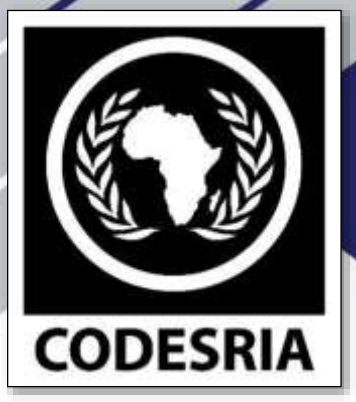

Dissertation

By

CHIMBA, Reginald Ikechukwu

DEPARTMENT OF ECONOMICS
UNIVERSITY OF NIGERIA, NSUKKA_

An econometric study of the relative impact of fisca and monetary policies on economic stabilization in Nigeria: 1960-1989

NOVEMBER, 1990

AN ECONOMETRIC STUDY OF THE RELATIVE IMPACT OF FISCAL AND MONETARY POLICIES ON ECONOMIC STABILIZATION IN NIGERIA, 1960 - 1989

BY

CHIMA, REGINALD IKECHUKWU
REG. NO. PG/M.Sc./89/7683

DEPARTMENT OF ECONOMICS
UNIVERSITY OF NIGERIA, NSUKKA

NOVEMBER, 1990

APPROVAL

SUPERVISORS

.....

DR O. E. OBINNA

.....

DR C. C. AGU

INTERNAL EXAMINER

.....

DR. O. E. OBINNA

.....

DR C. C. AGU

EXTERNAL EXAMINER

.....

HEAD OF DEPARTMENT

.....

DR O.E. OBINNA

DEPARTMENT OF ECONOMICS
UNIVERSITY OF NIGERIA NSUKKA

DEAN OF FACULTY

.....

PROFESSOR J. C. NWAFOR

AN ECONOMETRIC STUDY OF THE RELATIVE IMPACT OF FISCAL AND MONETARY POLICIES ON ECONOMIC STABILIZATION IN NIGERIA, 1960 - 1989

A PROJECT REPORT SUBMITTED TO THE DEPARTMENT OF ECONOMICS, UNIVERSITY OF NIGERIA, NSUKKA, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR AN AWARD OF THE DEGREE OF MASTER OF SCIENCE IN ECONOMICS

BY

CHIMA, REGINALD IKECHUKWU

REG. NO. PG/M.Sc/89/7683

DEPARTMENT OF ECONOMICS

UNIVERSITY OF NIGERIA, NSUKKA

NOVEMBER, 1990

DEDICATION

This study is dedicated to my youngest sister, Queen Priscillia Iheoma Chima for her love and dedicated prayers to God and for me.

ACKNOWLEDGEMENT.

My appreciation goes to the Council for the development of economic and social research in Africa, CODESRIA for their research grant which aided the preparation of this project. I am immensely indebted to the head of my department and chief supervisor of this project, Dr. O.E. Obinna and Dr. C. C. Agu, my alternate supervisor for their thorough and close supervision of this project. Their contribution to the arrangement of this project accounts for the high level of professionalism evident in this project.

My gratitude also goes to the academic staff of the department of economics whose reaction in the proposal and final report of this project provided the guidance and support needed in the arrangement and preparation of this project. My thanks also goes to Professor S.I. Ajayi for his illuminating discussion with me on the justification and objectives of this project. Also I am indebted to Dr. C. C. Soludo of the Brookings Institute USA for his guidance on the extensive application of econometric methods in this project. I thank the staff of the Central Bank of Nigeria Owerri currency area, the Nnamdi Azikiwe Library for the provision of the needed journals and data for this project. I shall not fail to thank Mrs Okoye of

the University of Nigeria Computing Centre for her assistance in writing the program for the regression experiments for the computer. I thank my dearly beloved parents, His Royal Highness Eze Leonard Chima Onyeanu and Lolo Priscillia Chima Onyeanu for their effort to see me through my Master of Science degree in Economics. I thank my friends, brothers Okey Orji, Austin Otuokere, Robert Asogwa Jude Mbanasor and Vivian Ochieze for their encouragement. The typist of this project Mr. C. S. Osuagwu is not left out in my heart felt appreciation for his diligence in typing the original manuscript of this project. Most of all, I thank my God, the Almighty who blessed me with such knowledge that is above human understanding; to Him be the glory.

R. I. Chima.

TABLE OF CONTENTS

LIST OF TABLES

ABSTRACT

Efforts to bring under control, cyclical fluctuations in economic activity have been largely elusive in the Nigerian economy. Stagflation has been a persistent problem in Nigeria since 1960. Fiscal and monetary policies are stabilization policies which are considered relevant in the battle against disequilibria in the economy, alternately or as a mix. The focal problem of this research is to investigate the relative impact of alternative stabilization policies - fiscal and monetary - on economic activity with the view to bringing about economic stabilization. Previous empirical studies have investigated this subject based on the evaluation of one or two hypotheses within a time span of about 10 years. These hypotheses are investigations on the relative magnitude of impact and the predictability of the response of economic activity - gross domestic product - to fiscal and monetary policies. The present study investigates the subject on the basis of three hypotheses which includes a further investigation on the time pattern of the relationship between economic activity and fiscal and monetary policies - the speed and time of impact. Also this study is made within a longer historical time span 1960-1989.

Amidst three alternative methods of study the single equation model is chosen as the operative model used in

this research. However, this study introduces distributed lags to the model and the ordinary least square technique is used to estimate the functional relationships between gross domestic product and fiscal and monetary variables respectively. Evidently, this technique is considered weak in the subsequent case of estimating the time pattern of the relationship between gross domestic product and fiscal and monetary variables respectively. However, the Stock Adjustment model is employed as a suitable econometric technique to estimate the speed of adjustment while the Half-lives are computed to aid the analysis of the speed and time of impact of these alternative stabilization policies.

It is found that monetary policy has greater impact on economic activity, it is more predicatable and reacts on economic activity faster than fiscal policy. However, this study does not nullify the potency of fiscal policy, rather, it offers empirical explanation for the reasons for greater faith in the effectiveness of monetary policy in bringing about desired changes to stabilize the economy of Nigeria.

CHAPTER ONE

INTRODUCTION

Developments in Economic Theory show a number of independent forces which influence disequilibria in macro-economic aggregates such as prices, interest rates and output. These independent forces include fiscal policy and monetary policy otherwise known as stabilization policies. Random events such as the outbreak of war, strikes in key industries also exert other influences. Monetary policy is the management of the expansion and contraction of the volume of money using central bank's discretionary and selective instruments of policy to achieve the desired objectives of general economic policy (Uzoaga, 1985, p. 161). Also fiscal policy is the government's management of the economy by varying the size and content of taxation and public expenditure for achieving specific objectives such as economic stabilization and growth (Obinna, 1985, P. 54). The measures of monetary policy employed in this research are the monetary base which is the sum of currency in the hands of the non bank public and the reserves of the banking system; the money stock M_1 which is the sum of currency and demand deposits of the non bank public; money stock M_2 which is the sum of M_1 and quasi money. The measures of fiscal policy employed

are government revenues and expenditures including their residual otherwise known as budget deficits or surpluses. A random event employed in this research is the influence of the Nigerian civil war 1967-1969. The gross domestic product GDP is used in this research as the measure of economic activity. It consists of total output of goods and services by households, businesses and government.

