{---------- (47)}$$

$$YA2_t = YA_t - YA_{t-1} \quad \text{---------- (48)}$$

$$YM2_t = YM_t - YM_{t-1} \quad \text{---------- (49)}$$

$$YMQ2_t = YMQ_t - YMQ_{t-1} \quad \text{---------- (50)}$$

$$YBC2_t = YBC_t - YBC_{t-1} \quad \text{---------- (51)}$$

$$YGC2_t = YGC_t - YGC_{t-1} \quad \text{---------- (52)}$$

$$YTC2_t = YTC_t - YTC_{t-1} \quad \text{---------- (53)}$$

$$YG2_t = YG_t - YG_{t-1} \quad \text{---------- (54)}$$

$$YU2_t = YU_t - YU_{t-1} \quad \text{---------- (55)}$$

$$YO2_t = YO_t - YO_{t-1} \quad \text{---------- (56)}$$

$$CONS_t = CP_t + GCON_t \quad \text{---------- (57)}$$

This means that total consumption expenditure is the sum of private, and Government consumption expenditures.

$$TINV_t = INVP_t + INVG_t \quad \text{---------- (58)}$$

This is the total investment identity. Total investment is shown to be the sum of private, and government investment expenditures.

$$YD_t = Y_t - T \quad \text{---------- (59)}$$

The national disposable income is the Gross National

product less net taxes.

$T = DT_t + IDT_t$ ---------- (60)

Total taxes is the sum of direct and indirect taxes.

$X_t = XP_t + XO_t$ ---------- (61)

Total exports is the sum of petroleum export, and other exports.

$DP_t = CONS_t/(YA_t + YM_t)$ ---------- (62)

Demand pressure or supply gap is the ratio of the private consumption expenditures to the sum of agricultural and manufacturing output.

5.3. Estimation Procedure

Several alternative techniques for estimating econometric models abound. These include the ordinary Least Squares (OLS) technique, and the various techniques for estimating simultaneous equation models. The OLS (and its generalizations) is mainly used for estimating single equation models. The use of OLS method in estimating a system of simultaneous equations is known to produce biased and inconsistent results.

However, it has been shown that the simultaneous equation estimation techniques have several shortcomings in comparison with the OLS, among which is their inappropriateness for small sample data. This study

which covers only a sixteen-year period (1970 - 1985) is therefore not suited for any of these techniques. Besides, Rao and Miller (1971:185) have noted that the OLS procedure does not necessarily yield bad estimates, and that it may happen that in some situations, single equation procedure yields better estimates "even though the true model involves simultaneous equations." According to Maddala (1977:231),

> --- it has been found that the OLS method is more robust against specification errors than many of simultaneous-equation methods and also that predictions from equations estimated by OLS often compare favourably with those obtained from equations estimated by the simultaneous-equation methods.

Furthermore, Fisher, F.M. (1965:607 - 620) has demonstrated on the basis of a number of other works in this area that improvements brought about by alternative procedures have not been more than 5 percent. The increased costs in terms of time and related costs and possible ambiguous interpretation of the results far outweigh the expected benefits. The OLS is therefore chosen for this study, and allowing for autocorrelation correction where necessary, at the expense of a 5% loss of efficiency, and bias. The choice of this technique is corroborated

by Olofin (1985), Ekeoku (1984), NISER (1983) and Poloamina (1986).

5.4. Technique for Evaluation of Results

Having thus obtained the parameter estimates by the use of OLS, the standard criteria are used: R^2 for testing goodness of fit or 'F' for testing the significance of the whole regression, 't' for testing the significance of each regression coefficient, a priori sign and magnitude of the coefficients to evaluate the results. The Dubin-Watson 'd' statistic is used to detect first order autocorrelation in the disturbance term. The test was designed under the assumption of a single equation model with exogeneous independent variables. However, it is invalid for regressions that contain lagged dependent variables among the regressors or for a simultaneous equation system (Johnston, 1972:249 - 51). This test is therefore inappropriate for most of the equations specified, that is, those containing lagged dependent variables.

However, the real test of a multi-equation model, perhaps more than the desirable properties tested by $\bar{R}^2$, the standard errors of coefficients, D.W. test statistic, etc lies in its predictive ability. In order to test

the validity of the postulated relationships and to see how well they hold, the model is subjected to the simulation technique. This is the technique for evaluating the stability, sensitivity and thus the overall performance of a multi-equation model. The description of the simulation processes and the results of the tests are presented in the next chapter.

5.5. Data Sources and Problems

Annual time series data on the variables under study covering the period 1970 - 1985 are used.

The data for this study are collected from the following institutions and their publications:

(a) The Central Bank of Nigeria
   (i) Economic and Financial Review
   (ii) Annual Report and Statement of Account.

(b) The Federal Office of Statistics
   (i) Annual Abstracts of Statistics
   (ii) Digest of Statistics
   (iii) Gross Domestic Product and Allied Macro-Aggregates.
   (iv) Industrial Survey of Nigeria (series).

(c) The Federal Ministry of National Planning
   (i) The National Development Plans (Second, Third, and Fourth).

(d) The Federal Ministry of Finance

(i) The Annual Report of the Accountant-General of the federation.

(e) The United Nations

(i) The Yearbook of International Trade Statistics.

(ii) The Yearbook of National Accounts Statistics

(f) The World Bank

(i) The World Tables.

(g) The I.M.F

(i) International Financial Statistics (IFS).

It should however be noted that there exist inconsistencies in the data obtained from the different sources. This is the major data problem. It is taken care of by adhering as much as possible to few sources or carrying out data transformations.

5.51. The Utility of the Poor Data Base for Econometric Modelling

In view of the poor data base of most developing countries, some scholars (see for instance, Shouries, A. 1972) have questioned the reliability of the macro-econometric models based on the data. The data problems manifest in three dimensions, namely: (i) the shortness of available time series for macro variables.

(ii) their very low reliability due to errors in the data collection process, and (iii) the too frequent data revisions. However, Sastry, V.K (1975) points out that most of the criticisms apply to all model building efforts regardless of whether the economy is a developed or a developing one. Also, he argues that economic data cannot be classified into good data and bad data, since the quality of data is a matter of degree. In a situation where even perfect data are available on a regular basis, model building is not a once-and-for-all activity and thus model revisions are necessary. Thus, the fact that some econometric models of developing countries have not been producing reliable forecasts may not necessarily imply that bad data alone is the source of the problem. The fact is that model building is at its infant stage in these countries and it is comparable to what obtained in the developed economies some fifty years ago, with the pioneering work of Jan Tinbergen.

Indeed, even if bad data were all the problem, policy makers in developing economies would still need to guess-estimate some quantitative relationships through modelling. Otherwise, economic policy-making

will be reduced to the uncertain gamble of crystal-ball mapping. A start is necessary, for we cannot even know how bad the data are unless we use them. Since modelling is never a once-and-for-all affair, the fundamental step in obtaining better quality data in the future lies in their use, so that present inadequacies may be pointed out and improvements made. For Nigeria in particular, the CEAR MAC IV model (see Olofin, 1985) has been used to obtain reliable forecasts for use by the Federal Ministry of National Planning. So, the so-called 'bad data' can still be relied upon to give reasonable guides to policy-makers.

CHAPTER SIX

PRESENTATION AND VALIDATION OF REGRESSION RESULTS

In this chapter, the results of the Ordinary Least Squares (OLS) regressions of the functions specified in Section 5.2 are presented. The model is subjected to historical and policy simulations to evaluate its performance, sensitivity and dynamic properties. These are to ensure the model's stability and validity.

6.1. Presentation of Regression Results

According to Rao and Miller (1971:81),

> As every researcher in the empirical world sooner or later realizes, the reported regression equation represents only a small part of the work he has done. To report all the permutations and combinations he has tried in reaching his final results would be tedious and boring to his reader. But they can be intimated by saying that any reported result is the finished product, and not the sketch book, of an artist.

The results are presented without the D.W. 'd' statistic of the regressions in all the equations containing lagged dependent variables as regressors. This is because of bias inherent in such statistics (Rao and Miller 1971:176). The figures in parenthesis below each coefficient is the t-statistic.

The adjusted coefficient of determination for each equation is also reported. The results are reported as follows:

(A) <u>The Monetary Sector</u>

Demand for Cash (CH).

(1) $CH_t = 5.165 + 0.1004Y_t + 0.031CPI_t - 76.65RS_t$

(2.03) (5.28) (0.34) (-0.26)

$-84.35Z_t + 0.142CH_{t-1}$

(3.16) (0.46)

$\bar{R}^2 = 0.992$

Demand for Demand Deposits:

(2) $DD_t = 20.18 + 0.066Y_t + 0.048CPI_t + 43.9Z_t$

(0.93) (2.14) (0.23) (1.98)

$- 47.71RS_t + 0.302DD_{t-1}$

(1.68) (2.28)

$\bar{R}^2 = 0.985$

Demand for Savings Deposits

(3) $SD_t = 35.05 + 0.045Y_t + 124.01RS_t$

(-2.99) (3.90) (1.67)

$-0.024CPI_t + 0.59SD_{t-1}$

(-0.75) (2.57)

$\bar{R}^2 = 0.996$

Demand for Time Deposits

(4) $TD_t = -24.55 + 0.0199Y_t + 154.73RT_t$

$\quad\quad (-1.73) \quad (2.88) \quad\quad (2.55)$

$-0.0012CPI_t + 0.52TD_{t-1}$

$\quad (-0.14) \quad\quad (4.49)$ $\quad\quad \bar{R}^2 = 0.997$

Credit to the Private Sector

(5) $DCP_t = -137.05 + 0.176Y_t + 9.787GDCP_t$

$\quad\quad (-0.67) \quad (2.59) \quad\quad (2.01)$

$-55.47RP_t + 0.0731DCP_{t-1}$

$\quad (-0.28) \quad\quad (3.03)$ $\quad\quad \bar{R}^2 = 0.988$

Vault Cash

(6) $VC_t = -20.01 + 0.062D_t + 0.09AGDCP_t$

$\quad\quad (-1.24) \quad (4.12) \quad\quad (2.20)$

$+ 0.455VC_{t-1}$

$\quad (3.13)$ $\quad\quad \bar{R}^2 = 0.923$

Excess Liquid Assets

(7) $ELQA_t = 82.68 + 0.019D_t + 0.19AGDCP_t$

$\quad\quad (1.06) \quad (2.58) \quad\quad (1.82)$

$+ 0.533ELQA_{t-1}$

$\quad (3.17)$ $\quad\quad \bar{R}^2 = 0.912$

Government Securities

(8) $GS_t = 19.2 + 1.286TBR_t + 0.567TCR_t$

(1.45) (1.12) (1.41)

$+ 0.108RLA_t - 0.069AGDCP_t + 0.562GS_{t-1}$

(2.89) (-2.02) (0.43)

$\bar{R}^2 = 0.951$

(B) Supply Sector

Output of Agricultural Sector

(9) $YA_t = 1669.5 + 38.77PA_{t-1} + 7.41CA_t + 0.111GA_t$

(1.21) (0.85) (2.16) (1.93)

$+ 0.497YA_{t-1}$

(1.35) $\bar{R}^2 = 0.958$

Output of Manufacturing Sector

(10) $YM_t = -85.397 + 3.704PM_t + 0.55CM_t$

(-0.12) (2.03) (2.76)

$+ 0.842GM_t + 0.54YM_{t-1}$

(2.08) (1.90) $\bar{R}^2 = 0.972$

Output of Building and Construction Sector

(11) $YBC_t = -1050 + 0.233CBC_t + 0.607GBC_t$

(0.67) (2.42) (3.31)

$+10.969PBC_t + 0.679YBC_{t-1}$

(1.84) (3.62) $\bar{R}^2 = 0.944$

Output of Mining and Quarying Sector

(12) $YMQ_t = 1140.4 + 0.595CMQ_t + 4.734GMQ_t$

(1.35) (1.34) (2.19)

$+ 33.64PMQ_t + 0.056YMQ_{t-1}$

(2.13) (0.14) $\bar{R}^2 = 0.887$

Output of Transport and Communication Sector

(13) $YTC_t = -253.3 + 2.199CTC_t + 0.191GTC_t$

(-1.19) (3.47) (5.09

$+ 2.52PTC_t + 0.284YTC_{t-1}$

(2.02) (1.33) $\bar{R}^2 = 0.985$

Output of the General Commerce Sector

(14) $YGC_t = -527.8 + 2.096CGC_t + 7.16GGC_t$

(-0.71) (2.30) (0.65)

$+ 35.56PGC_t + 0.434YGC_{t-1}$

(2.87) (2.74) $\bar{R}^2 = 0.973$

Output of the Government Sector

(15) $YG_t = -420.05 + 0.216CG_t + 0.1168GG_t$

(-0.77) (0.62) (1.95)

$+ 8.833PG_t + 0.63YG_{t-1}$

(2.07) (2.47) $\bar{R}^2 = 0.963$

Output of the Utilities Sector

(16) $YU_t = 43.0 + 0.19CU_t + 0.0366GU_t$

(1.08) (1.40) (1.093)

$+ 1.157PU_t + 0.641YU_{t-1}$

(2.60) (2.91) $\bar{R}^2 = 0.921$

Output of the Other Sectors

(17) $YO_t = 472.6 + 0.432CO_t + 0.178GO_t$

(2.02) (2.14) (1.68)

$+ 4.133PO_t + 0.626YO_{t-1}$

(1.51) (3.05)

$\bar{R}^2 = 0.961$

(C) Prices

Deflator for Agricultural Sector

(18) $PA_t = -1.57 + 0.012YA2_t + 1.06PA_{t-1}$

(-0.36) (5.24) (23.7)

$\bar{R}^2 = 0.991$

Deflator for Manufacturing Sector

(19) $PM_t = 8.45 + 0.006YM2_t + 0.97PM_{t-1}$

(0.92) (6.88) (12.53)

$\bar{R}^2 = 0.955$

Deflator for the Building and Construction Sector

(20) $PBC_t = 28.01 - 0.012YBC2_t + 0.79PBC_{t-1}$

(2.10) (-1.3) (6.8)

$\bar{R}^2 = 0.93$

Deflator for the Mining and Quarying Sector

(21) $PMQ_t = 3.71 + 0.007YMQ2_t + 0.84PMQ_{t-1}$

(0.46) (2.68) (17.7)

$\bar{R}^2 = 0.955.$

Deflator for the Transport and Communication Sector

(22) $PTC_t = 3.82 - 0.0256YTC2_t + 0.712PTC_{t-1}$

(0.74) (-1.95) (27.9)

$\bar{R}^2 = 0.98$

Deflator for the General Commerce Sector

(23) $PGC_t = 4.61 + 0.0008YGC2_t + 0.87PGC_{t-1}$

(0.98) (0.24) (32.8)

$\bar{R}^2 = 0.986$

Deflator for the Government Sector

(24) $PG_t = 9.72 - 0.012YG2_t + 0.96PG_{t-1}$

(1.22) (-0.92) (12.32)

$\bar{R}^2 = 0.91$

Deflator for the Utilities Sector

(25) $PU_t = 12.88 + 0.24YU2_t + 0.92PU_{t-1}$

(1.99) (3.88) (18.7)

$\bar{R}^2 = 0.963.$

Deflator for the Other Sectors

(26) $PO_t = 20.91 - 8.008YO2_t + 0.82PO_{t-1}$

(1.38) (-0.25) (5.71)

$\bar{R}^2 = 0.67$

Inflation

(27) $CPI_t = 3.39 + 0.0153GM2_t + 0.00073GM2_{t-1}$

(0.33) (1.22) (0.74)