However, fiscal policy and monetary policy are two policies which are applied as mutually complementary instruments of economic policy, to achieve economic stabilization. Although there is often considerable overlap between fiscal and monetary policies, because it is almost impossible to envisage any major fiscal or monetary measure which does not affect the other; yet it is necessary to evaluate fiscal operations separately from monetary operations in order to circumscribe the scope of both policies as instruments of economic stabilization. Thus this research, essentially is an investigation into the relative impact of fiscal and monetary policies on economic stabilization in Nigeria within the period 1960-1989 and with particular reference to the periods 1960-1969 and 1970-1989.

1.1 Background to the Statement of Problem.

While it is generally accepted that the two policy tools - fiscal and monetary policies - are relevant, opinions differ as to the relative impact of both on economic stabilization (Ajayi, 1974, P. 559).

Extreme monetarists are of the opinion that:

1. the state of the government budget by itself has no significant effect on the course of nominal income, on inflation, deflation or cyclical flunctuations; while the rate of change of money supply by itself has a very important effect on nominal income and prices in the long-run and on nominal and real income in the short-run (Friedman, 1969).
2. the myth about the ineffectiveness of small temporary changes in income taxes threaten to rob fiscal policy of its most legislatively feasible and socially acceptable tool for combating economic fluctuations (Okun, 1972).
3 that monetary influences dominate fiscal influences on economic activity in all periods except in times of war (Keran, 1969, P.15).
4. monetary policy is powerful because it acts quickly, without a long time lag. It is reversible and easily manipulated (Vaish, 1977, P. 358).

On the other hand extreme fiscalists are of the opinion that:

1. variations in government expenditures on goods and services remain a direct and highly potent factor for economic stabilization. This is because government investiment and consumption expenditures are prime weapons in the war against depression and they take analogous importance in the struggle against inflatation (Eisner, 1969).
2. In a situation where the conventional roles of monetary policy do not work and the fiscal policy activities of government are dominant, the efficacy of the traditional monetary policy particularly in less developed economies where the money market is not developed becomes questionable (Okah, 1985).
3. Since the main problem of the developing countries is that of effective demand, fiscal policy is more suited to meeting that problem because it makes a more direct intervention from the demand side than from the rather uncertain supply side (Sethi, 1961).
4. Fiscal policy could bring about changes in private demand through substitution effect induced by changes in relative prices which monetary policy could not do; hence monetary measures by their nature are incapable by themselves of having an effect sufficiently prompt

and far reaching for their purpose (Newlyn, 1962).

However, amidst these extremes are some policy makers and professionals who are of the opinion that:

1. Fiscal and monetary policies are interdependent because of the existence of the government budget restraint.
2. Since government policy variables - fiscal and monetary - are subject to a budget restraint, the effect of a change in any single policy variable depends on how other variables are varied in order to satisfy the budget restraint.
3. The effects of fiscal policy depend on how deficit financing is divided between printing money and borrowing from the private sector (Christ, 1967).
4. The possible alternative is the joint contemporaneous state of fiscal and monetary policies otherwise known as the fiscal - monetary policy mix (Brimmer and Sinai, 1986).

In any case, the criteria by which a stabilization policy may be evaluated are its capability to induce movements in aggregate demand, its flexibility in administration and its swiftness in producing desired effects (Vaish, 1977).

1.2 The Statement of the problem.

Evidently this fiscalist/monetarist controversy is no longer new in economic theory. Essentially, the existing line of agreement is the joint contemporaneous state of both policies otherwise known as the fiscal - monetary policy mix. This is usually specified as the tight fiscal - tight monetary policy, the easy fiscal - tight monetary policy, the tight fiscal - easy monetary policy and the easy fiscal - easy monetary policy. The basis for the adoption of this concensus is the case for the implications of the government budget restraint for fiscal and monetary policies respectively.

Apparently, inspite of the relevance of this concensus in the achievement of economic policy objectives, the set goal of economic stabilization is largely unachieved. Obviously, the Nigerian economy suffers the twin problems of unemployment and inflation, and this has rather been attributed to the inadequacy and underdevelopment of the nation's financial interrelations, financial institutions and financial instruments (Agu, 1988). These problems fraustrate efforts to predict or estimate the impact of fiscal and monetary policies on economic activity.

Also, an understanding of the nature and magnitude of disequilibria in the Nigerian economy since 1960 induces

a need for an up-to-date study of the relative impact of alternative stabilization policies on economic activity in Nigeria since 1960. For example, since 1960 certain developments such as the Nigerian civil war, 1967 - 1969, the oil boom 1970 - 1975, the Udorji salary increases 1974/75, the various changes in tax policy including the monetisation of the nations petroleum resources have characterised the Nigerian economy. The implcations of these developments upon the growth of domestic output and the efficacy of monetary and fiscal policies in achieving the goal of economic stabilization warrant an indept study of the relative impact of these alternative stabilization policies on economic activity.

However, Shapiro (1967) contends that if instruments of fiscal control are to have any influence on economic stabilization, they must not only be able to induce movements in the components of aggregate demand, but also, the effects of a particular policy action upon aggregate demand and the time pattern of response of this relation to the instruments of fiscal and monetary policies must be estimated. This means that if fiscal and monetary policies are to be used as tools for cyclical stabilization, the speed with which they operate on their target is a crucial factor in such considerations. Therefore, the

explicit problems which this research has addressed are:

1. What is the relative magnitude of influence of fiscal policy and monetary policy on economic activity in Nigeria?
2. To what extent can one predict the response of economic activity to fiscal and monetary policies respectively?
3. How long does it take fiscal policy and monetary policy to influence economic activity respectively?

Importantly, it is our contention that when we profer answers to these explicit problems we would be in a better position to advocate an appropriate policy approach to the stabilization problems of the Nigerian economy.

1.3 The Objectives of the study.

Perhaps we need to indicate here that few studies on this subject, with respect to Nigeria came to our notice. These are, Ajayi, (1974), Ubogu (1985), and Odedokun (1988). These studies shed some light on the relative effectiveness of monetary and fiscal policies and they reached the same conclusion that monetary policy is stronger than fiscal policy particulary in high income countries than in low income countries. Nevertheless, there is still the need to either validate or refute their findings using data which covers a longer period of time 1960 - 1989, and

a somewhat different methodology with distributed lag values. This is what our present study sets to accomplish hence, the explicit objectives of this research are:

1. To find the relative magnitude of impact of fiscal and monetary policies on economic activity.
2. To find the predictability of the response of GDP to fiscal and monetary policies respectively.
3. To find the speed of impact of fiscal and monetary policies on economic activity.

1.4 The Scope and Limitations of the Study.

The period covered by this research is the thirty-year period 1960-1989. This choice is guided by the fact that the various measures of fiscal and monetary action employed in this research, are operational in the Nigerian economy during the specified period. Also other considerations such as the implications of the Nigerian civil war 1967-1969, the boom of the 1970s, the depressing effects of economic recession in the 1980s and the availability of data on the relevant variables, guided our choice.

This research essentially, is an up-to-date study of the relative impact of fiscal and monetary policies on economic stabilization using a dynamic single equation model with distributed lags. The peeling of the various measures of fiscal policy by the subtraction of transfers

(to international organisations such as the UNO, OAU etc and external debt - servicing) is to enable us delineate the actual amount of government expenditure made within the domestic economy. The other limitations of this study are basically statistical. The exogeniety of the independent variable, required by the operative model of this research raises controversy over the inclusion of the monetary variables particularly the monetary base as independent variables. Also the statistical limitations are congruent with the size of the model and its inability to capture the transmission mechanism and the links between all the sectors of the economy. Finally, the use of the gross domestic product GDP rather than the gross national product GNP as a proxy for economic activity is for convenience and serves to solve the problems of this research. Finally, the data may not be too reliable.

1.5 Organisation of the Research.

Chapter one is the introductory chapter. It has an introductory statement, the background to the statement of problems; the statement of problem, the justification and objectives of the study are included in this chapter. Chapter two highlights the theoretical framework which provides a theoretical base for this study to despel any tendency for abitrariness. Chapter three is a review of empirical literatures, their limitations and the statement

of hypotheses. Chapter four, treats the methodology of this research. It highlights the alternative methods of study, the choice of the model and its behavioural assumptions. The specification of the model, estimation procedure and the techniques of evaluation of results are included in this chapter. Also the data requirements and sources of data are included in this chapter. The results of the econometric estimation are presented in chapter five where the various statistical tests are also conducted. The speed of adjustment and the computation of the half-lives forms part of this chapter. Chapter six highlights the analysis of the regression results while in chapter seven, the implications of the results for monetary policy, fiscal policy and economic stabilization are delineated. Conclusions are drawn and policy recommendations are made.

CHAPTER TWO

THE THEORETICAL FRAMEWORK.

To set the theoretical base for this research, three alternative theories which are relevant to this study are reviewed. These are the Keynesian theory, the theory of real balance or wealth effect and Milton Friedman's reformulation of the quantity theory as a theory of the demand for money.

2.1 The Keynesian theory.

The Keynesian theory suggests that monetary policy would be an ineffective cure for umemployment and recession for two reasons. First, monetary injections might be absorbed immediately into idle hoards without lowering interest rates sufficiently to stimulate investment spending. This conclusion is based on Keynes' theory of an absolute preference for liquidity at low interest rate levels otherwise known as the liquidity trap doctrine. The doctrine of the liquidity trap states that under certain circumstances such as a severe depression characterised by an abnormally low rate of interest and by virtually unanimous expectations of capital losses owing to anticipated rises in bond yields and declines in bond prices idle cash balances become perfect substitutes for bonds in

wealthholders' portfollios. That is, when the anticipated capital loss on bonds is large enough to at least offset the low current interest return, there would be no inherent advantage to holding bonds rather than zero-yield cash. Consequently, the quantity of money demanded would become insatiable, that is, infinitely sensitive to the slightest change in the rate of interest. In this liquidity trap case, only minute reductions in interest rates would be necessary to induce portfolio optimizers to hold virtually any amount of additional cash injected into the system. Increases in the money supply, therefore would be ineffective in reducing interest rates and thus in stimulating investment spending because the new money may simply disappear into idle hoards.

Second, Keynes argued that if monetary injections were successful in lowering market rates, those injections still would not stimulate economic activity if investment spending was unresponsive to changes in interest rate. To summerize, Keynes argued that either a liquidity trap or an interest insensitive investment expenditure scheduled ineffective in a depression could render a monetary expansion (Keynes, 1936). However, Keynes further argued that the income - expenditure approach was a superior analytical model to the quantity theory.

Expectedly, this model emphasised the determinants of expenditure rather than the quantity of money. Moreover, it stressed a non-monetary adjustment mechanism otherwise known as the income multiplier, rather than the direct and indirect monetary linkages. Specifically Keynes argued that there is a multiplier relationship between autonomous expenditure (otherwise known as non-income induced expenditures such as government outlays for armaments and public works projects) and income.

Humphrey (1974, P. 14) asserts that the chief policy implication of the Keynesian income - expenditure analysis is that fiscal policy would have a more powerful impact on income and employment than would monetary policy. Accordingly, K$_e$ynesians argue that greater reliance should be placed on government budgetary (tax and expenditure) policy rather than on monetary policy to stabilize the economy. P$_o$st-K$_e$ynesian extentions argue that attempts to induce changes in aggregate demand through monetary control measures are futile in a financial system that can economise on money by producing an array of money substitutes. They further argued that attempts to reduce inflation through contraction of money supply could be

fraustrated by a compensatory increase in money sub-stitudes, which in the equation of exchange would appear as a rise in the velocity of money.

2.2 The theory of real balance or wealth effect.

The theory of the real balance effect is used to demonstrate that money matters at least in principle, even in the extreme Keynesian case where the interest rate channel is blocked by a liquidity trap and an interest - insensitive investment spending schedule. The real balance argument weakened the Keynesian propositions, in favour of monetary policy. It casts doubt on the Keynesian view of money as a specific substitute solely for bonds because it emphasises the relation between real balance and spending, thus suggesting that money is a general substitute for a wide range of goods and services. Finally, it suggests that the Keynesian view of the monetary transmission mechanism is seriously incomplete. According to the real balance argument, prices would fall in a depression thereby raising the purchasing power of wealth held in money form. The price-induced rise in the real value of cash balances would then stimulate spending directly until full capacity utilization had been attained. As the wealth effect operates independently of changes in interest rates, closure of the indirect channel would not prevent the

restoration of full employment. This argument proves the potency of monetary policy even in a depression (Wonnacott, 1984, P. 162).

2.3 The quantity theory of money: a restatement.

Friedman (1956, P.3) believes that the demand for money is highly stable. H_e regards the demand function for money more stable than the $K_e$ynesian consumption function. But his belief in the high stability of the demand for money does not mean that the real quantity of money demanded per unit of output or the velocity of circulation of money is constant over time. Thus a rapid increase in the velocity of money during inflation is no contradiction of the stability of the demand for money if the function includes a variable $r_e$fering to expected price changes. The stability which he expects lies in the functional relation between the quantity of money demanded and the variables which determine it. Therefore a sharp rise in velocity of money during inflation is entirely consistent with a stable functional relationship. This countermands Keynes liquidity trap doctrine which is built around the notion that the demand for money function is unstable. Essentially, the modern quantity theory of money concludes that the impact of money on economic activity is overwhelming. He recommends that discretionary stabilization policy should be abandoned in favour of a rigid

monetary rule whereby the money supply grows at a fixed percentage rate corresponding to the long term growth rate of real output (Humphrey, 1974 P. 15).