$+ 0.0986DP_t + 0.00012IMPX_t + 0.099CPI_{t-1}$

(1.79) (0.55) (1.81)

$- 0.0045Y2_t$

(-1.58)

$\bar{R}^2 = 0.63$

D. CONSUMPTION

Private Consumption Expenditures

(28) $CP_t = 1079.4 + 0.34YD_t + 0.47CP_{t-1} + 0.66DCP_t$

(1.45) (4.13) (2.15) (2.32)

$\bar{R}^2 = 0.995.$

Government Consumption Expenditures

(29) $GCON_t = 343.85 + 0.39GR_t + 0.06DCG_t$

(1.22) (5.45) (2.24)

$\bar{R}^2 = 0.862$

D.W. 1.68

SEE = 23.12

(E) INVESTMENT

(30) Private Sector investment

(30) $INVP_t = 1321 + 0.037Y_t + 0.095GC_{t-1} + 0.55DCP2_t$

(0.56) (4.86) (2.04) (2.86)

$+ 0.23INVP_{t-1}$

(1.81)

$\bar{R}^2 = 0.868$

D.W= 1.83

SEE= 44.79

Government Investment Expenditure

(31) $INVG_t = 25.3 + 0.93GCR_t + 0.69FDB_t$

(0.77) (2.11) (0.64)

$+ 0.476DCG_t + 0.081INVG_{t-1}$

(1.97) (0.91)

$\bar{R}^2 = 0.77$

(F) GOVERNMENT TAXES)

Direct Taxes

(32) $DT_t = -515.0 + 0.15Y_t$

(-1.3) (14.2)

$\bar{R}^2 = 0.93$

D.W= 2.13

SEE= 14.5

Indirect Taxes

(33) $IDT_t = 30.0 + 0.06CP_t\ 0.004IM_t$

(0.14) (5.95 (1.13)

$\bar{R}^2 = 0.81$

D.W.= 1.74

SEE = 19.21

(G) EXTERNAL SECTOR

Export of Petroleum

(34) $XP_t = -7059 + 0.82YUSEEC_t + 6.64QP_t$

(-4.16) (3.58) (4.08)

$+ 116.9XPP_t$

(2.10)

$\bar{R}^2 = 0.987$

D.W.= 1.87

SEE = 34.20

Export of Other Goods

$$(35)\quad XO_t = 271.6 + 0.13DCP + 0.35XO_{t-1}$$
$$(1.24)\quad (1.64)\quad (1.83)$$
$$+ 0.32Y2_t + 0.002YUSEEC_t + 0.0015PEX_t$$
$$(1.27)\quad (1.45)\quad (0.82)$$

$$\bar{R}^2 = 0.71$$

General Import

$$(36)\quad IM_t = 789.5 + 0.175Y_t + 0.537DCP_t$$
$$(1.34)\quad (2.69)\quad (2.20)$$
$$+ 0.013FRSV_t + 0.008FDB2_t - 1.118IMP_t$$
$$(1.82)\quad (0.66)\quad (-0.97)$$

$$\bar{R}^2 = 0.964$$
$$D.W. = 2.18$$
$$SEE = 49.15$$

The coefficients of most of the explanatory variables have the expected signs. As stated in section 5.227, the signs of the variables in the 'Sectoral Prices' equations will depend on whether the respective sectors' output have dampening or accentuating effects on prices. This is a matter for empirical verification. Therefore, the respective signs of the coefficients in these equations are taken to

represent the correct structural relationships.

Furthermore, the standard evaluation of the statistical performance of the individual equations has been de-emphasised. This is a multi-education model, and it is known that "even if all the individual equations fit the data well and are statistically significant, we have no guarantee that the model as a whole, when simulated, will reproduce those same data series closely" (Pindyck and Rubinfeld, 1981:361). To test for the model's properties, it is subjected to simulation analysis.

6.2. Validation of Results

In this section, the model is simulated to test its validity. The discrete stochastic simulation technique, which is appropriate for solving multi-equation econometric models, is employed in this research. There are various kinds of simulation experiments and they are performed for a variety of reasons, including model testing and evaluation, historical policy analysis, and forecasting. This section is concerned with the model testing and evaluation.

6.21. Performance Tests Criteria

A historical simulation of the model is carried out for the entire estimation period 1970 - 1985. The ex-post or historical simulation is performed in order to evaluate the models ability to replicate actual data. By simulating the model during the period for which the model was estimated, a comparison of the actual data series with the simulated series for each endogeneous variable can provide a useful test of the validity of the model. However, when all the equations are simulated simultaneously, errors may accumulate and a bad simulation fit may result. "Of course, no model is expected to fit the data exactly: the question is whether the residual errors are sufficiently small to be tolerable and sufficiently unsystematic to be treated as random" (Holt, 1965:639).

Usually, two methods are used to test this tracking ability of a model. First the actual and simulated values of the endogeneous variables are plotted

in a graph and compared. This is to ascertain how well the simulated values duplicate the turning points or rapid changes in the actual data. Secondly, and more importantly, some quantitative criteria are used to measure how closely individual variables track their corresponding data series. "The measure that is most often used is called the RMS (root-mean-square) simulation error" (Pindyck and Rubinfeld, 1981:362). The RMS simulation error for the variable Y_t is defined as,

$$RMSE = \sqrt{\frac{1}{T}\sum_{t=1}^{T}(Y_1^s - Y_1^a)^2} \quad \text{---------- (6.2}$$

where Y_t^s = simulated value of Y_t

Y_t^a = actual value

T = number of periods in the simulation.

The rms error is thus a measure of the deviation of the simulated variable from its actual time path. Of course, the magnitude of this error can be evaluated only by comparing it with the average size of the variable in question.

Other measures of simulation fit exist and are often used. These include: the root mean square

percentage error (RMSPE), the mean absolute error (MAE), and the mean absolute percentage error (MAPE). The MAE and MAPE measure errors in terms of absolute level to avoid the problem of positive and negative errors cancelling, but RMSE and RMSPE measure errors in terms of level to penalize large individual errors.

However, a useful simulation statistic related to the RMSE and widely applied to the evaluation of historical simulations or expost forecasts is "Theil's Inequality Coefficient" defined as

$$V = \frac{\sqrt{\frac{1}{T}\sum_{t=1}^{T}(Y_t^s - Y_t^a)^2}}{\sqrt{\frac{1}{T}\sum_{t=1}^{T}(Y_t^s)^2} + \sqrt{\frac{1}{T}\sum_{t=1}^{T}(Y_t^a)^2}}$$

Note that the numerator of V is just the RMSE, but the scaling of the denominator is such that V will always fall between 0 and 1. If $V = 0$, $Y_t^s = Y_t^a$ for all t and there is a perfect fit. If $V = 1$, on the other hand, the predictive performance of the model is as bad as it possibly could be. The V can be decomposed into three different components: V^m, V^s and V^c. With some little

algebra (see Pindyck and Rubinfeld 1981:365), the numerator of V can be decomposed such that $\frac{1}{T}\sum(Y^s_t - Y^a_t)^2$ $= (\bar{Y}^s - \bar{Y}^a)^2 + (\delta_s - \delta_a)^2 + 2(1-\rho)\delta_s\delta_a$ --- (6.4

where $\bar{Y}^s$, $\bar{Y}^a$, δ_s, and δ_a are the means and standard deviations of the series Y^a_t and Y^a_t, respectively, and ρ is their correlation coefficient. The proportions of inequality can thus be defined as

$$V^m = \frac{(\bar{Y}^s - \bar{Y}^a)^2}{(1/T)\sum(Y^s_t - Y^a_t)^2} \text{ ----------(6.5)}$$

$$V^s = \frac{(\delta_s - \delta_a)^2}{(1/T)\sum(Y^s_t - Y^a_t)^2} \text{ ----------(6.6)}$$

$$V^c = \frac{2(1-\rho)\,\delta_s\delta_a}{(1/T)\sum(Y^s_t - Y^a_t)^2} \text{ ----------(6.7)}$$

From the above, we have

$$V^m + V^s + V^c = 1 \text{ ---------- (6.8)}$$

where,

V^m = bias proportion. It is an indication of systematice error. If $V^m > 0.2$, it would mean that a systematic bias is present and the model would need to be revised.

V^S = Variance proportion and it indicates the ability of the model to replicate the degree of variability in the variable of interest. Large $V^S \Longrightarrow$ bad model.

V^C = Covariance proportion. It is the remaining (or unsystematic) error. Since it is unreasonable to expect predictions that are perfectly correlated with actual outcomes, this component of error is less worrisome. Indeed, for any value of $V>0$, the ideal distribution of inequality over the three sources is $V^m = V^S = 0$; and $V^C = 1$.

The Theil's statistics have been computed for all the endogeneous variables in the model and the results are tabulated in Appendix (ii).

In a multi-equation system, it is possible for some endogeneous variables to have large forecast errors. All the forecast errors are therefore evaluated together to judge the model as a whole. From the simulation statistics table (appendix ii) it is evident that most of the active response variables in the system have less than 20 percent bias or forcast error. The distribution, for instance, shows that about 87 per cent of the variables have the Theil's inequality

coefficient of less than 20 percent. The corresponding percentages for the bias and variance proportions are 85 percent and 88 percent respectively. The poor predictive performance are confined to a few variables, especially the AGDCP, GM2 and TINV, which are identities. It is therefore safe to conclude that the model generally tracks the historical time paths of the variables fairly well.

6.22. Sensitivity Test of the Model

Another criterion of model performance is the overall sensitivity of the model to such factors as the initial period in which the simulation is begun, minor changes in estimated coefficients, and small changes in the time paths of exogeneous variables (Pindyck and Rubinfeld, 1981:366). For example, if the model approximately represents the real world, then the model should not be very sensitive to any change in the initial period of simulation. That is, if the model was estimated using data from 1970 to 1985, then it should not matter very much whether the simulation is begun in 1970, 1975 or 1978. For this kind of test, a number of simulation runs should be made with the initial period of simulation being altered from run to

run. Each run generates time paths for all endogeneous variables in the model. For each such run, the time paths generated may be compared with corresponding time paths of the original initial simulation period.

In this study, the sensitivity tests are performed by simulating the estimated model for two different initial periods: 1970 - 1985 and 1975 - 1985. The 1970 - 1985 period is the estimation period, and the model has been simulated for this period and its statistics generated. The period 1975 - 1985 is arbitrarily selected. The Theil's inequality coefficients of the endogeneous variables are compared for the two simulation periods, and their percentage differences are also computed. The results are presented in Appendix iii. The appendix shows that about 85 percent of the variables record a variability of less than 5 per cent between the simulation periods. Indeed, only four of the variables, PGC, AGDCP, GM2 and TINV, have percentage differences of more than 10 percent. This is not surprising. With the exception of PGC, the other variables are the ones that particularly record large errors as evidenced by their bias and variance proportions. Given therefore that

over 95 percent of the variables show variability of less than 10 percent, the model can, in general, be said to be insensitive to changes in the initial simulation period. It is thus relatively stable, and can be relied upon as a good approximation of the Nigerian economy.

6.3. Dynamic Multiplier Analysis

A multi-equation model is constructed to represent the dynamic behaviour of the real world. Therefore, its own time - dynamic behaviour is of central concern in both its construction and its use. Thus, even if a model tracked well, that is, had small RMS simulation and forecast errors for most or all of the endogeneous variables, one would also want to investigate whether or not it responds to stimuli (e.g. small or large changes in exogeneous variables or policy parameters) in a manner consistent with economic theory and with empirical observation. If the structural relationships are well-defined, a change in any of the policy instruments generates predictable reaction in the system.

In econometric literature, there are three types of dynamic multipliers in terms of time dimension: impact (short run) multipliers, interim multipliers,

and total (long run) multipliers. The impact multipliers measure the immediate (first period) impact of each exogeneous variable on each endogeneous variable. The interim multipliers indicate the effects on each endogeneous variable over a given time period. The sum of all interim multipliers over time is the total multipliers (see Golberger, 1959:83 - 99). These dynamic multipliers provide an additional check on the stability of the system. The system is considered stable if the interim multipliers become smaller and smaller in absolute value and converge to zero over time or, the total multipliers are finite (Moroney, and Mason, 1971: 807 - 808). Other benefits of the dynamic multipliers include:

(i) The determination of the extent to which the endogeneous variables exhibit business cycle variations.

(ii) The determination of the timing relationship between the endogeneous variables in the system.

(iii) Deriving useful insight into the related problems of prediction and stabilization of the system that the model represents (see Howry, and Klein, 1972).

In the present study, several multiplier simulations are tried with some of the exogeneous monetary policy variables, namely:

(i) Statutorily prescribed growth rate of commercial bank credit to the private sector (GDCP).

(ii) Prime lending rate (RP)

(iii) Interest rate on Savings deposits (RS)

(iv) Sectoral Credit to the agricultural sector (CA)

(v) Sectoral Credit to the Manufacturing sector (CM)

(vi) Sectoral credit to the General Commerce sector (CGC

(vii) Sectoral Credit to the Building and Construction Sector (CBC)

These variables are shocked for the period 1978 to 1985, implying that their values are adjusted one at a time during the relevant period, and their impact on the other variables determined. For any exogeneous change in the model, a different simulation (B) is run, whilst keeping all the other exogeneous variables constant. The difference between simulation (B) and the original (control) simulation of the model, (A), gives the impact attributable to the exogeneous shock and is defined as:

$$\text{Impact, } T = Y^{B}_{i,t} - Y^{A}_{i,t} \text{ ---------- (6.9)}$$

for any variable Y_i and t = 1, --- n; where T may approach a constant in the long run. Given that the exogeneous variable is increased by X, then the dynamic multiplier D, attributable to the change is given as

$$\text{Multiplier, } D = (Y^{B}_{i,t} - Y^{A}_{i,t})/X \text{ ---------- (6.10)}$$

Two different kinds of shocks are applied in this study for the multiplier analysis, namely:

(i) Once-and-for-all increase in exogeneous variable done in 1978 only. This is carried out for seven of the exogeneous policy variables: GDCP, RP, RS, CA, CM, CGC and CBC.

(ii) Sustained increases in the exogeneous variable values for the period 1978 - 1985. This is done for five of the exogeneous variables, namely, GDCP, CA, CM, CGC and CBC.

The multiplier results of the once-and-for-all, and sustained shocks are presented simultaneously for each exogeneous variable. A few monetary and real sector macro variables are selected, and they are those considered to be the key ones that are directly related to the particular policy variables. The results are

extracted and the computed multiplier effects are tabulated for each of the policy variables. In the case of the once-and-for-all shocks, the total (long run) multipliers are computed. In addition, the percentage of the impact multiplier to total multiplier is calculated for all the selected endogeneous variables. The averages of these statistics are also computed, and the results will aid the policy analysis. The total multipliers are computed in absolute terms, that is, by ignoring the signs. The multipliers are briefly presented below, while the policy implications of their structures are considered in the next chapter.

6.31. Once-and-for-all, and Sustained Shocks in the Statutorily Prescribed Growth Rate of Commercial Bank Credit to the Private Sector (GDCP)

A 5 percent once and for all, and sustained shocks are applied to GDCP for the periods 1978, and 1978 - 1985 respectively. The resulting multipliers are shown in Tables 6.1 and 6.2.