CHAPTER THREE

LITERATURE REVIEW AND STATEMENT OF HYPOTHESIS

3.1 Empirical Literature.

Empirical attempts at resolving the controversy about the relative impact of fiscal and monetary policy on economic activity, have been divergent and conflicting in their statistical methods and approaches to the subject.

According to Saunders and Taylor (1976, p. 186) the relative impact of fiscal and monetary policies can be seen most clearly by taking total differentials of the fiscal and monetary equations respectively and solving for the change in equilibrium income. This produces a reduced form equation which relates changes in government expenditure and money stock to changes in gross national product through constant multipliers. They stated that the numerical values of both the fiscal multiplier and the monetary multiplier are crucial to the effective operation of stabilization policy, monetary or fiscal. Furthermore, empirical research in this area has taken two different methodological approaches. The first is the friedman - Mieselman approach which attempted to calculate the value of monetary and fiscal multipliers directly from a reduced form equation which sought to determine whether consumption

was more responsive to a change in money supply or autonomous government expenditures. In otherwords, the aim of the study was to find out which policy instrument monetary or fiscal was more powerful in affecting economic activity. The result of their study showed that a stable and predictable relationship existed between money stock and aggregate demand while no such relationship was observed for autonomous government spending. The simplicity of this approach being that it does not require any specific view of the transmission mechanism between money stock and income changes (Friedman and Mieselman, 1963).

Another approach which is an estimation of separate structural equation for different sectors of the macroeconomy. This alternative approach was first published in the work of De-leeuw and Gramlich (1969) and is otherwise known as the Federal Reserve Board - Massacheussetts Institute of Technology (FRB/MIT) model. This study was the first large-scale economy wide econometric model employed in an attempt to find the relative impact of fiscal and monetary policies on economic activity. The simulation exercise carried out with this model showed that monetary policy exerts a larger impact on the aggregate level of income than fiscal policy.

In addition, the authors found that monetary policy works more slowly than fiscal policy even though the former is more powerful in affecting the level of income.

Andersen and Jordan (1968) studied the empirical relationships between the measures of fiscal and monetary actions of government and total spending. These relationships were studied by regressing quarterly change in gross national product on quarterly changes in money stock and in the various measures of fiscal action. Also similar studies were conducted using the monetary base instead of the money stock. However, the result of these studies inferred that monetary policy is move depdndable in the drive towards economic stabilisation.

Deleeuw and Kalchbrenner (1969) disagreed with this conclusion reached by Andersen and Jordan (1968). They questioned the exogeniety of the monetary base and went ahead to redefine it as the sum of unborrowed reserves, reserves and currency. Against this background, Deleeuw and Kalchbrenner proposed, on statistical criteria only, using unborrowed reserves rather than money supply or the monetary base as a measure of monetary action. In another study, Keran (1969) considered the issue of relative impact of fiscal and monetary policies on economic activity, on a longer historical context, using data spanning over fifty years. His aim was to find out

whether monetary influences dominated economic activity in the United States in periods when financial and institutional factors were different, and the general economic outlook was substantially depressed. Keran's results showed that monetary influences were superior to fiscal influences on economic activity in all the periods considered except for the years covering the second world war. Furthermore, Keran (1970) studied the relative effectiveness of fiscal and monetary influences based on data from seven foreign countries and the United States. He adopted the same methodology as in his earlier study. In all the eight countries studied, Keran found that monetary measures exerted more influence on the level of economic activity than fiscal measures. In addition, Teigen (1975) in his study of three Scandinavian countries (Denmark, Finland and Norway) attempted to ascertain empirically which of the two instruments - fiscal and monetary - is relatively a more effective stabilisation policy measure. However, in all the three countries studied, Teigen observed that fiscal actions dominated economic activity. This finding contridicted earlier research on this subject. Lybeck and Teigen (1975) jointly conducted another study using Swedish data. They also adopted the methodology of the Andersen and Jordan study.

Unlike the results of earlier research on this subject their findings were inconclusive as to which of the two policy instruments has stronger influence on gross domestic product. Furthermore, they indicated that their results depended on whether or not a constant term was included in the regression equation and on whether or not correction for auto-correlation in residuals was made. The imposition of a constant term, for example, reduced the performance of fiscal impulses while those of monetary actions improved. The results shifted remarkably in favour of fiscal policy when correction was made for autocorrelation. However, they found that for a longer time period, fiscal instruments dominated while monetary instruments proved relatively superior over shorter time span.

In another study Ajayi (1974) undertook an econometric case study of the relative importance of monetary and fiscal policy in Nigeria, 1960 to 1970. He applied the St Louis model to Nigerian time series data. Apparently, he regressed nominal changes in gross domestic product on changes in five different measures of fiscal and monetary influences. These include the money stock described as M_1 which is the sum of currency and demand deposits, M_2 which is the sum of M_1 and quasi money, M_3 which is the sum of currency outside the banking system and total commercial

bank deposits, high powered money or monetary base H, which is the sum of currency and reserves; H * which is the sum of H and treasury bills outside the central bank. The fiscal variables include high employment budget surplus, full-employment tax revenue, government current and capital expenditures. Compressing the explanatory variables into three namely, changes in government expenditure, revenue and money supply; he regressed changes in gross domestic product on them. The results of his work showed that monetary variables performed better than fiscal variables in influencing economic activity in Nigeria. However, this result casts doubt on the undue emphasis that was placed on fiscal policy in Nigeria till about 1970. In recent years, the importance of money for economic activity has become more apparent since the era of petroleum revenue and its attendant effect on policy and such economic variables as prices and output (Ojo and Ajayi, 1981).

Ubogu (1985) studied the potency of fiscal and monetary instruments on economic activities of fifteen African countries. H_e applied the single equation or St. Louis model on annual time series data from these countries.

The overall findings of his study are that changes in monetary policy tend to exert much impact on economic activity of middle income African countries such as Nigeria, while fiscal policy instruments tend to be more potent in effecting changes in economic activity of low income African countries.

Finally, Odedokun (1988) studies the impacts of fiscal variables, financial variables and composition of financial aggregates on Nigerian economy. He concluded that empirical results of his study suggest that monetary and credit policies are more potent on the economic activity than the fiscal policy.

3.2 Limitations of previous studies.

Excluding Andersen and Jordan (1968) and Keran (1969) most of the studies reviewed tested one out of the three major hypothesis which could validate or refute various hypothetual propositions on the relative impact of alternative stabilization policies on economic activity. Essentially, they concentrated their investigation on the computation of beta coefficients as a statistical tool for finding the relative magnitude of influence of fiscal and monetary policies. Also excluding Ajayi (1974) none of the studies based on Nigeria tested the predictability

of the response of gross domestic product to monetary and fiscal policies in economic stabilization. Furthermore, Ajayi (1974) did not specify a dynamic model hence he did not introduce distributed lags to the system. Although Ubogu (1985) and Odedokun (1988) introduced distributed lags into the single equation model, they did not go on to find the speed of impact of fiscal and monetary variables on gross domestic product. Apparently, the technique used by Andersen and Jordan (1968) to evaluate the speed of impact of the alternative stabilization policies on economic activity is considered to be quite mechanical and outdated. There are current dynamic models to undertake such tests, for example, the stock adjustment model and the computation of half-lives. Besides, one common limitation of all these studies emanates from the specification of their operative model which requires that the independent variables be exogenously determined. This has generated controversy over the eligibility of the monetary base as an exogenous variable. Finally, most of these studies did not consider the implications of the 'transfers' component of both current and capital expenditures of the government. However, it is erroneous to include transfers into the expenditure

variable of fiscal policy. This is because transfers such as payments of international obligations outside the economy of Nigeria, transfer of funds to international bodies such as the United Nations, the Organisation of African Unity (OAU) etc do not constitute part of the actual expenditures of the government on the domestic economy of Nigeria. Also debt service charges or debt retirement and relief funds to international financial institutions and poor neighbouring countries respectively do not constitute actual expenditures within the domestic economy of Nigeria. Finally, the previous studies on Nigeria are limited to ten-year periods which is considered too short for this study.

3.3 The Statement of hypotheses.

Drawing from our stated problems, objectives and the limitations of previous studies, this research is guided by the following hypotheses:

1. Fiscal policy exerts a greater impact on the gross domestic product, than does monetary policy in Nigeria.
2. The response of the gross domestic product to fiscal policy is more predictable than its response to monetary policy in Nigeria.
3. Fiscal policy influences the gross domestic product, faster than monetary policy.

CHAPTER FOUR

METHODOLOGY.

4.1 Alternative methods of the study

The 1S - LM model

This model specifies that macroeconomic performance can be controlled either by changing the money supply in the financial market or by changing government's demand for goods and services and tax policies in the product market. Let us consider an economy's macroeconomic framework with the following functions as components of the product market (leonard, 1979, P. 304).

$$AD_t = (1 - z)(C_t + 1_t + G_t + X_t) \quad (1)$$

$$C_t = m\ (D1_t) + a\ (C_t-1) \quad (2)$$

$$I_t = A1_t + v\ (Y_t) - x\ (1_t-1) \quad (3)$$

$$G_t = \bar{G}_t \quad (4)$$

$$X_t = X_t \quad (5)$$

$$D1_t = w(Y_t) + TP_t \quad (6)$$

$$TP_t = ATP_t \quad (7)$$

$$Y_t = AD_t \quad (8)$$

Drawing from the above functions, equilibrium in the product market can be specified as follows:

$$Y_t = (1-z)\ \ a(Ct-1) + (m)(Y_t) + Al_t + vYt - x(i_t-1)$$
$$+m(ATP_t) + \bar{G}_t + \bar{X}_t \quad (9)$$

The financial market can be reduced to an interest rate equation:

$$i_t = \frac{k}{q}(Y_t) - \frac{i}{q}(M_t) \qquad (10)$$

Equation (9) = 1S equation

Equation (10) = LM equation

The equilibrium solution of the 1S-LM model is:

$$Y_t = (I-z)\ a(C_t-1) + Al_t - x\left(\frac{k}{q}\right)(Y_t-1)+\left(\frac{x}{q}\right)M_{t-1} + m(ATP_t) + G_t + X_t \quad \frac{1}{1-(1-z)(m)(w)-(1-z)(v)}$$

Drawing from the above equlibrium solution of the product and financial markets we obtain the following Fiscal and money multipliers:

Government Demand multiplier

$$\frac{(I-z)}{I-(I-z)(m)(w)-(1-z)(v)-(1-z)(a)(m)(w)+(1-z)x\left(\frac{k}{q}\right)}$$

Money multiplier

$$\frac{(X/q)(I-z)}{I-(I-z)(m)(w)-(I-z)(v)-(I-z)(a)(m)(w)+(I-z)x(k/q)}$$

where:

AI = Autonomous Investment demand

G = Government Demand

X = Export Demand

I = Investment Demand

Z = Import coefficient

C = Consumption Demand

a = lagged consumption coefficient

x = slope of investment Demand Function

i = interest rate

AD = Aggregate Demand

m = marginal propensity to consume

q = slope of L_2 function

k = slope of L_1 function

w = relationship of Disposable Income to GNP

b = Employment coefficient

D1 = Disposable Income

M = Money Supply

N = Employment

ATP = Autonomous Transfer Payments

v = marginal propensity to invest

Y = real output

L = Demand for money.

It is important to note that the numerical values of both fiscal and monetary multipliers are crucial to the effective operation of stabilization policy and depend on all the parameters of the system (Saunders and Taylor, 1976, P. 187). Drawing from the above explanations it is possible to find the quantitative impact of a given change in money stock by simply calculating the value of the monetary multiplier.

Also, we could find the quantitative impact of a given change in government expenditure by calculating the value of the fiscal multiplier. Therefore, a comparative analysis of the relative impact of monetary and fiscal policies can be calculated by finding the difference between the numerical values of the monetary multiplier and the fiscal multiplier.

The Large Structural Model.

Another alternative model for an econometric study of the relative impact of fiscal and monetary policies on economic activity is the large structural model. An example is the Federal Reserve Board - Massachaussett Institute of Technology model (FRB-MIT) (De leeuw and Gramlich, 1969). This model illustrates two basic characteristics of neo-Keynesian models:

1. a highly detailed sector-by-sector build up of aggregate demand;
2. a detailed specification of the portfollio adjustment process that attaches a central role to interest rates as an indirect link between monetary policy and final demand;
3. also prices are determined in this model by real sector forces, that is by a variable markup over wage costs (Crews, 1973, P. 7). The characteristic

feature of this model is that fiscal and monetary variables are introduced in the structural model at those points where their functional roles are indicated by economic theory and their measured impact on economic activity is dependent upon the explicit transmission mechanism which is postulated and built into the structural model (Keran, 1969, P. 6). However, an important advantage of the model is that it allows one to distinguish between direct and indirect fiscal and monetary influences and to see how subsectors of the economy are affected. Also the major disadvantage of this model is that an omition of an important transmission channel results to an incorrect estimate of the magnitude of the fiscal or monetary influences. It also has the problem of selecting monetary and fiscal measures which are statistically exogenous.