Table 6.1: Dynamic Multipliers Due to Once-and-for-all shock in the Statutorily Prescribed Growth Rate of Credit to the Private Sector (GDCP)

VARIABLE / YEAR	1978	1979	1980	1981	1982	1983	1984	1985	TOTAL	% of 1978 to Total
DD	-	0.002	0.002	0.001	-	-	-	-	0.005	0
TD	0.006	0.006	0.004	0.002	0.001	-	-	-	0.019	31.58
DCP	9.7880	0.7140	0.0520	0.004	-	-	-	-	10.558	92.71
VC	0.0812	0.0120	0.0020	0.0018	0.0012	-	-	-	0.0987	82.68
ELQA	0.4600	0.1280	0.1100	0.1080	0.0740	0.0340	0.0080	0.0061	0.8941	51.45
GS	0.678	0.4300	0.244	0.1380	0.078	0.044	0.024	0.014	1.648	41.14
CPI	0.008	0.006	0.006	0.002	0.002	0.001	-	-	0.025	24.0
CP	1.6800	1.3400	0.7400	0.4200	0.3400	0.2200	0.014	0.008	4.767	35.24
IM	1.256	0.872	0.358	0.026	0.002	-	-	-	2.514	49.99
INVP	1.784	0.8721	0.359	0.027	0.002	-	-	-	3.042	52.38
T	0.242	0.1220	0.078	0.044	0.026	0.002	-	-	0.514	47.08
X	0.1280	0.1000	0.002	-	-	-	-	-	0.2300	55.65
AVERAGE									2.0262	46.99

Table 6.2. Dynamic Multipliers Due to Sustained Shock in the Statutorily Prescribed Growth Rate of Credit to the Private Sector (GDCP)

YEAR/ VARIABLE	1978	1979	1980	1981	1982	1983	1984	1985
TD	0.004	0.0100	0.016	0.024	0.028	0.0320	0.0340	0.0360
DCP	9.788	10.5020	10.554	10.558	10.560	10.570	10.798	11.160
VC	0.0812	0.9940	1.006	1.008	1.010	1.016	1.020	1.028
ELQA	0.4600	2.988	3.598	3.924	4.0980	4.1920	4.2420	4.2660
GS	0.678	1.106	1.348	1.4880	1.5660	1.6100	1.6340	1.648
CPI	0.008	0.010	0.014	0.017	0.0200	0.0290	0.0320	0.03512
CF	1.68	6.04	7.3800	8.100	8.5400	8.740	8.900	8.9600
IM	1.256	6.384	6.628	6.802	7.0900	7.424	7.560	7.800
INVP	1.784	5.8580	6.028	6.202	6.6300	7.1400	7.800	8.424
T	0.242	0.354	0.440	0.486	0.5120	0.5340	0.5400	0.548
X	0.1280	0.1320	0.1360	0.138	0.1420	0.1440	0.1460	0.1500

From Table 6.1, some twelve endogeneous variables are considered. The average total multiplier is 2.0269 and the average percentage of short-run to total multipliers is 46.99. The multipliers have the expected impact signs and tend to zero over time. Interestingly, the greatest impacts of the once-and-for-all shock are felt on the volume of credit to the private sector (DCP), Private sector consumption expenditures (CP), imports (IM), and private sector investment expenditures (INVP). Its impact on the components of money supply and the banks' portfolio variables is very minimal. It is however, inflation accentuating, as evidenced by its positive impact on the consumer price index (CPI) over time.

Furthermore, the sustained shocks produce multiplier results which are consistent with the results of the once-and-for-all shock. One dynamic feature which is evident from Table 6.2 is that the multipliers are increasing over time for the respective endogeneous variables. This is expected, given the positive impact signs of the once-and-for all multipliers.

6.32. Once-and-for-all shock in the Interest Rate on Savings Deposits (RS)

A 5 percent increase in this interest rate (RS) is applied for 1978. The resulting multipliers are shown Table 6.3.

Table 6.3. Dynamic Multipliers Due to Once-and-for-all Shock in Savings Deposit Rate (RS)

YEAR/ VARIABLE	1978	'79	'80	'81	'82	'83	'84	'85	Total	% of 1978 to Total
CH	-2.2120	-1.6120	-1.0100	-0.7700	-0.3960	-0.1840	-0.0640	-0.002	6.2500	35.39
DD	-2.9820	-2.2280	-1.6080	-0.9740	-0.3400	-0.0900	-0.0700	-0.0080	8.30	35.92
SD	24.800	19.5680	15.4380	12.1800	9.6100	7.5820	5.9820	4.7200	99.88	24.83
VC	1.5490	1.3120	1.042	0.824	0.6500	0.5120	0.4060	0.3180	6.6130	23.42
ELQA	0.6740	0.6300	0.6120	0.5720	0.4900	0.4080	0.3320	0.2080	3.9260	17.17
GS	0.6760	0.9140	0.9260	0.7460	0.6280	0.5160	0.4200	0.2500	5.076	13.32
CPI	0.384	0.3580	0.2896	0.2300	0.1810	0.1428	0.1128	0.0460	1.7442	22.02
AVERAGE									18.827	24.58

The impacts of the shock are felt more on the monetary variables. It alters the composition of money supply away from cash and demand deposits to savings deposits, where its impact is felt most. The shock is also inflation accentuating. The average long run multiplier is 18.83, which is indeed very high. However, the average percentage of short run to total multipliers is just 24.58 per cent. This shows that even though the sizes of the multipliers are large, the impacts are felt over a variable time lag with minimal impact in the first year. The multipliers also tend to zero over time.

6.33. Once-and-for-all Shock in the Prime Lending Rate (RP)

The 1978 value of RP is increased by 5 percent, and the resulting multipliers are shown in Table 6.4. below.

The impacts of the shock are felt in both the monetary and real sectors. The shock impacts most on the credit to the private sector (DCP), Private sector investments (INVP), private consumption expenditures (CP), imports (IM), and the Excess liquid assets (ELQA). It is interesting to note however, that apart from the monetary variables (TD, VC, ELQA, and GS), the shock

Table 6.4. Dynamic Multipliers Due to Once-and-for-all Shock in the Prime Lending Rate (RP)

YEAR/ VARIABLE	1978	1979	1980	1981	1982	1983	1984	1985	Total	% of 1978 to Total
TD	0.008	0.006	0.006	0.006	0.004	0.002	-	-	0.032	25.00
DCP	-2.0940	-02120	-0.060	-0.004	-	-	-	-	2.370	92.68
VC	0.9988	0.128	0.012	0.002	-	-	-	-	1.1405	87.55
ELQA	2.1080	1.278	0.692	0.37	0.196	0.1040	0.056	0.0300	4.834	43.61
GS	0.764	0.486	0.278	0.1560	0.0886	0.0500	0.028	0.014	1.864	40.98
CPI	-0.0042	-0.0026	-0.0002	-0.0002	-	-	-	-	0.0072	58.33
CP	-0.6200	-0.4420	-0.2812	-0.1301	-0.1146	-0.0820	-0.014	-0.008	1.6919	41.34
INVP	-0.5102	-0.0656	-0.0414	-0.03	-0.002	-	-	-	0.6492	59.80
IM	-0.5958	-0.3522	-0.0404	-0.03	-0.0021	-	-	-	1.0205	60.08
X	-0.1440	-0.1000	-0.0400	-0.02	-	-	-	-	0.304	47.37
T	-0.2740	-0.1380	-0.0880	-0.052	-0.028	0.002	-	-	0.5840	46.92
AVERAGE									4.6378	54.88

impacts negatively on all the other variables. This implies that the shock produces contractionary effects on the economy. The average total multiplier and average percentage short run to total multipliers of 4.6378 and 54.88% respectively are quite high. Also, the shock has a dampening effect on the price level.

6.34. Once-and-for-all, and Sustained Shocks in the Sectoral Credit to the Agricultural Sector (CA)

A 5 percent once-and-for-all, and sustained shocks are applied to the values of CA for the periods 1978, and 1978 - 1985 respectively. The multipliers are presented in Tables 6.5 and 6.6.

From Table 6.5, the multiplier effects are well spread over the selected fifteen endogeneous variables. The once-and-for-all shock impacts positively on all the monetary variables and the key real sector variables. The impacts are mostly felt on the output of the agricultural sector (YA). It is through this output that the effects of the shock on national income (Y) are transmitted. The other variables mostly affected include: the private consumption (CP), taxes (T), imports (IM), cash (CH), demand deposits (DD) and private investments (INVP). It is to be observed that

TABLE 6.5. Dynamic Multipliers Due to Once-and-for-all Shock in the Credit to Agricultural Sector (CA)

YEAR/ VARIABLE	1978	1979	1980	1981	1982	1983	1984	1985	Total	% of 1978 to Total
CH	0.7438	0.3482	0.1830	0.1160	0.0938	0.0875	0.0714	0.0643	1.6366	45.44
DD	0.4821	0.3875	0.2455	0.1563	0.1107	0.0928	0.0893	0.0759	1.5295	31.52
SD	0.0330	0.0420	0.0411	0.0375	0.0339	0.0304	0.0277	0.0178	0.2634	12.53
TD	0.0250	0.0321	0.0285	0.0268	0.0232	0.0188	0.0179	0.0152	0.1643	15.21
VC	0.1509	0.1000	0.0589	0.0384	0.0286	0.0250	0.0205	0.0169	0.3393	44.47
ELQA	0.2580	0.2804	0.2250	0.1688	0.1277	0.1027	0.0893	0.0848	1.3366	19.30
GS	0.1045	0.1196	0.1008	0.0785	0.0616	0.0500	0.0438	0.0411	0.7008	14.91
YA or Y	7.4098	3.4473	1.8107	1.1607	0.9196	0.8660	0.8482	0.8286	17.2911	42.85
PA	0.0889	0.0466	0.0299	0.0238	0.0224	0.0196	0.0178	0.0145	0.2638	33.69
CPI	-0.0138	-0.0297	-0.0186	0.0104	0.0063	0.0046	0.0041	0.0038	0.0637	21.65
CP	2.5893	2.6875	2.1607	1.6161	1.2411	0.9911	0.8835	0.8304	12.9999	19.92
IM	1.9973	0.2804	0.1384	0.1277	0.1250	0.1214	0.1143	0.1071	3.0116	66.32
INVP	0.9919	0.2036	0.1161	0.0339	0.0063	0.0419	0.0357	0.0250	1.4344	68.19
T	1.2750	0.6795	0.4018	0.2705	0.2134	0.1964	0.1786	0.1616	3.3768	37.75
X	0.9063	0.3036	0.2589	0.1339	0.0536	0.0178	0.0017	0.0009	1.6768	54.05
AVERAGE									3.0726	35.18

Table 6.6. Dynamic Multipliers Due to Sustained Shock in the Credit to the Agricultural Sector (CA)

YEAR/ VARIABLE	1978	1979	1980	1981	1982	1983	1984	1985
CH	0.7438	0.9794	1.080	1.1610	1.1873	1.2176	1.3437	1.3358
DD	0.4821	0.7455	0.8784	0.9814	1.0145	1.0987	1.1967	1.1845
SD	0.0330	0.0618	0.0831	0.1032	0.1143	0.1319	0.1530	0.1568
TD	0.0250	0.0475	0.0645	0.0808	0.0897	0.1036	0.1205	0.1233
VC	0.1509	0.2188	0.2506	0.2765	0.2846	0.3064	0.3317	0.3292
ELOA	0.2580	0.4478	0.5671	0.6666	0.7072	0.7857	0.8781	0.8758
GS	0.1045	0.1861	0.2389	0.2846	0.3047	0.3408	0.3836	0.3843
YA or Y	7.4098	7.9188	10.7485	11.5567	11.8094	12.5319	13.3650	13.2885
PA	0.0889	0.1206	0.1368	0.1511	0.1579	0.1719	0.1880	0.1913
CPI	-0.0138	-0.0064	-0.0165	-0.0238	-0.0256	-0.0313	-0.0377	-0.0359
CP	2.5893	4.4121	5.5541	6.5076	6.9021	7.6596	8.5532	8.5374
IM	1.9973	2.1873	2.2645	2.3418	2.3804	2.4638	2.5608	2.5801
INVP	0.9919	2.5091	0.7900	0.7549	0.7583	0.8036	0.7220	0.7522
T	1.2750	1.7364	1.9549	2.1330	2.1951	2.3510	2.5285	2.5160
X	0.9063	0.7030	0.5671	0.4771	0.4574	0.4028	0.3388	0.3679

the impacts of the shock are felt over a variable time lag. It can be observed that the impact multiplier for 1985 are substantial for all the variables. The average percentage of short run to total multipliers of just 35.18 bears further evidence to this. Also, the impact on the price level draws a curious attention. The shock produces a dampening effect on the consumer price index for the first three years, and then aggravates the inflationary pressure for the rest of the years. Probably this is because, within the first three years, the output of the sector is so large that it exerts dampening effects on prices. Since the shock also increases the quantity of money supply, especially cash and demand deposits, it is not unlikely that as the multiplier effects on output decline rapidly after the third year the inflationary pressure may be exacerbated. Finally, it is evident that all the multipliers tend to zero over time.

Furthermore, in Table 6.6, the sustained shocks produce results consistent with the once-and-for-all multipliers. With the exception of the export variable (X) which shows declining multipliers, all the others

produce the expected increases. The sustained shocks also produce sustained dampening effects on the price level.

6.35. Once-and-for-all, and Sustained Shocks in the Credit to the Manufacturing Sector (CM)

The once-and-for-all, and sustained shocks are carried out for the periods 1978, and 1978 - 1985 respectively, by increasing the values of CM by 5 percent. The multiplier values are shown in Tables 6.7 and 6.8.

From Table 6.7, the once-and-for-all shock impacts positively on all the selected monetary and real sector variables. The impacts are felt mostly on the output of the sector (YM). The total (long run) multipliers are not large, and the average total multiplier of just 0.2641 supports this claim. However, the average percentage of the short-run to total multipliers of 56.27 shows that the first period impact of the shock is substantial. Surprisingly, the shock impacts positively on the price level.