The Single Equation Model

This model is another alternative method for an econometric study of the relative impact of fiscal and monetary influences on economic activity. An example is the Federal Reserve bank of St. louis model (Andersen and Jordan, 1968) and Andersen and Carlson, 1970). The model does not specify the structure of the economy; rather it

explains such broad measures as total spending, prices and unemployment in terms of changes in money, government expenditure, potential output and price expectations (Crews, 1973, P.11). An advantage of the model is that if the fiscal and monetary variables are correctly specified, and if they are are not themselves determined by economic activity, they will capture the impact of fiscal and monetary influences on economic activity, irrespective of the transmission channels. The single equation model avoids the problem of specifying and measuring the specific links between fiscal and monetary influences and economic activity which is consistent with a wide range of views about the structural interrelations in the economy (Keran, 1969, P. 6). However, the usefulness of the model is narrowed to studying the relative impact of fiscal and monetary measures on economic activity. I_t does not specify the impact of these policies on subsectors of the economy.

4.2 The Choice of the Model.

Considering these alternative methods of study, the single equation model is chosen as the operative model of this research. Our choice is guided by its simplicity and the ability of its variants to give clearer and more definite estimates of the impact of fiscal and monetary policies on economic activity (Duesenberry, 1974).

4.3 Behavioural assumptions of the model.

The single equation model is a multiple regression model and its assumptions are:

a. The model specification takes the form:

$$Y_t = bo + b1\ X1_t + b_2X_{2t} + \ldots + bk\ X_{kt} + \varepsilon_t$$

b. The distribution of each of the explanatory variables is independent of the true regression parameters.

c. Each of the explanatory variables is distributed independent of the true errors in the model.

d. There is no exact linear relationship among two or more of the independent variables.

e. The error term has zero expected value and constant variance for all observations.

f. Errors corresponding to different observations are incorrelated.

g. The error variable is normally distributed.

h. The independent variables are not influenced by movements in the dependent variable hence the independent variables should be exogenously determined (Pindyck and Rubenfield, 1976).

4.4 Model Specification.

The working hypotheses underlying the analysis in this study is expressed by the following relation:

$$Y = f(E,R,M,Z) \qquad (1)$$

where:

Y = Gross domestic product GDP

E = Government expenditure

R = Government revenue

W = Money Supply

Z = Other factors influencing GDP

An expression of this relation in terms of the changes in each variable yields:

$$Y = f(\Delta E, \Delta R, \Delta M, \Delta Z) \qquad (2)$$

Since we are to empirically estimate equation (2) then it has to be expressed as a linear relation of the form:

$$Y_t = bo + b1\Delta E_t + b2\Delta R_t + b3\Delta M_t \qquad (3)$$

where:

bo = the constant term whose estimate summarises the impact of other factors affecting the level of economic activity

b1, b2, and b3 = the coefficients of the fiscal and monetary variables respectively. They measure the magnitude to which changes in the explanatory variables affect the level of economic activity.

4.5 Functional Equations.

Considering the measures of fiscal policy and monetary policy, the following lagged variants of the single equation model are specified and estimated. However, these equations constitute the large number of experiments which

were estimated. Out of these experimental equations we then chose the ones that have the best fit, to guide our evaluation of the working hypotheses of this research.

1.1 $$Y_t = bo+b1\Delta E_t +b2\Delta E_{t-1} +b3\Delta E_{t-2} +b4\Delta E_{t-3} +b5\Delta R_t +b6\Delta R_t-1 +b7\Delta R_{t-2} + b8\Delta R_{t-3} +b9\Delta M_{1t} + b10\Delta M_{1t-1} + b11\Delta M_{1t-2} +b12\Delta M_{1t-3} +b13\ WD$$

1.2 $$Y_t = bo + b1\Delta E_t+b2\Delta E_{t-1}+b3\Delta E_{t-2}+b4\Delta E_{t-3} +b5\Delta R_t+b6\Delta R_{t-1}+b7\Delta R_{t-2} +b8\Delta R_{t-3} +b9\Delta M_{2t} + b10\Delta M_{2t-1}+b11\Delta M_{2t-2}+b12\Delta M_{2t-3} +b13\ WD$$

1.3 $$Y_t = bo + b1\Delta E_t + b2\Delta E_{t-1}+b3\Delta E_{t-2}+b4\Delta E_{t-3} +b5\Delta R_t+ b6\Delta R_{t-1}+b7\Delta R_{t-2}+b8\Delta R_{t-3} +b9\Delta M_t + b10\Delta H_{t-1}+b11\Delta H_{t-2}+b12\Delta H_{t-3} +b12\ WD$$

2.1 $$Y_t = bo + b1\Delta E_t + b2\Delta E_{t-1}+b3\Delta E_{t-2} +b4\Delta E_{t-3} + b5\Delta M_{1t} + b6\Delta M_{1t-1} +b7\Delta M_{it-2} + b8\Delta M_{1t-3} + b9\ WD$$

2.2 $$Y_t = bo +b1\Delta E_t + b2\Delta E_{t-1}+b3\Delta E_{t-2} +b4\Delta E_{t-3} +b5\Delta M_{2t} + b6\Delta M_{2t-1} +b7\Delta M_{2t-2}+b8\Delta M_{2t-3} +b9\ WD$$

$$2.3 \quad Y_t = bo+b1\Delta E_t + b2\Delta E_{t-1} + b3\Delta E_{t-2} + b4\Delta E_{t-3} + b5\Delta H_t + b6\Delta H_{t-1} + b7\Delta H_{t-2} + b8\Delta H_{t-3} + b9 \quad W\Delta$$

$$3.1 \quad Y_t = bo+b1\Delta(R-E)_t + b2\Delta(R-E)_{t-1} + b3 \quad (R-E)_{t-2} + b4\Delta(R-E)_{t-3} + b5\Delta M_{1t} + b5\Delta M_{1t-1} + b7\Delta M_{1t-2} + b8\Delta M_{1t-3} + b9 \; W\Delta$$

$$3.2 \quad Y_t = bo+b1\Delta(R-E)_t + b2\Delta(R-E)_{t-1} + b3\Delta(R-E)_{t-2} + b4\Delta(R-E)_{t-3} + b5\Delta M_{2t} + b6\Delta M_{2t-1} + b7\Delta M_{2t-2} + b8\Delta M_{2t-3} + b9 \quad W\Delta$$

$$3.3 \quad Yt = bo+b1+\Delta(R-E)_t + b2\Delta(R-E)_{t-1} + b3\Delta(R-E)_{t-2} + b4\Delta(R-E)_{t-3} + b5\Delta M_t + b6\Delta H_{t-1} + b7\Delta H_{t-2} + b8\Delta H_{t-3} + b9 \quad W\Delta$$

$$4.1 \quad Y_t = bo+b1\Delta E^*_t + b2\Delta E^*_{t-1} + b3\Delta E^*_{t-2} + b4\Delta E^*_{t-3} + b5\Delta R^*_t + b6\Delta R^*_{t-1} + b7\Delta R^*_{t-2} + b8\Delta R^*_{t-3} + b9\Delta M_{1t} + b10\Delta M_{it-1} + b11\Delta M_{1t-2} + b12\Delta M_{1t-3} + b13 \quad WD$$

$$4.2 \quad Y_t = bo+b1\Delta E^*_t + b2\Delta E^*_{t-1} + b3\Delta E^*_{t-2} + b4\Delta E^*_{t-3} + b5\Delta R^*_t + b6\Delta R^*_{t-1} + b7\Delta R^*_{t-2} + b8\Delta R^*_{t-3} + b9\Delta M_{2t} + b10\Delta M_{2t-1} + b11\Delta M_{2t-2} + b12\Delta M_{2t-3} + b13 \quad W\Delta$$

$$4.3 \quad Y_t = bo + b1\Delta E^*_t + b2\Delta E^*_{t-1} + b3\Delta E^*_{t-2} + b4\Delta E^*_{t-3} + b5\Delta R^*_t + b6\Delta R^*_{t-1} + b7\Delta R^*_{t-2} + b8\Delta R^*_{t-3} + b9\Delta H_t + b10\Delta H_{t-1} + b11\Delta H_{t-2} + b12\Delta H_{t-3} + b13 \quad W\Delta$$

$$5.1 \quad Y_t = bo + b1\Delta E^*_t + b2\Delta E^*_{t-1} + b3\Delta E^*_{t-2} + b4\Delta E^*_{t-3} + b5\Delta M_{1t} + b6\Delta M_{1t-1} + b7\Delta M_{1t-2} + b8\Delta M_{1t-3} + b9 \quad W\Delta$$

$$5.2 \quad Y_t = bo + b1\Delta E^*_t + b2\Delta E^*_{t-1} + b3\Delta E^*_{t-2} + b4\Delta E^*_{t-3} + b5\Delta M_{2t} + b6\Delta M_{2t-1} + b7\Delta M_{2t-2} + b8\Delta M_{2t-3} + b9 \quad W\Delta$$

$$5.3 \quad Y_t = bo + b1\Delta E^*_t + b2\Delta E^*_{t-1} + b3\Delta E^*_{t-2} + b4\Delta E^*_{t-3} + b5\Delta H_{t-1} + b6\Delta H_{t-1} + b7\Delta H_{t-2} + b8\Delta H_{t-3} + b9 \quad W\Delta$$

$$6.1 \quad Y_t = bo + b1\Delta(R^*-E^*) + b2\Delta(R^*-E^*)_{t-1} + b3\Delta(R^*-E^*)_{t-2} + b4\Delta(R^*-E^*)_{t-3} + b5\Delta M_{1t} + b6\Delta M_{1t-1} + b7\Delta M_{1t-2} + b8\Delta M_{1t-3} + b9 \quad W\Delta$$

$$6.2 \quad Y_t = bo + b1\Delta(R^*-E^*)_t + b2\Delta(R^*-E^*)_{t-1} + b3\Delta(R^*-E^*)_{t-2} + b4\Delta(R^*-E^*)_{t-3} + b5\Delta M_{2t} + b6\Delta M_{2t-1} + b7\Delta M_{2t-2} + b8\Delta M_{2t-3} + b9 \quad W\Delta$$

$$6.3 \quad Y_t = bo + b1\,\Delta(R^*-E^*)_t + b2\,\Delta(R^*-E^*)_{t-1} + b3\,\Delta(R^*-E^*)_{t-2} + b4\,\Delta(R^*-E^*)_{t-3} + b5\,\Delta H_t + b6\,\Delta H_{t-1} + b7\,\Delta H_{t-2} + b8\,\Delta H_{t-3} + b9\ W\Delta$$

4.6 Notations

R = Government tax Revenue

E = Government Current expenditure less transfer

(R-E)= Government budgetary residual: Current surplus/deficit

R* = Government Retained Revenue

E* = Government Expenditure: Current expenditure less transfers plus capital expenditures less transfers

(R*-E*)= Government budgetary residual: overall surplus/deficit.

M_1 = Currency + demand deposits

M_2 = M_1 + quasi money

H = Currency + reserves

WD = War Dummy.

4.7 Estimation Procedure.

Two alternative techniques are available for estimating the parameters of the equations specified in this research.

They are the Almon Lag technique and the ordinary least square (OLS). The advantage of the Almon lag technique is that it is designed to avoid the bias in estimating distributed lag coefficients which may arise from multi-collinearity in the lag values of the independent variables (Almon, 1965). On the other hand, according to Elliot (1975, P. 184) the unrestricted ordinary least square method constitute a reasonable alternativeto Almon lags for our purposes because it is free from prior restrictions of the distribution of the parameters and the fact that it also has the unique property of minimum variance. Again since we are also interested in the total weights of the coefficients of the lagged independent variables then the disadvantage of multicollinearity among the lagged values under the ordinary least square method seases to be too important.

Consequently, the ordinary least square method is used in estimating the parameters of the equations specified in this research. Our choice is further guided by the simplicity of its computational procedure and the optimal properties of the estimates obtained from this procedure. Among such properties are linearity, unbiasedness and minimum variance. Comparison of the OLS estimates is restricted traditionally to the class of linear unbiased

estimators which are popular because they are easy to analyse and understand (Wonnacott and Wonnacott, 1970)

However, since we are also interested in the time pattern of the effects of the lagged independent variables upon the dependent variable; the ordinary least square method is not the best. This is because, the lagged dependent variable enters the regression equation as an independent variable. However, no other estimation procedure has been shown to be 'better' particularly in small samples when lagged dependent variables are on the right-hand side of the equation (Rao and Miller, 1971, P. 176). The variables in our model are lagged in three past periods t, t - 1, t - 2 and t - 3. Changes in all the variables are computed by the conventional first differences.

4.8 Techniques of evaluation of results.

To start with, the results of this econometric estimation are subjected to various tests to ensure the compliance of the computational procedure to the optimal rules of econometrics. These tests are:

1. The test of structural stability of the coefficients of the model as sample size increases - the Chow test.

2. The test for the seriousness of autocorrelation - the Durbin - Waston test.
3. The test for the presence of multicollinearity - The Klein test.
4. The test of significance of the parameter estimates of the regression equations - the F test.

Considering the working hypothesis of this research, the following methods are used in evaluating our regression results with respect to each of the hypotheses.

Hypothesis I:

To find the relative magnitude of impact of fiscal policy and monetary policy on gross domestic product respectively; there are two alternative techniques of evaluating this result.

a. By computing Beta Coefficients such that, the larger the value of beta coefficients the greater is the magnitude of impact.
b. By computing partial coefficients of determination $\bar{R}^2$, such that the larger the value of $\bar{R}^2$ the greater the magnitude of impact.