In Table 6.8, it is observed that the sustained shocks produce declining multipliers in five of the fifteen endogeneous variables, namely: cash (CH), output of the manufacturing sector (YM), imports (IM), private investments (INVP) and exports (X). The other

Table 6.7. Dynamic Multipliers Due to Once-and-for-all Shock in the Credit to the Manufacturing Sector (CM)

YEAR/ VARIABLE	1978	1979	1980	1981	1982	1983	1984	1985	Total	% of 1978 to Total
CH	0.1226	0.00035	0.00035	0.00035	0.00017	0.00017	0.00014	-	0.1242	98.69
DD	0.0796	0.0267	0.0081	0.0025	0.0005	0.0002	0.00002	-	0.1177	67.60
SD	0.0056	0.0044	0.0033	0.0026	0.0019	0.0016	0.0012	0.0009	0.0216	25.91
TD	0.0040	0.0033	0.0025	0.0023	0.0017	0.0014	0.0010	0.0007	0.0170	23.46
VC	0.0249	0.0047	0.0012	0.0005	0.00017	0.00017	-	-	0.0317	78.42
ELQA	0.0425	0.0262	0.0142	0.0077	0.0040	0.0021	0.0010	0.00035	0.0982	43.26
GS	0.0174	0.0117	0.0068	0.0040	0.0025	0.0014	0.0007	0.0005	0.0452	38.52
YM or Y	1.2225	0.0037	0.0035	0.0035	0.0033	0.0031	0.0025	0.0017	1.2464	98.08
PM	0.0073	0.0025	0.0023	0.0021	0.0021	0.0019	0.0015	0.0012	0.0232	31.49
CPI	0.0023	0.0059	0.0008	0.0002	0.00009	0.00005	0.00003	0.00001	0.0095	24.28
CP	0.4271	0.2442	0.1353	0.0738	0.0404	0.0211	0.0123	0.0053	0.9596	44.51
IM	0.3295	0.1081	0.0084	0.0012	0.0007	-	-	-	0.4479	73.55
INVP	0.1636	0.1102	0.0083	0.0007	0.00017	0.00017	0.00017	0.00014	0.2832	57.75
T	0.2104	0.0137	0.0076	0.0038	0.0019	0.00017	-	-	0.2376	88.55
X	0.1495	0.1195	0.0246	0.0053	0.00017	0.00017	-	-	0.2993	49.95
AVERAGE									0.2641	56.21

Table 6.8. Dynamic Multipliers Due to Sustained Shock in the Credit to the Manufacturing Sector (CM)

YEAR/ VARIABLE	1978	1979	1980	1981	1982	1983	1984	1985
CH	0.1226	0.1226	0.1224	0.1222	0.1221	0.1218	0.1215	0.1212
DD	0.0796	0.1019	0.1029	0.1044	0.1095	0.1150	0.1163	0.1153
SD	0.0056	0.0091	0.0104	0.0115	0.0134	0.0160	0.0179	0.0189
TD	0.0040	0.0071	0.0081	0.0091	0.0106	0.0126	0.0142	0.0149
VC	0.0249	0.0288	0.0289	0.0293	0.0302	0.0312	0.0316	0.0314
ELOA	0.0425	0.0645	0.0691	0.6725	0.0797	0.0886	0.0631	0.0935
GS	0.0174	0.0271	0.0293	0.0311	0.0347	0.0391	0.0416	0.0421
YM or Y	1.225	1.2194	1.2179	1.2165	1.2142	1.2108	1.2076	1.2052
PM	0.0073	0.0071	0.0070	0.0094	0.0068	0.0066	0.0064	0.0062
CPI	0.0023	0.0027	0.0024	0.0026	0.0036	0.0046	0.0047	0.0045
CP	0.4271	0.6381	0.6755	0.7067	0.7762	0.8601	0.9047	0.9096
IM	0.3295	0.2499	0.2497	0.2451	0.2286	0.2136	0.2127	0.2159
INVP	0.1636	0.4738	0.0824	0.0780	0.0615	0.0462	0.0456	0.0497
T	0.2104	0.2283	0.2241	0.2258	0.2296	0.2345	0.2367	0.2364
X	0.1495	0.0486	0.0531	0.0474	0.0270	0.0058	0.0023	0.0068

ten variables record increases in their values.

6.36. Once-and-for-all, and Sustained shocks in the Credit to the General Commerce Sector (CGC)

A 5 percent once-and-for-all, and sustained shocks are applied to the values of CGC for the periods 1978, and 1978-1985 respectively. The computed multipliers are shown in Tables 6.9 and 6.10.

From Table 6.9 below, it is evident that the once-and-for-all shock impacts positively and strongly on all the monetary and real sector variables. The impacts are felt mostly on the output of the sector (YGC), private consumption (CP), imports (IM), private investments (INVP) and exports (X). The total multipliers are quite substantial for most of the variables. Also, the average percentage of shortrun to total multiplier of 61.78 shows that a substantial part of the impacts is recorded in the first year. All the multipliers tend to zero over time.

However, the results of the sustained shocks show that four of the variables record decreases in their multiplier values over time. They are: consumer price index (CPI), imports (IM), private investments (INVP), and exports (X). The other eleven endogeneous variables have increasing multiplier values.

Table 6.9. Dynamic Multipliers Due to Once-and-for-all Shock in the Credit to the General Commerce Sector (CGC)

YEAR/ VARIABLE	1978	1979	1980	1981	1982	1983	1984	1985	Total	% of 1978 to Total
CH	0.5525	0.0029	0.0015	0.0015	0.0019	0.0012	0.0009	0.0008	0.5634	98.06
DD	0.3584	0.1222	0.0401	0.0137	0.0054	0.0029	0.0019	0.0015	0.5462	65.61
SD	0.0244	0.0195	0.0156	0.0097	0.0078	0.0058	0.0049	0.0029	0.0909	26.83
TD	0.0186	0.0151	0.0127	0.0103	0.0083	0.0064	0.0049	0.0034	0.0797	23.33
VC	0.1122	0.0225	0.0063	0.0029	0.0019	0.0015	0.0015	0.0009	0.1499	74.87
ELQA	0.1917	0.1193	0.0660	0.0367	0.0205	0.0122	0.0073	0.0048	0.4587	41.79
GS	0.0777	0.0533	0.0318	0.0191	0.0117	0.0054	0.0049	0.0034	0.2073	37.47
YGC or Y	5.5056	0.0142	0.0151	0.0137	0.0122	0.0107	0.0098	0.0078	5.5892	98.50
PGC	0.0440	0.0047	0.0003	0.0003	0.0004	0.00029	0.0002	0.00006	0.0503	87.45
CPI	0.0269	0.0101	0.0038	0.0010	0.0005	0.0003	0.00029	0.0002	0.0432	62.22
CP	1.9217	1.1051	0.6259	0.3569	0.2054	0.1174	0.0782	0.0488	4.4595	43.09
IM	1.4841	0.4782	0.0322	0.0049	0.0049	0.0029	0.0019	0.0012	2.0105	73.81
INVP	0.7369	0.4919	0.0352	0.0019	0.0009	0.0009	0.0007	0.0005	1.2691	58.06
T	0.9472	0.0665	0.0396	0.0235	0.0152	0.0097	0.0083	0.0068	1.1169	84.81
X	0.6733	0.5330	0.1076	0.0049	0.0047	0.0005	-	-	1.3242	50.84
AVERAGE									1.1973	61.78

Table 6.10. Dynamic Multipliers Due to Sustained Shock in the Credit to the General Commerce Sector (CGC)

YEAR/ VARIABLE	1978	1979	1980	1981	1982	1983	1984	1985
CH	0.5525	0.5549	0.5552	0.5553	0.5567	0.5582	0.5589	0.5594
DD	0.3584	0.4713	0.6726	0.4802	0.4817	0.5075	0.5042	0.5001
SD	0.0244	0.0429	0.0485	0.0541	0.0573	0.0661	0.0691	0.0699
TD	0.0186	0.0329	0.6378	0.0425	0.0452	0.0522	0.0545	0.0549
VC	0.1122	0.1345	0.1319	0.1343	0.1348	0.1395	0.1393	0.1388
ELOA	0.1917	0.3020	0.3175	0.3367	0.3432	0.3775	0.3801	0.3763
GS	0.0777	0.1269	0.1354	0.1452	0.1489	0.1653	0.1674	0.1661
YGC or Y	5.5056	5.5192	5.5256	5.5331	5.5385	5.5526	5.5585	5.5640
PGC	0.0440	0.0047	0.0048	0.0050	0.0057	0.0054	0.0058	0.0057
CPI	0.0269	0.0147	0.0111	0.0241	0.0130	0.0178	0.0165	0.0157
CP	1.9217	2.9481	3.1024	3.2826	3.3498	3.6711	3.7009	3.6684
IM	1.4841	1.0419	1.1294	1.0997	1.1035	1.0284	1.0592	1.0736
INVP	0.7369	1.5160	0.3707	0.3394	0.3390	0.2633	0.2933	0.3074
T	0.9472	1.0090	1.0192	1.0314	1.0363	1.0567	1.0606	1.0597
X	0.6733	0.1806	0.2331	0.1956	0.1959	0.0985	0.1233	0.1426

6.37. Once-and-for-all, and Sustained Shocks in the Credit to the Building and Construction Sector (CBC)

The once and for all, and sustained shocks are carried out for the periods 1978, and 1978 - 1985 respectively, by increasing the values of CBC by 5 per cent. The computed multipliers are as shown in Tables 6.11 and 6.12.

From Table 6.11, it can be observed that the once-and-for-all shock produces lower multiplier effects on the endogeneous variables than all the earlier policy shocks. For some of the variables, the total multiplier values are either zero, or near zero. The average total multiplier of just 0.0026 is negligible, compared to similar figures for other policy shocks. However, a major part of the impacts is recorded in the first year as shown by the average percentage of shortrun to total multiplier of 57.60 percent. With the exception of those variables with zero total multipliers, all the others record positive multiplier effects. They also tend to zero over time.

Table 6.11. Dynamic Multipliers Due to Once-and-for-all Shock in Credit to the Building and Construction Sector (CBC)

YEAR VARIABLE	1978	1979	1980	1981	1982	1983	1984	1985	Total	% of 1978 to Total
CH	0.0011	0.0002	0.0001	-	-	-	-	-	0.0015	74.4
DD	0.0007	0.0004	0.0002	0.0001	-	-	-	-	0.0014	49.78
SD	-	-	-	-	-	-	-	-	0	0
TD	-	-	-	-	--	-	-	-	0	-
VC	0.0002	-	--	-	-	-	-	-	0.0002	100.0
ELGA	0.0004	0.0002	0.0002	0.0002	0.0001	0.0001	-	-	0.0012	33.33
GS	0.0002	0.0002	0.0001	-	-	-	-	-	0.0005	40.00
YBC or Y	0.0113	0.0009	0.0007	0.0004	0.0004	0.00015	0.0001	-	0.0140	80.62
PBC	0.00014	0.00002	0.00002	0.-	-	-	-	-	0.00018	78.39
CPI	0.00007	0.00002	-	-	-	-	-	-	0.00009	77.24
CP	0.0022	0.0022	0.0022	0.0018	0.0003	-	-	-	0.0089	24.77
IM	0.0029	0.0007	0.0004	0.0002	-	-	-	-	0.0040	71.69
INVP	0.0016	0.0009	-	-	-	-	-	-	0.0025	60.19
T	0.0020	0.0002	-	-	-	-	-	-	0.0023	88.28
X	0.0014	0.0002	-	-	-	-	-	-	0.0016	88.28
AVERAGE									0.0026	57.60

Table 6.12. Dynamic Multipliers Due to Sustained Shock in the Credit to the Building and Construction Sector (CBC)

YEAR/ VARIABLE	1978	1979	1980	1981	1982	1983	1984	1985
CH	0.0011	0.0013	0.0012	0.0013	0.0012	0.0013	0.0013	0.0014
DD	0.0007	0.0011	0.0011	0.0011	0.0012	0.0012	0.00126	0.0014
SD	-	-	0.00015	0.00011	0.00009	0.00009	0.00017	0.00016
TD	-	-	-	0.00011	0.00019	0.0002	0.00017	0.00008
VC	0.0002	0.0002	0.0003	0.0003	0.00028	0.00026	0.00034	0.00032
ELQA	0.0004	0.0007	0.00075	0.0008	0.00086	0.00097	0.0010	0.0009
GS	0.0002	0.0004	0.0003	0.0003	0.0004	0.00035	0.0004	0.0005
YBC or Y	0.0113	0.0119	0.0122	0.0125	0.0127	0.0133	0.0136	0.0139
PBC	0.00014	0.00015	0.00011	0.0001	0.00009	0.00009	0.00008	0.00007
CPI	0.00007	0.00004	0.00003	0.00002	0.00004	0.00004	0.00005	0.00006
CP	0.0022	0.0057	0.0075	0.0068	0.0086	0.0079	0.0101	0.0104
IM	0.0029	0.0025	0.0024	0.0025	0.0025	0.0026	0.0025	0.0032
INVP	0.0016	0.5201	0.00075	0.0008	0.0077	0.0066	0.00067	0.00056
T	0.0020	0.0021	0.0022	0.0023	0.0024	0.0026	0.0025	0.0032
X	0.0014	0.0025	0.0015	0.0011	0.0009	0.00026	0.00017	0.00024

In Table 6.12, the sustained exogeneous shocks increase the multiplier values of most of the variables over time. For the savings and time deposits, the multipliers for the first two and three years respectively are zero. Two variables, namely; price deflator for building and construction (PBC), and private sector investments (INVP) record decreases in their multiplier values over time.

Conclusion

It can be observed that in all the seven once-and-for-all shocks, the multiplier values of the various endogeneous variables tend to zero over time. Also, the multiplier values in the five sustained shocks show sustained increases over time for most of the variables. The signs of the multiplier values conform to the a priori expectations. As the character of the dynamic multiplier analysis provides a powerful test of the model's stability, it is further confirmed from the above favourable characteristics that the model is very stable.

CHAPTER SEVEN

POLICY SIMULATIONS AND IMPLICATIONS OF RESEARCH RESULTS

The validation tests in the last chapter show that the model is stable enough to be relied upon for policy analysis and forecasts. Given the numerous exogeneous monetary and fiscal policy variables, the model has great potentials for several policy experiments and ex-post forecasting. In this chapter, some of the policy implications of the various policy shocks carried out in the last chapter are considered. In addition, the implications of some policy experiments, namely: expansionary and contractionary monetary policies, and the interest rate policy, are discussed. The discussions also help to evaluate the working hypotheses of the research.

7.1. Structure of the Economy's Approach to Monetary Policy

The conduct of monetary policy in an LDC, such as Nigeria, characterised by structural disequilibria, is an arduous task. The major challenge of monetary policy, among other things, is to influence the composition and magnitude of real output, and also maintain macroeconomic stability. The results of the once-and-for-all, and sustained policy simulations in the last chapter show

that failure to attain these objectives through monetary policy could be a consequence of erroneous manipulation of macroaggregates like aggregate credit or money supply, etc.

In the bid to control aggregate credit in the economy, the monetary authorities often focus on the growth rate of private sector credit, or on the sectoral distribution of credit or both. Evidence from the dynamic multiplier results shows that both policy instruments are not substitutes for each other as their impacts on macroaggregates differ (see Tables 6.1, 6.2, 6.5, 6.6,---,6.12). Also, the summary statistics of the once-and-for-all simulations as shown in Table 7.1 below demonstrate further the differences between the instruments.

It can be observed that the average long run multiplier for the statutorily prescribed growth rate of private sector credit (GDCP) is 2.0269 whereas its average percentage of shortrun to total multipliers is 46.99. However, only 12 endogeneous variables are affected by a shock in the variable. An equivalent shock in the sectoral credits to agriculture (CA), manufacturing (CM), Building and Construction (CBC) and General

Table 7.1. Summary Statistics of the Once-and-for-all Simulations

Exogeneous Policy Variable	Selected Number of endogeneous Variables affected	Average longrun multiplier	Average Percentage of shortrun to total multipliers
RS	7	18.827	24.58
RP	11	4.6378	54.88
GDCP	12	2.0269	46.99
CM	15	0.2641	56.27
CBC	15	0.0026	57.50
CGC	15	1.1973	61.78
CA	15	3.0726	35.18

Commerce (CGC) affects 15 endogeneous variables but their average longrun multipliers and average percentage of shortrun to total multipliers differ greatly as shown in the table. While a shock in agricultural credit (CA) has the largest average longrun multiplier value of 3.0726, its average percentage of shortrun to total multipliers is just 35.18. Sectoral credit to the building and construction sector (CBC) has the smallest average long run multiplier of just 0.0026.

Furthermore, it should be noted that these aggregate statistics as shown in Table 7.1 above obscure the details of the differences between these policy instruments. A closer study of Tables 6.1 to 6.12 reveals the marked differences in the magnitude and direction of impacts of the policy shocks on various macroaggregates. For example, whereas the GDCP and CBC impact very weakly on the components of money supply, the other sectoral credits CA, CM, and CGC exert greater impacts on all the components of money supply. The GDCP affects only the demand deposits (DD), and time deposits (TD), while the CBC affects only the cash (CH) and demand deposits (DD). The sizes of their multiplier values on the selected endogeneous variables over time also show marked differences. While some policy instruments impact powerfully on the macro-variables, others exert lesser influences. The shortrun multiplier value on income, for instance, is 7.4098 for agricultural credit, 5.5056 for credit to general commerce, 1.225 for credit to the manufacturing sector, and just 0.0113 for credit to building and construction. Also, the direction of policy impacts further reveals the differences among the various instruments. Apart from the interest rate on savings deposits whose effects are concentrated

on the monetary variables, and the prime lending rate, whose increase, predictably, exerts contractionary effects on the economy, the five percent increase in each of the sectoral credits produces expansionary impulses on the economy. In addition, the direction of certain policy shocks on some macro variables is less certain in some cases than in others. For example, the growth rate of private sector credit (GDCP) impacts on only five real sector variables, namely; private consumption (CP), imports (IM), private investments (INVP), Taxes (T) and exports (X). The direction and magnitude of its effects on sectoral output are uncertain. It can be observed from the multiplier results that the impact of sectoral credits on sectoral output is often concentrated on the particular sector, and hardly transmits to other sectors. In view of this, it is probable that the increase in GDCP without any deliberate effort to sectorally ration the credit may produce 'concentration effects' on certain sectors, depending on which sectors are favoured by banks in their lending operations. The results also show that whereas the shocks in agricultural credit have dampening effects on inflation, the other sectoral credits and the growth rate of private

sector credit accentuate it. Furthermore, the distribution of the impact multipliers of the policy shocks on the selected endogeneous variables show marked differences between the instruments. Table 7.2 below is self explanatory in this regard. Thus, whereas the first period impact is high for some policy variables, it is very low for others.

Table 7.2. Distribution of Percentage of Shortrun to Total Multipliers

Instruments/ Variables	GDCP	RS	RP	CA	CM	CBC	CGC
CH	-	35.39	-	45.44	98.69	71.4	98.06
DD	-	35.92	-	31.52	67.6	49.78	65.61
SD	-	24.83	-	12.53	25.91	-	26.83
TD	31.58	-	25.0	15.21	23.46	-	23.33
VC	82.68	23.42	87.55	44.47	78.42	100	74.87
ELQA	51.45	17.17	43.61	19.30	43.26	33.33	41.79
GS	41.14	13.32	40.98	14.91	38.52	40.0	37.47
Y	-	-	-	42.85	98.08	80.62	98.50
P*	-	-	-	33.69	31.49	78.39	87.45
CPI	24.0	22.02	58.33	21.65	24.28	77.24	62.22
CP	35.24	-	41.34	19.92	44.51	24.77	43.09
IM	49.99	-	60.08	66.32	73.55	71.69	73.81
INVP	52.38	-	59.80	68.19	57.75	60.19	58.06
T	47.08	-	46.92	37.75	88.55	88.28	84.81
X	55.65	-	47.37	54.05	49.95	88.28	50.84

Note:
* - Here P represents the sectoral prices.

Finally, one area of difference deserves special mention. Recently, it has become the practice for the monetary authorities to divide the economy into 'high priority' or 'productive' sectors and 'other' sectors in its annual sectoral credit allocation guidelines to the commercial and merchant banks. The 'high priority' sectors comprise the 'agricultural production' and the 'manufacturing enterprises'. The 'other sectors' include the General Commerce, building and construction, Transport and Communication, Utilities, Mining and Quarying, etc. This policy of aggregating the economy into only two broad sectors is part of the programme for de-regulating the financial system. The aggregation or de-regulation exercise implicitly assumes greater homogeneity and competitiveness of the sectors being aggregated. Evidence from the dynamic multiplier tables, that is, Tables 6.1, 6.2, 6.5, 6.6 ---, 6.12; and Tables 7.1 and 7.2 show that the assumptions are likely to be wrong. Two sectors from each of the two sectoral classifications are selected, namely; agriculture and manufacturing from the high priority sectors, and the general commerce and building and construction from the 'other sectors'. The multiplier results of a five percent shock in the credit

allocation to each of the four sectors are compared. It is evident that even sectors within the same sub classification show marked differences in the multiplier effects of credit allocation to them. A comparison of Tables 6.9 and 6.11 for instance, reveals that the sectors that make up the 'other sectors' are not homogeneous. The same conclusion can be reached about the agricultural and manufacturing sectors (that is, 'productive sectors'), by comparing Tables 6.5 and 6.7. The magnitudes, direction and spread effects of their multiplier values differ greatly. Therefore, any policy directed to these heterogeneous aggregates is bound to produce spurious or unpredictable results.

The results of this research therefore call to question, on empirical grounds, the aspect of financial system's de-regulation that concerns the increasing aggregation of rather 'heterogeneous' sectors for the purposes of sectoral credit allocation. Indeed, the results validate the basic argument of the Theoretical Framework (Chapter 4) that an optimal, sectorally homogeneous partitioning of the economy and allocating required amounts of credit to them is the most effective framework for monetary policy in an LDC, such as Nigeria.

The second research hypothesis that sector specific policy instruments impact more directly and powerfully on income than the aggregated, sectorally non-discriminating instruments, is therefore fully supported by the results of this research. In an economy characterised by market imperfections and structural rigidities, the challenge of economic policy, among others, is how to raise the society's social welfare function by ensuring an optimal output mix. To attain the desired, balanced sectoral development would, no doubt require sector-specific policies.

The challenge to model builders and policy makers would then be the determination of the optimal level of sectoral partitioning. This is because, the water-tight partitioning of the economy into nine sectors in this research cannot be regarded as the optimal partition for effective policy. The partitioning is merely demonstrative. The various sectors can be further divided into sub-sectors, and even finer sub-sectors. For instance, the agricultural sector could be broken into production, and processing sub-sectors, or into foods, fisheries, poultry, forestry, etc. Also, for the manufacturing sector, there is a great difference in the credit needs

of large and medium scale industries on the one hand, and small scale industries on the other. Each of these categories requires a different orientation in terms of credit policy. The exact level of permissible partitioning will be determined by the cost-efficiency trade-off the society can accommodate at any time. The finer the sectoral partitioning, the greater the efficiency achieved in terms of the certainty of impacts on targets, and thus the attainment of the desired output composition. However, it will also involve greater costs in terms of policy analysis and monitoring. Since model building is never a once-and-for-all affair, a periodic review and disaggregation of the model is necessary to monitor the changing trends and in order to gain new insights.

7.2. Transmission Mechanism of Monetary Policy

The main goal of all monetary models is the understanding of the link between the monetary sector and the real sector. In the monetary sector, the policy and intermediate monetary variables and the effects of the real variables determine the final monetary variables. In the real sector, the behaviour of the economy is determined by the given final monetary variables and the exogeneous variables of the real sector. In this analytical scheme, the monetary models emphasise the

workings of the monetary sector in order to see how the individual instrumental monetary variables forward their effects into the final monetary variables which influence the real sector, and how the real sector reacts back upon the monetary sector.

The two main theoretical explanations of this process are the Keynesian and the monetarist theories. The debate as to which theory is right is unending. As Johnson (1969:103) concludes, "this whole area is still in something of a state of flux, and there is much work still to be done before definite knowledge can emerge." If it has been difficult to resolve the debate with evidence from advanced market economies, the situation will be worse for an LDC such as Nigeria. With the market imperfections and structural rigidities that characterise the Nigerian economy, one may easily agree with Wrightsman (1976:234) that "there is no simple way to use real world 'facts' to determine who is right in the debate." The relevant issue may, afterall, not relate to who is right or wrong, but whether any of the theories explains the Nigerian situation.

For instance, the monetarist's argument that monetary expansion lead to general economic expansion is based on two premises about the interest rate. One is that a

change in the interest rate has a much larger impact on the demand for non-monetary assets and goods and services than it has on the demand for money. The other is that the interest rate varies in the same direction with the money supply (Wrightsman 1976:149). The transmission mechanism is through the realignment of relative prices throughout the economy, thereby increasing the price level and the nominal income. This presupposes a highly competitive and efficiently functioning market system in which substitutions between assets easily take place. The underdeveloped structures of the Nigerian economy rule out this mode of monetary transmission process. Besides, the results of the simulation experiments show that the impacts of policy instruments are often concentrated on particular sectors and hardly transmit to other sectors. Therefore, the transmission process that leades to 'general' economic expansion appears not to be supported by the empirical evidence.

The other major explanation is the Keynesian theory, which sees the transmission process as working through the interest rate channel. Two interest rate variables, the savings deposit rate (RS) and the Prime lending rate (RP) are shocked and their multiplier effects are shown in Tables 6.3 and 6.4, respectively. The impacts

of the interest rate on savings deposit are concentrated on the monetary variables. It's impacts on the real sector are uncertain. The increase in the prime lending rate produces the expected contractionary effects on the economy, but the multiplier values appear to be comparatively low. This is not surprising. The results of the single equations show that the interest rate variables except the time deposits rate (RT), are statistically insignificant. This conforms with the results of earlier researchers, such as Ajayi (1974), Ojo (1974); Fakiyesi (1980), etc. This may be due, in part, to the fact that the variables were statutorily determined during the study period. They therefore hardly varied. Besides the weak impacts of the interest rate variable (RP), the direction of its effects on income is unknown. Its multiplier effects on consumption (CP), investment (INVP), imports (IM), etc are not as large as the effects of, say, the prescribed growth rate of private sector credit (GDCP).

Consequently, we examine the alternative thesis that the credit availability channel is the most direct and powerful source of transmission of monetary changes to the real sector in developing countries. A comparison of

Tables 6.1, and 6.4 reveals that the statutorily prescribed growth rate of credit (GDCP) produces larger multiplier effects on the selected macro variables than the prime lending rate (RP). This is not surprising. In the single equation in which both variables appear as determinants of the volume of the domestic credit to the private sector, the GDCP variable is statistically significant while the RP is not. Given Nigeria's under-developed money and capital markets, the monetary authorities statutorily control the growth rate of bank credit and the prevailing interest rates. Hence, the commercial banks (lenders) ration the available supply of credit among the would-be borrowers by various non-price considerations. The rationed credit then exerts influences on the real sectors. Furthermore, an examination of the multiplier effects of shocks in the sectoral credits, underlines one fact. Besides impacting on more number of variables than the interest rate variable (RP), sectoral credits produce more direct and predictable effects on national income. It can therefore be concluded that the credit availability channel, depending on which sectors are affected by the rationing decisions of lenders, gives a better explanation of the

monetary transmission process than either the Keynesian or the monetarist framework. The third hypothesis of the research is therefore validated by the results of the research.

The conclusion above has further implication for the ordering of the intermediate targets of monetary policy. Ajayi (1978:54) has rightly observed that "the monetary policy targets in Nigeria are the rate of growth of loans and rate of interest ---." These are the major monetary policy targets in most developing countries. The evidence on the reaction process of the interest rate variable (RP) and the growth rate of private sector credit (GDCP) would however appear to question his conclusion that "interest rate is the main target with the rate of growth of bank credit as a subsidiary target." If as we have shown, the growth rate of credit exerts greater impacts on macro variables than the interest rate variable, and the sectoral credits produce more direct and predictable effects on income, it would be reasonable then to conclude that the magnitude and direction of credit should be the main targets of policy. The effects of the interest rate variable are equally substantial. In order of importance, however, the interest rate plays a secondary role as an intermediate target of monetary policy.

7.3. Time Lags in Monetary Policy

One major development in the growing field of monetary economics has been a shift of interest from static equilibrium theory to analysis in terms of process of adjustment over time. According to Wrightsman (1976: 305), there are two major dimensions of the effect of monetary policy on the economy. One is the magnitudinal dimension which measures the strength or ultimate size of the effect of monetary policy, and the other is a time dimension which measures the lag in the effect of policy. But the state of the art in Nigeria suggests that the monetary policy has instantaneous once-and-for-all effects on the national economy. The Annual Report and Statement of Accounts of the Central Bank of Nigeria tends to attribute major changes in macro-aggregates to that year's monetary policies. Evidence is required on the nature of time lags of policy so as to enable policy makers understand, among other things, how much of last years policies still affect the economy, and when and by how much this year's policies will take effect.

The results of this research provide some useful insights into the nature of time lags in Nigeria's monetary policy. The yearly percentage distribution of the multiplier values of the once-and-for-all policy

experiments are computed, and presented in Table 7.3. The percentage distribution of the impacts of the experimental policy simulations (expansionary, contractionary and interest rate policies) are also presented in the table.

Table 7.3. Summary of Multiplier Distribution (Percentages) of the Once-and-for-all Policy Simulations

YEAR/ INSTRUMENT	1978	1979	1980	1981	1982	1983	1984	1985
GDCP	66.26	14.30	10.50	4.49	2.49	1.24	0.19	0.12
RS	25.25	20.20	15.88	12.37	9.33	7.16	5.60	4.21
RP	62.05	25.07	6.84	1.96	1.53	0.86	0.44	0.24
CA	37.00	19.50	12.60	8.7	6.4	5.6	5.30	4.90
GGC	70.56	17.03	5.76	2.80	1.70	0.99	0.70	0.46
CBC	63.09	12.85	10.22	6.57	2.08	0.65	0.26	-
CM	70.89	17.37	5.74	2.80	1.51	0.85	0.52	0.27
Interest Rate Policy	25.15	19.06	17.03	13.35	9.04	7.24	5.08	4.05
Expansionary Policy	48.16	19.46	10.22	6.96	5.18	4.06	3.29	2.76
Contractionary Policy	46.67	20.98	10.16	6.94	5.17	4.06	3.28	2.74
Group Average	50.9	19.19	10.50	6.80	4.44	3.27	2.47	1.98

From the table, it is evident that the impacts of monetary policy on the selected macro variables are distributed over the eight year period. The magnitudes of the yearly distribution differ among the policy instruments. For example, whereas about 70.9% of the impacts of a shock in credit to the manufacturing sector (CM) occur in the first year, the equivalent figures for credit to agriculture (CA) and interest rate policy are 37.0% and 19.06%, respectively. As summary statistics, the group averages are computed as shown for the various years. Such statistics enable us to infer that, on the average, about 50% of the impact of monetary policy actions occurs in the first year, 19% in the second year, 10% in the third year, etc. Thus, both from the individual instruments and the aggregate of all instruments, monetary policy is shown to impact powerfully on the economy, but over a variable time lag. This corroborates Friedman's (1960:84 - 99) argument that 'monetary policy occurs with a long and highly variable time lag.' Consequently, the fourth hypothesis of the study is fully borne out by the empirical results.

It should be noted, however, that the nature of the lags is determined, not only by the timing and instruments of policy applied by the monetary authorities, but also

by the nature of the portfolio interactions of the agents affected by the policy actions. Generally, it is possible to think of the total effect of a change in the money stock on the economy as working through two separate channels which might be called the primary, and the secondary effects. The primary effect is directly related to the credit creation associated with the increase in the money supply, and the relationship between this new credit and increases in aggregate expenditure. Banks therefore play a crucial role in this process. But the actual outcome of the primary effect is likely to depend on the way in which the new money comes into existence, and the uses to which the credit is put. The secondary effect refers to the continuing influence of money on the economy in the process of bringing demand and supply into equilibrium. The exact speed and pattern of adjustment will depend on the interaction of the various agents, including the banks, in the economy and their reactions to the disequilibrium (Coghlan, 1981:36 - 37). Usually, each of the reaction processes involves a time lag.

However, it has to be emphasised that the monetary authorities can influence the magnitude of these lags. The nature of the lags will depend on the objectives of policy and the instruments employed. Some instruments are certainly swifter and more direct on targets than others. If, for example, long term growth is the ultimate target, policies will be directed to elicit a credit structure with longer term maturity. This will produce longer time lag structure. Also, to control the lag effects, the CBN could give special directives to banks on the implementation schedule of certain policies. In the 1988 'Credit Policy Guidelines', for instance, the CBN prescribed the quarterly permissible growth rates of credit. If a greater impact of policies is desired in the same year, then the phasing of the quarterly growth will be skewed in favour of the first two quarters, contrary to the provisions of the 1988 Guidelines.

Therefore, the insights provided by the results of this research will challenge policy makers not only to consider the magnitude and direction of policy alternatives, but also and very importantly, the directional impacts of the policies over time.

7.4. Experimental Contractionary/Expansionary Monetary Policy and the Choice of Policy Instruments

The major focus of policy in most less developed countries (LDCs), including Nigeria, is how to remove the rigidities that constrain the supply sector, realign the composition of output and put the economy on the path to sustainable long-term growth and development. However, the desire for economic growth cannot be divorced from a need for macroeconomic stability. Conflicts often arise in the process of pursuing these objectives. The problem therefore is how to select an optimal combination from a basket of instruments to attain the socially desirable mix between macroeconomic stability (stable price level, and healthy balance of payments), and desirable economic growth. The choice of the necessary instruments is never an easy one.

In Nigeria, as in most other countries, it is conventional for the monetary authorities to resort to contractionary (deflationary) or expansionary (reflationary) policies, depending on the perceived needs of the economy. This entails the simultaneous application of several policy instruments whose group effects may be uncertain. Experimental simulations of the two alternative policy scenarios are carried out. This is to provide policy-makers with useful insights on the implications of a simultaneous interaction of different policy instruments.

In the policy experiments, three major categories of policy instruments are selected, namely; (a) interest rate variables, (b) the prescribed growth of bank credit to the private sector (GDCP), and (c) the sectoral credit allocations. The expansionary policy is carried out by: (i) reducing all the interest rate variables (prime lending rate (RP), savings deposit rate (RS), time deposit rate (RT), treasury bill rate (TBR), and treasury certificate rate (TCR)) by one percent; (ii) a 5 percent increase in the prescribed growth rate of bank credit (GDCP); and (iii) 5 percent increases in all the sectoral credits. The alternative simulation (contractionary

monetary policy) is carried out by applying the opposites of the policy shocks enumerated above.

The simulations are carried out with 1978 as the base year. A once-and-for-all shock is applied to the values of the selected policy instruments in 1978. The results are compared with the control simulation, and the extracted differences are presented in Tables 7.4 and 7.5. The absolute values of the differences are presented. This is to enhance comparisons of the magnitudinal effects of policies.

An examination of the two tables below makes some currious revelations. The expansionary monetary policy, expectedly, produces expansionary effects on the major real sector variables. The national income increases substantially by about ₦389.8 million in the first year. The balance of payments (BOP) account worsens as shown by the widening gap between changes in imports and exports. The national savings as approximated by the savings and time deposits decreases substantially. Curiously, the expansionary policy dampens the inflationary pressure, contrary to popular belief among policy makers. On the other hand, and surprisingly too, the contractionary policy accentuates the inflationary

Table 7.4. Results of the Experimental Expansionary Monetary Policy

YEAR/ VARIABLE	1978	1979	1980	1981	1982	1983	1984	1985
CH	38.97	3.9	2.02	1.29	1.06	1.01	1.06	1.03
DD	23.32	8.61	2.68	0.63	0.07	0.05	0.22	0.45
SD	-122.25	-96.68	-75.87	-59.8	-47.13	-37.14	-29.26	-23.03
TD	-153.35	-115.99	-87.77	-66.43	-50.28	-38.06	-28.8	-21.79
DCP	173.02	19.54	5.10	2.77	2.14	2.01	2.0	2.0
VC	- 0.069	-10.87	-10.12	- 8.09	- 6.29	- 4.83	-3.66	- 2.76
ELQA	28.08	14.81	5.80	1.24	0.78	1.46	1.49	1.22
GS	- 3.28	- 2.31	-5.29	6.17	-5.95	-5.24	-4.36	-3.49
CPI	- 5.019	- 2.13	-2.71	-2.25	-1.78	-1.39	-1.06	-0.81
CP	175.6	116.7	73.1	45.7	29.5	20.1	15.2	12.6
IM	161.14	75.56	4.10	1.13	1.6	1.8	2.0	2.0
INVP	109.59	55.64	7.17	0.78	0.07	0.31	0.43	0.51
T	69.66	12.58	7.50	4.79	3.43	2.80	2.60	2.60
X	49.03	34.0	9.30	2.80	0.9	0.25	0.1	0.1
Y	389.8	39.1	20.9	13.6	11.0	10.5	10.8	11.7

Table 7.5. Results of Experimental Contractionary Monetary Policy

YEAR/ VARIABLE	1978	1979	1980	1981	1982	1983	1984	1985
CH	-36.63	-3.85	-1.98	-1.27	-1.01	-0.97	-1.01	-1.09
DD	-21.8	-8.06	-2.48	-0.54	-0.01	-0.01	-0.18	-0.39
SD	122.35	96.36	75.93	59.85	47.17	37.17	29.28	23.05
TD	153.42	116.05	87.82	66.48	50.33	38.09	28.83	21.80
DCP	-168.89	-19.18	-5.02	-2.70	-2.07	-1.92	-2.0	-2.0
VC	0.55	10.97	10.15	8.12	6.30	4.84	3.68	2.77
ELOA	-27.26	-14.29	-5.51	-1.05	0.90	1.55	1.55	1.27
GS	- 2.94	-2.54	-5.43	-6.26	-6.01	-5.28	-4.39	-3.53
CPI	4.98	2.25	2.72	2.26	1.78	1.38	1.06	0.81
CP	-167.5	-111.9	-70.2	-44.0	-28.3	-19.5	-14.5	-12.1
IM	-154.82	-73.6	-4.02	-1.07	-1.53	1.7	-1.8	-2.0
INVP	-106.45	-108.23	-7.03	-0.78	-0.05	-0.29	-0.41	-0.49
T	- 65.63	1-12.24	-7.28	-4.64	-3.30	-2.70	-2.40	-2.40
X	- 46.16	-31.8	-8.90	-2.80	-0.9	-0.25	-0.01	-0.01
Y	-366.5	-38.9	-20.5	-13.3	-10.7	-10.1	-10.4	-11.1

pressure. Its effects on most economic aggregates (including national income) are, expectedly, negative. However, it improves the balance of payments. Therefore, the choice between expansionary and contractionary monetary policy is one between greater balance of payments crisis, combined with dampened inflationary rate and higher economic growth on one hand, and improved balance of payments, higher inflation and depressed economic growth on the other.

Also, the earlier single-instrument policy shocks have been seen to differ markedly in terms of the direction and magnitude of their effects. For instance, all the instruments, (except the expansionary credit to agriculture (CA) and increase in prime lending rate (RP)) are inflation accentuating. While the increase in the prime lending rate dampens inflation and improves the balance of payments, it depresses economic growth. In addition, with the exception of the prime lending rate, all the other once-and-for-all policy shocks have worsening effects on the balance of payments. This evidence corroborates the observation by Olufade (1986: 12 - 13) that "the only possibility for the balance of

payments deficits whatever its origin to continue indefinitely is the policies of monetary authorities allowing domestic credit expansion, and the problem of external disequilibrium is associated fundamentally with the power of the national banking system to create money." The evidence so far shows that, on the single-instrument basis, only two instruments can simultaneously dampen the inflationary pressure and also improve the balance of payments. A decrease in the growth rate of private credit (GDCP) or an increase in the prime lending rate, achieves the purposes. However, this must be weighed against the obvious cost in terms of depressed economic growth.

This evidence on the attendant conflicts in the pursuit of macroeconomic balance re-echoes the well known predicament of policy makers. As Neal and Shone (1976:131) note, "the interdependence of policy objectives and the limited means to obtain them is one of the major reasons why economists have not had success in macro policy-making." Indeed, not only are the instruments limited, they do not work in isolation of one another. When applied as a set of instruments,

the effects of some instruments may offset those of others, resulting in the uncertainty of the final group effects. This point is validated by the results. For instance, judging by the impacts of the single-instrument simulations, the expansionary policy is expected to be inflation accentuating while the contractionary policy would be inflation attenuating. The opposite results are obtained probably because of the offsetting effects of the combined policy instruments. Furthermore, it is evident from the results that no combination of all the instruments has guaranteed relative shortrun economic stability. Apparently therefore, there is a trade-off between inflation and improved balance of payments. Thus, the naive resort to the so called expansionary or contractionary policies to achieve even shortrun stabilization programme is challenged by the results of this research.

The above discussions emphasise the fact that each alternative policy mix involves, at least, an opportunity cost. Each combination of output arising from credit expansion is associated with a certain level of balance of payments crisis and inflationary level. Evidently

also, the pursuit of balance of payments stability must entail a certain disutility arising from the exacerbated inflationary pressure. This is currently the case in Nigeria under the structural adjustment programme. These observations underline the futility of the attempt by monetary authorities to maximize all the objectives of monetary policy simultaneously. One gets this impression that the Nigerian monetary authority seeks to maximize all the objectives of policy by reading through most of its 'Annual Monetary Policy Circulars'. It is not easy to maximize on all fronts. Some objectives will definitely become the necessary constraints.

In the circumstance, the challenge to policy makers is a choice between what can be categorised as an optimizing model and a satisficing model of monetary policy. Under the optimizing model, the objectives are prioritized and relative weights assigned to them. The less important objectives at the point in time are sacrificed. They necessarily become the constraints in the process of optimizing the one or two top priority objectives. The weighting of the objectives will depend on what the society regards as 'the best'goal. This

'best goal' is,however, determined by the preferences of the policy makers depending on their perception of the state of the economy. This framework may require the application of either 'contractionary' or 'expansionary' policies. In the alternative a single instrument may be relied upon to achieve some objectives. For example, if shortrun stability is the priority, either a decrease in the growth rate of credit (GDCP) or an increase in the prime lending rate (RP) will improve the balance of payments and dampen the price level, and vice versa. The growth of the economy and employment are sacrificed. From this model of policy, the growth rate of credit and, or, the lending rate could be relied upon for shortrun economic stability. The sectoral credits produce varying results, and cannot be relied upon. The problem with this optimizing model, however, is that the sacrificed objective(s) can indeed negate the gains in the other objectives in the medium term.

The satisficing model, on the other hand, focuses on the simultaneous pursuit of all the objectives of policy without attempting to maximize any. This requires

the setting of some "social minimum standards" for all the objectives. The benefit of this framework is that it keeps the economy on an even keel. This should, decidedly, be a preferred framework for a developing economy, desirous of laying a solid foundation for sustainable balanced development. The growth of income and employment are priority objectives, but at the same time, the attendant social costs resulting from deepening balance of payment crisis and choking price level cannot be contemplated. All the objectives are taken account of in policy making. Since the pursuit of either a contractionary or expansionary monetary policy will entail the sacrifice of at least one policy objective, none of them is appropriate under this policy framework. Having set the minimum-tolerance-limit for all the objectives, the challenge to policy makers is the location of the contractionary-expansionary nexus that achieves these minima.

The optimal selection of the basket of instruments to attain this macroeconomic balance requires much ingenuity. However, insights gained from the simulation results of this research underline the fact that the effects of the policies will depend on which sectors are

primarily affected. It can, for example, be shown that whereas a policy of decreased growth rate of private sector credit (GDCP) and, or an increase in the prime lending rate (RP) will work to reduce inflation and balance of payments crisis, it is the sectoral rationing of the available credit that has implications for the level and direction of economic growth. On the other hand, the results of the expansionary policy show that an increase in GDCP is not necessarily inflation accentuating. The consequences may depend on which sectors are affected by the expansionary credit, and the other instruments that are combined with the GDCP. A policy that expands the growth rate of credit (GDCP) but skews the distribution heavily in favour of agriculture in particular and the manufacturing sector will produce different effects on inflation, balance of payments, growth and employment than an alternative rationing that favours building and construction or general commerce. The nature of the sectoral rationing is therefore very crucial. Under this framework, the use of one single instrument for shortrun stability will involve the sacrifice of the growth objectives. Therefore, a combination of policies is always required for both

shortrun stabilization purposes, and long term economic growth.

In conclusion therefore, it is the orientation of policy makers that determines whether or not specific policy instruments are chosen singly or in combinations, and the nature of the combinations. If they are optimizers, the weights attached to specific objectives determine which instruments to adopt and when. On the other hand, if they are satisficers, the simultaneous adaptation of all instruments to achieve the minimum-tolerance limit for all objectives is required. This latter model tasks the dynamism expected of policy makers in a developing economy such as Nigeria. However, the predicament of the policy makers, whether as optimizers or satisficers, is worsened by the variable time lags of policies. For example, the effects of present policies might be vitiated by the lingering effects of previous years' policies. This observation further demonstrates the unique role of an up-to-date macro model in policy simulations. Useful insights could be continuously garnered on the prevailing tendencies and trends in macroeconomic behaviour.

7.5. Interest Rate Simulation and Implications for Policy

The multiplier results of the once-and-for-all simulations of the interest rate on savings deposit (RS) and the prime lending rate (RP) are shown in Tables 6.3 and 6.4, respectively. While the effects of the increase in the RS are concentrated on the monetary variables, the increase in (RP) produces contractionary effects on the economy. In practice, however, the rise or fall in one rate is not always independent of the movement in other rates. It is therefore necessary to examine the effects of the interaction of a simultaneous rise or fall in all the rates. This experiment is done by applying a once-and-for-all one percent increase in all the interest rate variables in 1978. The variables are: the prime lending rate (RP), interest rate on time deposits (RT), savings deposit rate (RS), the treasury bill rate (TBR) and the Treasury Certificate rate (TCR). The choice of one percent is arbitrary, because ordinarily, the rates do not rise at the same rate. The results are compared with the control solution with 1978 as base year, and the absolute differences in the values of the endogeneous variables over time are presented in Table 7.6.

Table 7.6. Results of the Experimental Interest Rate Policy

YEAR/ VARIABLE	1978	1979	1980	1981	1982	1983	1984	1985
CH	0.14	0.16	0.10	0.07	0.06	0.04	0.03	0.03
DD	2.06	2.53	2.27	1.85	1.46	1.13	0.88	0.69
SD	124	97.84	77.19	60.9	48.05	37.91	29.91	23.60
TD	154.7	117.25	88.86	67.36	51.06	38.70	29.33	22.23
DCP	-55.47	-4.06	-0.30	-0.02	-	-	-	-
VC	12.42	13.81	11.17	8.68	6.71	5.19	4.02	3.10
ELQA	5.20	0.59	3.55	4.31	4.21	3.72	3.13	2.55
GS	5.61	8.75	9.44	8.82	7.67	6.41	5.22	4.20
CPI	4.30	3.96	3.13	2.42	1.93	1.45	1.12	0.87
CP	-21.0	-13.3	7.50	-4.2	-2.30	-1.40	-0.70	-0.40
IM	-29.79	-27.61	-2.02	-0.15	-0.01	-	-	-
INVP	-30.51	-28.28	-2.07	-0.15	-0.01	-	-	-
T	-1.37	-0.69	-0.44	-0.26	-0.14	-0.01	-	-
A	-0.72	-0.50	-0.20	-0.1	-	-	-	-

From the table, the effects of the shocks include: improvement in the balance of payments account, contraction in the volume of private investment (INVP) and private consumption (CP); higher price level; and increased national savings. Indeed, the greatest impacts are on the

savings and time deposits. The effect of the shocks on the price level is curious. In Table 6.4, the increase in the prime lending rate (RP) produces negative multiplier values for the consumer price index (CPI). The opposite effect is observed in Table 7.6. This reinforces the earlier conclusion that the effects of policy instruments on the economy are better studied in a scenario of simultaneous interaction of several of them. The evidence (as shown in Table 7.6), on the magnitudinal and directional effects of increases in interest rate variables helps to shed some light on the controversy among economists on the appropriate interest rate policy in an LDC such as Nigeria.

Most economists seem to agree that interest rates in Nigeria (especially during the study period 1970 - 85) were artificially kept at very low levels. Some researchers, namely Ajayi 1974, Ojo 1974, etc have attributed the relative insignificance of interest rate variables in empirical researches to this statutory determination of interest rates. In all the equations containing interest rate variables in this research, the rates are statistically insignificant except the rate on time deposits. The Central Bank of Nigeria (CBN) (1979:102) has articulated

the obvious reasons for the official control of these rates. It observes that

> The underdeveloped nature of the financial markets coupled with the relative scarcity of capital resources in the economy, are important factors which could make market determined interest rates incapable of producing the most desirable pattern of resource allocation .... Apart from the desire to obtain the social optimum in resource allocation, the tinkering with interest rates in Nigeria is aimed at promoting orderly growth of the financial markets, combating inflation and lessening the burden of internal debt servicing on the government.

Thus, one of the reasons for controlling the interest rate is to combat inflation. This is supported by the evidence in Table 7.6 that an increase in the rates exacerbates the inflationary pressure.

However, the statutory control of the interest rate structure, particularly at very low levels, has several consequences. The real interest rate has, for most years, been negative in Nigeria. Negative real deposit rates signify that in general, physical assets earn a higher rate of return than do savings accounts, and negative real loan rates mean that it is profitable to borrow even when there is a very low rate of return on the uses to which the borrowed funds are put.

In addition, artificially low interest rates generate excess demand for credit, and the authority often resorts to

selective allocation, and other forms of rationing. One result of official credit rationing is to encourage further development of traditional curb markets operating outside the purview of monetary authorities, with consequences for the allocation of resources which run contrary to official design. The distribution of income also deteriorates as a result of low interest policies and credit rationing (Galbis, 1977:70). It is also argued that low interest rates tend to discourage financial savings and therefore reduce the funds available for lendings, so that desired investment is higher than the realised investment.

In order to mitigate the above undesirable effects, some scholars have suggested the raising of interest rates as a panacea. Galbis (1977:70) observes that "the rise in interest rates, by discouraging consumption, would increase the surplus of investible resources, thereby raising the rate of capital accumulation and mitigating inflationary pressures." The views of Lanyi and Saracoglu (1983:13) can be summarised as follows: A substantial increase in interest rates to positive levels in real terms, following a protracted period of negative real rates, can be expected to have both shortrun and longrun effects. In the shortrun, an increase in interest

rates could cause an immediate once-and-for-all rise in the demand for domestic interest bearing financial assets and an accompanying fall in the demand for inflation hedges. When a large change in interest rates are involved, this reallocation of the public's wealth may result in a substantial rise in the resources available for investment in the shortrun. Moreover, if the new rates are higher than those abroad, taking expected exchange rates into account, capital inflows will take place and permit the government to liberalize imports, removing a previous barrier on investment. In the long-run, the average rate of return on savings will rise and may result in a continuing increase in the ratio of savings to income.

The Nigerian monetary authority appears to be strongly influenced by the above views in its current interest rate policy under the Structural Adjustment Programme. Some of its expectations are corroborated by the results in Table 7.6. In the short run, the interest bearing financial assets (savings and time deposits) increase sharply while inflation exacerbates. Under the current Structural Adjustment Programme (SAP), the correction of balance of payments disequilibrium is the short run primary concern of policy, and market forces are heavily

relied upon as the resource allocating mechanism. Consequently, the interest rate structure is deregulated and market forces given greater fillip. This has led to tremendous increases in the various interest rates. The evidence from Table 7.6 shows that whereas the balance of payments crisis may be corrected and savings increased, the accompanying level of inflation and contractionary effects on investment, consumption, and hence income, are worrisome. With only one percent increase in the rates, the spread effects on some macroaggregates in the first year show that: consumer price index (CPI) increases by 4.3; private consumption (CP) and investment (INVP) decrease by ₦21.0 million and ₦30.5 million, respectively; and imports decrease by ₦29.8 million. One then imagines the magnitudes of the effects of the escalating interest rate structure. The results therefore confirm the unceasing complaints of the investors, especially the small scale ones of the choking effects of high interest rates. Also, the current persisting inflationary pressure may be partly explained by these high rates. The relevant policy issue therefore is the determination of the appropriate trade-off between the requirements of efficiency in resource allocation, correction of balance of payments crisis, etc on the one hand, and the costs

in terms of depressed income, heightened inflation and the need to guarantee an orderly development of the financial system, on the other. Furthermore, it needs to be shown that the economic structures and institutions in Nigeria are now so developed that the unguarded competitive impulses will not aggravate the distortions in resource allocation. In otherwords, have the initial conditions that warranted the statutory control of these rates ceased to exist? Again, can market forces, unguided, produce a most desirable interest rate structure? Then what rates can be regarded as the social optimum and how will such rates be determined?

The resolution of these questions requires much ingenuity on the part of policy makers. However, the nature of the interest rate policy will depend on the overall posture of the authority to monetary policy. That is, it depends on whether the posture is optimizing or satisficing. In any case, interest rates do not work in isolation of other instruments. Therefore, the results produced by a particular interest rate policy will also depend on the effects of other supporting instruments.

The evidence from this research, however, suggests that reliance on a market determined interest rate

structure is questionable. A dynamic tinkering with the rates may still be required. It is not easy to go into the details of the nature of this dynamic structure. However, insights gained from this research help to suggest some guidelines as a general framework, thus:

(i) The Central Bank of Nigeria (CBN) should continue to regulate the determination of the interest rate structure. Its continued intervention in the exchange rate market is an indication that the market forces are less than efficient. The rates should be reviewed, perhaps quarterly, to reflect the inflationary and other economic circumstances. It has been shown that higher interest rates cause inflation. Therefore, whereas it will be reasonable for the rates to move in the same direction with the rate of inflation, the quest for real interest rates may be counter-productive.

(ii) The Central Bank should concentrate on fixing the minimum deposit rates and the maximum lending rates. The minimum rediscount rate cannot be wholly relied upon to give sufficient signals as to the desired trends or limits. Also, the phasing out of the sectoral interest rates is

supported. First, empirical studies (see, Igben 1981:387 for instance) have shown that the sectors are not significantly constrained by variations in the interest rates in their demand for credit. This is also consistent with the assumptions of our theoretical framework. It does not however mean that the interest rate insensitivity tends to infinity. There may be a certain limit within which sectors become interest sensitive. Secondly, it appears very difficult and costly for the Central Bank to monitor the adherence of banks to the prescribed sectoral interest rates. Customers often complain of being charged rates higher than the sectoral prescriptions. Also, this framework will now encourage some competition among banks within the fixed interest rates range. However, the range should be reasonable to allow the banks enough room to manoeuvre.

(iii) The Central Bank should therefore, concentrate on sectoral allocation of credit as the only technique of rationing. The percentage of credit allocation to each sector and sub-sector should be clearly defined, and stricter penalties meted for non-compliance.

(iv) The monetary authorities could devise other incentives to encourage investments in the preferred sectors. The Nigerian Industrial Development Bank (NIDB), and the Nigerian Agricultural and Co-operative Bank (NACB) may be encouraged to grant, say, three years of grace on all projects with long term gestation period. The agricultural credit guarantee scheme should be intensified as an official policy. Besides, the agricultural and manufacturing sectors could be favoured in other ways such as the rationing of foreign exchange; subsidizing of inputs; preferential tariff and tax policies, etc.

7.6. Proposal for the Reform of the Relationship Between the Monetary and Budgetary Authorities

In this study, the credit to the government sector has been treated as an exogeneous variable. This is because its size is determined by the decision of the treasury. The review of the financial system in chapter two provides some insights about the size of this credit, and other sources of money supply outside the control of the monetary authority. The institutional setting is worrisome because it is a potential source of monetary policy ineffectiveness.

Indeed, the dominance of the government sector as a participant in the financial system is overwhelming. As Philips (1989:7) observes 'it is not generally appreciated that government is, among other things, a financial institution. In fact, it is the largest financial institution in the financial system, with a current annual turnover of about ₦50 billion." The commercial banks, historically, account for only a small proportion of new money creation in the less developed countries with a dominant public sector. In Nigeria, this proportion averaged 15.2% between 1970 - 1982 (Okah, 1985:24). In fact, an examination of the Central Bank's Annual Reports shows that for the 1970 - 1988 period, the private sector component of total domestic credit has averaged below 50 percent. This implies that even if the Central Bank achieves one hundred percent success along the 'direct control' of private sector credit, the total money stock is still far from being controlled. The predicament faced by the Central Bank in the circumstance is captured by Okah's (1985:23) observations that:

> Given a monocultural export-oriented economic base in which export earnings accrue in the first place to the government, and in the absence of a foreign exchange sterilization policy, fiscal factors will become very important in

> determining the intensity and character of monetary movements. Suppose, in addition, that the public sector deficit is large and growing, and that such deficit is financed mainly by the creation of new money: suppose also, that there are constitutional provisions for sharing all financial accruals in any fiscal year to the various levels of government in a federal structure, each armed with statutory powers to spend irrespective of monetary implications; then a Central bank charged with the responsibility of maintaining monetary stability in such a system is faced with an uphill task. In fact, it may, in practice, do little more than document activities of the government and record the resulting changes in monetary aggregates. That is very different from controlling the stock of money! In such a special case, controlling money supply tantamounts to controlling government behaviour itself. No central bank is known to be doing that in less developed countries.

Furthermore, Teriba (1976:8) notes that "the primary determinant of the extent to which government has financed its expenditures by loans from financial institutions and the general public has been the government budget over which the central bank has no control."

Therefore, if monetary policy is to be effective, these circumstances need not be so. This explains why Philips (1989:7) further argues that,

> As the largest financial institution in the system, it is inevitable that it will often be as it has recently been, the major source of problems in the financial system. Therefore, any major attempt to

> sanitize the system which does not cover the government sector is unlikely to be significantly effective.

The working relationship between the fiscal authority and the monetary authority therefore needs to be re-examined. Currently, the CBN is autonomous of the Ministry of Finance. It reports directly to the office of the President, and this apparently enhances the speed and efficiency of its operations. However, the budgetary decisions of the ministry of finance affect and often vitiate the monetary policies of the CBN. The problem then, is how to harmonize the budgetary and monetary decisions of government. One option is to statutorily assign the control of government's budgetary policy to the CBN. The Central Bank often has in mind the desired level of money supply that satisfies a set of macroeconomic objectives. Its control over the government budget will ensure that government finances become much more effectively monitored, controlled and managed to ensure consistency with overall economic policy. The recent order to all government parastatals to withdraw their accounts from the commercial banks and deposit same with the Central Bank gives it a partial control over government finances. The other option is to ensure a system in which the treasury and the Central

Bank agree on all budgetary matters of the government, especially the borrowing decisions. These suggestions reflect the peculiar 'unconventional' circumstances of an underdeveloped economy.

CHAPTER EIGHT

SUMMARY AND CONCLUSION

The study has been concerned with an empirical investigation of the workings of monetary policy in Nigeria. This was motivated by the current pivotal role assigned to monetary policy in the economic transformation of Nigeria, and the unique roles of a macroeconometric model in macroeconomic analysis and forecasting. The absence of such an operational model within which detailed monetary analysis and forecasts can be carried out warranted the study.

A general background information on the nature and character of the financial institutions, and monetary policy in Nigeria were provided in chapter two. Even though the financial system is relatively underdeveloped, it was shown to have recorded an impressive growth pattern and contributed significantly to the process of economic growth. Most of the conventional instruments of monetary policy do not work, and the selective variant of credit control was shown to be the most popular instrument of monetary policy. Generally, monetary policy in Nigeria is dynamic, responding to the economic circumstances as the needs arise. Furthermore,

a review of the earlier macroeconometric models showed that none of the solved and operational models has an elaborately specified monetary sector. This research was therefore undertaken to try to correct this. In chapter four, the theoretical framework for the research was discussed. A review of the theoretical literature on the role and transmission process of money in the economy revealed the inappropriateness of the dominant theories for Nigeria. The need to provide a consistent framework for the research led to the development of the relevant 'Structuralist-Developmental' model. This framework guided the model's specification and evaluation.

The macroeconometric-simulation technique was presented as the appropriate methodology in chapter five. A medium sized model, made up of seven sectors was specified. The sectors were the supply, monetary, consumption, Investment, Prices, Government, and the External sectors. In all, the model consisted of 62 equations, 36 of which were stochastic. It had also 69 predetermined variables, 38 of which were exogeneous variables and 31 were lagged endogeneous variables. The model therefore had dynamic features. The equations were estimated using the Ordinary Least Squares estimating technique. The presentation and evaluation of the

regression results were the concern of chapter six. The model was then simulated and its dynamic properties tested. The tests based on the model's tracking ability, sensitivity and the dynamic multiplier tests showed that it was stable enough to be relied upon for policy experiments and forecasts. This finding validated the first working hypothesis of the research.

In chapter seven, the implications of the various simulation experiments were discussed. The magnitude, direction and spread effects over time of the various policy instruments were shown to be diverse. The nature of the impacts of certain instruments on income was uncertain, whereas the sectoral credits produced the most certain and powerful effects on income. However, the effects of the sectoral credits on income were often concentrated on the specific sectors. Furthermore, the results showed that the impacts of the different sectoral credits on selected endogeneous variables were very diverse. These results provided basis to question the government policies of financial de-regulation, particularly as it concerned the aggregation of 'heterogeneous' sectors for the purposes of credit rationing. In an underdeveloped economy such as Nigeria, the attainment of balanced development would require

sector-specific policies. Therefore the results validated the basic postulation of the theoretical framework of the research that an optimal, sectorally homogeneous partitioning of the economy and allocating required amounts of credit to them is the most effective framework for monetary policy in an LDC, such as Nigeria.

The evidence on the monetary transmission process showed that the credit availability channel, depending on which sectors were affected by the rationing decisions of the lenders, gave a better explanation of the monetary transmission process than either the Keynesian or the monetarist framework. This supported the third working hypothesis of the research. Furthermore, the results provided a basis for ordering the intermediate targets of monetary policy. It was shown that the magnitude and sectoral distribution of bank credit should be the main target of policy, while the interest rate should be the secondary target.

The results of the spread effects of the various policy instruments showed that monetary policy impacted powerfully on the economy, but over a variable time lag. The implications of this for the designing and timing of policy actions were highlighted. The evidence therefore

challenged policy makers to be mindful of the distributional effects of policies over time.

Furthermore, the results of the contractionary and expansionary policy experiments illuminated the dilemma faced by the policy makers in the choice of a set of instruments to achieve stated objectives. The futility of the attempt to maximize all the objectives of policy simultaneously was demonstrated. The maximizing posture to policy would definitely entail the sacrifice of one or more of the objectives of economic policy. The sacrificed objectives might turn out to vitiate the benefits of the other objectives. The satisficing model was suggested as the relevant model for Nigeria. It focuses on the simultaneous pursuit of all the objectives of policy without attempting to maximize any. This requires the setting of 'social minimum standards' for all the objectives. Its major benefit is that it helps to keep the economy on an even keel, and ensures balanced development. The implications of these conclusions on the choice of policy instruments for shortrun stabilization and long run economic development were discussed.

The results also provided interesting insights into the nature and impacts of interest rates. The implications of the results were fully discussed and a framework for an improved interest rate policy was suggested. Finally, a proposal was made for the reform of the working relationship between the monetary and the fiscal authorities. This was because of the vitiating effects of the operations of the fiscal authorities on the effectiveness of monetary policy.

Limitations of the Study and An Agenda for Further Research

This research, expectedly, has some limitations. The discussion of the empirical results will therefore not be complete without enumerating the failures. This important philosophy by Evans (1969:15) is quoted by Ajayi (1978:64) thus:

> In presenting these results, I have adopted the philosophy that the cataloguing of failure is almost as important as the description of final success. ('Success', of course, is a relative term). From the point of view of economic science it is important to present this work in as complete and reproducible a fashion as possible, however galling that record may be. One of the most valuable products of the exercise may then become the information it yields on unfruitful approaches - other researchers can thus avoid these blind alleys. Better still, they may see light where I saw only darkness and discover that it was the presenter who was blind.

Guided by this philosophy, it is believed that the cataloguing of failures in this case provides a research programme for future researches.

A simulation model is not a sacrosanct tool in the hands of policy makers. It is not expected to give an exact description of reality. A model, after all, is an abstraction from reality. In the case of an economy, it merely indicates the broad spectrum of some trends and tendencies. The simulation results, especially the multiplier results of this research, should therefore be interpreted cautiously.

The only true test of a model is its approximation to reality. Reality in itself is an ever changing phenomenon. That is why model building is never a once-and-for-all affair. The model has to be continuously revised in the light of the ever changing circumstance, and as a reflection of new insights gained into the operational dynamics of the economy. In the light of this, the following issues are raised as probable items for the modification and extension of the model.

First, the assumption that sectoral credits are exogeneously determined is tenuous. This credit availability argument implicitly assumes that the volume of sectoral credits are not significantly constrained by the demand and supply factors. The extent of the constraining influence of the demand and supply factors needs to be constantly verified. Therefore, it is suggested that an extension of the model by endogenizing sectoral credits will be a worthwhile exercise.

Secondly, the model appears to be too aggregative. Indeed, the partitioning of the economy into nine water-tight sectors is far less than optimal. The model merely demonstrates the niceties of greater disaggregation in macro modelling and economic analysis. It is to be expected, for instance, that the agricultural sector can further be disaggregated into the forestry, livestock, food, cash crops, or even break the cash crops into major components - cocoa, rubber, etc. The manufacturing sector is also an amorphous collection. There are

differences between the small, medium and large scale industries; between food processing and machinery or drug manufactures, etc. The same argument goes for modelling capital formation, exports, etc.

Furthermore, the concentration of the monetary relationships on the commercial banking activities needs a review. The major justification for this concentration stems from the dominant role of the commercial banks in the financial system. For all practical purposes, commercial banking system is the banking system (Ojo, 1984). Of all the financial institutions, commercial banks are the most significant intermediaries measured in terms of assets. Between 1970 and 1985, for example, the total assets of the commercial banks represented about 60% of the total assets of the financial system, and over 85% of the banking system. It is therefore expected that the results obtained from the study will approximate the situation in the monetary sector. However, in the light of recent developments in the monetary sector, future modelling efforts may take cognisance of the following:

(a) the growing importance of other financial intermediaries especially the merchant banks; and

(b) the government sector as the dominant participant in the financial system. Furthermore, in the light of recent developments in the foreign exchange market, efforts should be made to incorporate its equation into the model. During the study period, (1970 - 1985) its values were statutorily determined.

In addition, the assumption that the stock of money is demand determined is for convenience. Recent developments in monetary economics point out that the stock of money is the result of the interaction of the demand and supply of money. It will therefore be interesting to investigate the equilibrating or disequilibrating process in the determination of money stock. This is an item for further research.

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APPENDIX I

LIST OF VARIABLES

AGDCP	Actual Growth rate of Domestic Credit to the private sector.
CA	Commercial bank credit to the Agricultural sector.
CBC	Commercial bank credit to the Building and Construction sector.
CG	Commercial bank credit to the Government sector.
CGC	Commercial bank credit to the General Commerce sector.
CH	Currency in circulation outside the banks.
CM	Commercial bank credit to the manufacturing sector.
CMQ	Commercial bank credit to the Mining and Quarying sector.
CO	Commercial bank credit to the other sectors.
CONS	Total consumption expenditures
CP	Private consumption expenditure.
CPI	Consumer Price Index.
CTC	Commercial bank credit to the Transport and Communication sector.

CU	Commercial bank credit to the Utilities sector.
D	Total Deposit liabilities of Commercial banks.
DD	Demand deposits.
DCG	Total Commercial bank credit to the federal government.
DCP	Total Commercial bank credit to the private sector.
DCP2	Change in total commercial bank credit to the private sector.
DP	Demand pressure or supply gap
DT	Direct Taxes
ELQA	Excess Liquid Assets of Commercial banks
FDB	Medium and long term federal government external debt.
FDB2	Change in federal government medium and long term external debt.
FRSV	Nigeria's Foreign Reserves
GA	Federal Government Capital expenditure on the Agricultural sector
GBC	Federal Government Capital expenditure on the Building and Construction sector.
GC_{t-1}	Total Federal Government capital expenditure lagged one period.

GCON Government Consumption expenditures.

GCR Federal Government capital Reserves

GDCP Statutorily prescribed Growth Rate of Commercial bank credit to the private sector.

GGC Federal Government capital expenditure on the General Commerce sector.

GG Federal Government capital expenditure on the Government sector.

GM Federal Government capital expenditure on the manufacturing sector

GM2 Growth Rate of the broader definition of money (M2).

GMQ Federal Government capital expenditure on the mining and Quarying sector.

GS Government Securities held by the Commercial bank.

GTC Federal Government capital expenditure on the Transport and Communication sector.

GO Federal Government capital expenditure on the other sectors.

GR Total Federal Government Revenue

GU Federal Government capital expenditure on the Utilities sector.

IDT	Indirect Taxes
IM	Total imports
IMP	Ratio of import price index to price index of GDP
IMPX	Import price index
INVG	Total Government investment expenditures
INVP	Total private sector investment expenditure
M1	Narrow definition of money supply, that is, the sum of currency and demand deposits.
M2	Broader definition of money supply to include time and savings deposits.
PA	Price deflator for the Agricultural sector
PBC	Price deflator for the Building and Construction sector.
PEX	Ratio of export price index, to GDP price index, as a measure of relative price.
PG	Price deflator for the Government sector
PGC	Price deflator for the General Commerce Sector
PM	Price deflator for the manufacturing sector.
PMQ	Price deflator for the Mining and Quarying sector.
PO	Price deflator for the Other sectors

PTC	Price deflator for the Transport and Communication sector.
PU	Price deflator for the Utilities sector
QP	Quantity of crude petroleum produced in millions of barrels
RLA	Required Liquid Assets of the commercial banks
RP	Prime Lending rate
RS	Savings Deposit rate
RT	Time Deposit rate
SD	Savings Deposits with the Commercial banks
TBR	Treasury Bill Rate
TCR	Treasury Certificate Rate
T	Total Taxes
TD	Time Deposits with the Commercial banks
TINV	Total investment expenditures
TLA	Total Liquid Assets held by Commercial banks.
VC	Total Vault Cash held by Commercial banks.
X	Total exports.
XO	Export of other sectors apart from the petroleum sector.
XP	Value of Petroleum export in millions of naira.
XPP	Unit export price of petroleum (₦ per barrel).

Y	Gross Domestic Product (GDP) (Nominal).
Y2	Change in GDP
YA	Output of the Agricultural sector
YA2	Change in output of the Agricultural sector
YBC	Output of the Building and Construction sector.
YBC2	Change in the Output of the Building and Construction sector
YD	Disposable income
YGC	Output of the General Commerce Sector.
YGC2	Change in the Output of the General Commerce Sector
YG	Output of the Government sector
YG2	Change in the Output of the Government.
YM	Output of the manufacturing sector
YM2	Change in the output of the manufacturing sector
YMQ	Output of the Mining and Quarying sector.
YMQ2	Change in the Output of the Mining and Quarying sector.
YO	Output of the Other sectors.
YO2	Change in the output of the other sectors.

YOTH	Gross Domestic output of other sectors apart from the petroleum sector.
YTC	Output of the Transport and Communication sector.
YTC2	Change in the output of the Transport and communication sector.
YU	Output of the Utilities sector.
YU2	Change in the output of the Utilities sector.
YUSEEC	Average per capita income of USA and the EEC countries as a proxy for external demand.
Z	Proxy for degree of monetization, defined as the ratio of demand deposits to money stock (M1).

APPENDIX II

SIMULATION STATISTICS

VARIABLE	THEIL'S INEQUALITY	BIAS PROPORTION	VARIANCE PROPORTION	COVERIANCE PROPORTION
CH	0.1697	0.0165	0.1432	0.8403
DD	0.1012	0.0149	0.0451	0.9400
SD	0.1872	0.0304	0.0492	0.9204
TD	0.1385	0.1991	0.2276	0.5733
DCP	0.1006	0.0609	0.1256	0.8135
VC	0.1805	0.1079	0.1712	0.6409
ELQA	0.1575	0.0325	0.0312	0.9363
GS	0.1621	0.0247	0.0549	0.9204
YA	0.0940	0.0069	0.0296	0.9635
YM	0.0861	0.0025	0.0411	0.9564
YMQ	0.1317	0.0112	0.1017	0.8871
YBC	0.0988	0.0079	0.0753	0.9168
YTC	0.1144	0.1454	0.1322	0.7224
YGC	0.1770	0.0177	0.0522	0.9301
YG	0.1759	0.2963	0.0006	0.7031
YU	0.1327	0.0034	0.0475	0.9491
YO	0.0772	0.0001	0.0188	0.9811
CP	0.0492	0.0517	0.0017	0.9466
GCON	0.1019	0.2359	0.0991	0.6650
INVP	0.3062	0.1181	0.0368	0.8451
INVG	0.1397	0.2192	0.0998	0.6810
DT	0.1327	0.0071	0.1362	0.8567
IDT	0.1244	0.0088	0.0204	0.9707
IM	0.2635	0.0084	0.1521	0.8395
XP	0.0750	0.1365	0.0000	0.8635
XO	0.2501	0.0015	0.2162	0.7823

APPENDIX II (CONT'D)

VARIABLE	THEIL'S INEQUALITY	BIAS PROPORTION	VARIANCE PROPORTION	COVERIANCE PROPORTION
PA	0.1537	0.2614	0.1237	0.6149
PM	0.0520	0.0217	0.1485	0.8198
PMQ	0.1242	0.1309	0.2678	0.6013
PBC	0.1449	0.0712	0.1006	0.8282
PTC	0.0528	0.2706	0.0193	0.7101
PGC	0.0325	0.2077	0.2743	0.5179
PG	0.0453	0.1896	0.0322	0.7782
PU	0.0995	0.0141	0.1406	0.8453
PO	0.0880	0.0134	0.1030	0.8836
CPI	0.0680	0.0120	0.2097	0.7782
RLA	0.0251	0.0074	0.0199	0.9727
M1	0.2023	0.1701	0.0153	0.8146
M2	0.0953	0.0814	0.1028	0.8158
D	0.0677	0.0002	0.1715	0.8282
TLA	0.0884	0.0038	0.2644	0.7317
AGDCP	0.1128	0.0650	0.6164	0.3186
GM2	0.2341	0.5177	0.1005	0.3818
DCP2	0.0619	0.0472	0.1898	0.7630
Z	0.1159	0.1072	0.0491	0.8437
Y	0.0849	0.0016	0.1365	0.861
Y2	0.0533	0.0216	0.1165	0.8619
YA2	0.0842	0.0046	0.0579	0.9375
YM2	0.0769	0.0053	0.0276	0.9671
YMQ2	0.0436	0.0107	0.1795	0.8098
YBC2	0.1008	0.0893	0.0125	0.8982
YTC2	0.2155	0.1725	0.113	0.7162
YGC2	0.0917	0.0276	0.0147	0.9577

APPENDIX II (CONT'D)

VARIABLE	THEIL'S INEQUALITY	BIAS PROPORTION	VARIANCE PROPORTION	COVERIANCE PROPORTION
YG2	0.1938	0.2001	0.0081	0.7918
YU2	0.0603	0.0447	0.0216	0.9337
YO2	0.1221	0.0039	0.0141	0.9820
CONS	0.1297	0.1048	0.0917	0.8035
YD	0.0553	0.0029	0.0105	0.9866
TINV	0.2262	0.2701	0.1389	0.5910
T	0.0846	0.0138	0.0733	0.9129
X	0.2263	0.1511	0.1103	0.7386
DP	0.1128	0.0209	0.0007	0.9784

APPENDIX III

SENSITIVITY RESULTS

VARIABLE	INEQUALITY COEFFICIENT 1970 - 1985	INEQUALITY COEFFICIENT 1975 - 1985	% Difference
CH	0.1697	0.1710	-4.30
DD	0.1012	0.1003	0.88
SD	0.1872	0.1944	-3.84
TD	0.1385	0.1367	1.29
DCP	0.1006	0.1053	-4.67
VC	0.1805	0.1794	0.61
ELQA	0.1575	0.1553	1.39
GS	0.1621	0.1534	5.36
YA	0.0940	0.0891	4.36
YM	0.0861	0.0855	0.69
YMQ	0.1317	0.1377	-4.50
YBC	0.0988	0.0996	-0.81
YTC	0.1144	0.1120	2.09
YGC	0.1770	0.1753	0.96
YG	0.1759	0.1879	-6.82
YU	0.1327	0.1324	0.23
YO	0.0772	0.0781	-1.16
CP	0.0492	0.0491	0.20
GCON	0.1019	0.0949	6.86
INVP	0.3062	0.2954	3.53
INVG	0.1397	0.1497	-7.15
DT	0.1327	0.1311	1.20
IDT	0.1244	0.1288	-3.53
IM	0.2635	0.2530	3.98
XP	0.0750	0.720	4.00

APPENDIX III (CONT'D)

VARIABLE	INEQUALITY COEFFICIENT 1970 - 1985	INEQUALITY COEFFICIENT 1975 - 1985	% DIFFERENCE
XO	0.2501	0.2626	-4.99
PA	0.1537	0.1634	-6.31
PM	0.0520	0.0515	0.96
PMQ	0.1242	0.1118	9.98
PBC	0.1449	0.1421	2.00
PTC	0.0528	0.0566	-7.19
PGC	0.0325	0.0266	18.15
PG	0.0453	0.0458	-1.10
PU	0.0995	0.0986	0.90
PQ	0.0880	0.0872	0.91
CPI	0.0680	0.0686	-0.88
RLA	0.0251	0.0242	3.58
M1	0.2033	0.1933	4.90
M2	0.0953	0.0988	-3.67
D	0.0677	0.0671	1.03
TLA	0.0994	0.0901	9.45
AGDCP	0.1128	0.0817	27.57
GM2	0.2341	0.3275	-39.89
DCP2	0.0619	0.0638	-3.06
Z	0.1159	0.1110	4.27
Y	0.0849	0.0841	0.94
Y2	0.0533	0.0553	-3.75
YA2	0.0842	0.0802	4.70
YM2	0.0769	0.0766	0.30
YMQ2	0.0436	0.0425	2.00
YBC2	0.1008	0.0994	1.38
YTC2	0.2155	0.2256	-4.68

APPENDIX III (CONT'D)

VARIABLE	INEQUALITY COEFFICIENT 1970 - 1985	INEQUALITY COEFFICIENT 1975 - 1985	% DIFFERENCE
YGC2	0.0917	0.0898	2.07
YG2	0.1938	0.1845	4.79
YU2	0.0603	0.0616	-2.15
YO2	0.1221	0.1214	0.57
CONS	0.1297	0.1276	1.62
YD	0.0553	0.0545	1.44
TINV	0.2262	0.2544	-12.46
T	0.0846	0.0838	0.90
X	0.2263	0.2160	4.50
DP	0.1128	0.1166	-3.30