Hypothesis II:

To find the predictability of the response of gross domestic product to fiscal policy and monetary policy

respectively, there are three alternative techniques of evaluating this result.

(a) By computing the 't' values of the regression coefficients such that the larger the 't' value the more confidence there is in the predictability of the response of the dependent variable to the independent variable.

(b) By computing elasticity coefficients of the fiscal and monetary variables such that the relative size of their elasticity coefficients shows the relative predictability of response of GDP to fiscal and monetary variables respectively.

(c) By computing the Point and Interval prediction estimates of the fiscal and monetary variables respectively.

Hypothesis III.

To find the speed and time of impact of fiscal policy and monetary policy on GDP, there are two alternative techniques of evaluating this result.

(a) By observing which of the variables has a shorter time lag in influencing economic activity from quaterly or annual patterns of the beta coefficients.

(b) By computing the speed of adjustment and half-lives using the stock - adjustment model. According to Ajayi (1978, P.55), in the usual stock - adjustment

model framework, the change from one period to the next (annual) is assumed to be a fraction of the difference between the actual and desired values.

Therefore,

$$\Delta Y_t = \lambda(Y_t^* - Y_{t-1}) + U_t \qquad (1)$$

$$Y_t^* = f(E,R,M \ldots\ldots) \qquad (2)$$

where Y_t^* = desired level of GDP

Y_{t-1} = actual level of GDP in period t-1

U_t = stochastic error term.

let us rewrite equation (2) as

$$Y_t^* = a + \beta^{Et}$$

so that from equation (1) we obtain

$$Y_t = \lambda a + \lambda\beta^{Et} - \lambda Y_{t-1} + U_t \qquad (3)$$

similarly, since $Y_t^* = a + \beta M_t$

we also obtain;

$$\Delta Y_t = \lambda a + \lambda\beta M_t - \lambda Y_{t-1} + U_t \qquad (4)$$

In equations (3) and (4) λ is the partial adjustment coefficient indicating the proportion of the gap between the actual and desired GDP that is closed in one period. The closer λ is to 1, the faster is the speed of adjustment. Since dependent variable in the equation is expressed as a level, the speed of adjustment λ is one

minus the coefficient of the lagged dependent variable - $(1 - \lambda)$.

A convenient statistic for summerising the implications of a given value of the speed of adjustment is the half-lives that is the number of periods required to close one half of any gap between the desired and actual GDP. This can be described as follows:

Consider the value of Y in period ttn-1.

Then we have

$$Y_{t+n-1} = \lambda Y^* + (1-\lambda) Y_{t+n-2} \quad (5)$$

and

$$Y_{t+n-2} = \lambda Y^* + (1-\lambda) Y_{t+n-3} \quad (6)$$

substituting successively we obtain

$$X_{t+n-1} = \lambda \sum_{i=0}^{n-1} 1 \quad (1-\lambda)^i \quad Y^* + (1-\lambda)^n Y_{t-1} \quad (7)$$

$$= 1-(1-\lambda)^n \quad Y^* + (1-\lambda)^n \quad Y_{t-1}$$

$$= Y^* + (1-\lambda)^n \quad (Y_{t-1} - Y^*)$$

To obtain the half-life we solve for the value of n such that

$$Y_{t+n-1} - Y = 1/2(Y_{t-1}-Y^*) \quad (8)$$

that is the value of n such that

$$(1-\lambda)^n = 1/2 \quad (9)$$

Taking natural log of both sides we obtain:

$$\text{In } (1 - \lambda)^n = \text{In } 1/2$$

$$n \text{ In}(1 - \lambda) = \text{In } 1/2$$

Thus we have

$$n = \frac{\text{In } 1/2}{\text{In } (1-\lambda)} \qquad (10)$$

Therefore the half-lives are computed from equation (10)

4.9 Data Requirements and Sources.

Annual time series data on the variables under study, within the period 1959 - 1989 are used in this research. Quaterly time series data would have been an excellent alternative since the monetary variables are likely to exhibit quaterly variations. But because some of the data particularly the GDP are given on annual basis, the annual data is preferred to ensure consistency. The data is collected from Central Bank of Nigeria Publications: Annual Reports and Statement of Accounts, and the Economic and Financial review for the different years 1960 - 1989.

CHAPTER FIVE

PRESENTATION OF REGRESSION RESULTS

The regression results are presented in three groups. Group I is for 1960-1969 data; Group II is for 1970-1989 data, and Group III is for the entire thirty year period covered by this research, 1960-1989. The justification for this choice is not only to aid analysis but also to capture the structural stability of the model as the sample size increases and to check the equality of the regression coefficients obtained from different samples. Most importantly, our choice is based on considerations of movements in aggregate demand and the influence of random events such as the civil war, 1967-1969; the oil boom, 1970-1975, the Udorji Salary Award 1974 and changes in tax policy during the thirty year period 1960-1989. The details of the regression results are presented in the appendix. However, in order to evaluate our working hypotheses we present the results of our functional equations based on 1960-1989 data.

5.1 REGRESSION RESULTS

The ordinary least squares estimates of the experimental equations specified in 4.5 shows that equations 2.1, (2.2) 2.3 and 5.1, 5.2, 5.3, 6.1, 6.2, and 6.3 have the best fit. Their results are as follows:

$$(2.1)\ \Delta Y_t = 1484.96 - 1.80\Delta E_t - 3.94\ \Delta E_{t-1} - 4.74\ \Delta E_{t-2}$$
$$(-1\text{-}27) \quad (-0.48) \quad (-5.27)$$
$$- 3.52\Delta E_{t-3} + 3.75\ \Delta M1_t + 0.36\ \Delta M1_{t-1}$$
$$(-2.19 \quad (5.0) \quad (5.1)$$
$$+ 3.51\Delta M1_{t-2} - 0.24\ \Delta M1_{t-3}$$
$$(4.6) \quad (-2.96)$$
$$- 1639.039WD$$
$$(1.22)$$

$R = 0.85$ $\quad F^* = 5.91$

$R^2 = 0.73$ $\quad Fo.05 = 2.74$

$\bar{R}^2 = 0.60$ $\quad D.W. = 2.00$

$to.025 = 2.05$

$$(2.2)\ \Delta Y_t = 1801.49 - 3.44\Delta E_t - 3.90\Delta E_{t-1}$$
$$(-3.54) \quad (-3.79)$$
$$-4.35\Delta E_{t-2} - 4.51\Delta E_{t-3} + 2.65\Delta M_{2t}$$
$$(-4.31) \quad (-2.45) \quad (3.84)$$
$$- 0.36\Delta M_{2t-1} + 2.22\ \Delta M_{2t-2} - 0.19\Delta M_{2t-3}$$
$$(-4.67) \quad (3.58) \quad (-0.31)$$
$$- 1927.19WD$$
$$(-1.34)$$

$R = 0.83$ $\quad F^* = 4.78$

$R^2 = 0.70$ $\quad Fo.05 = 2.74$

$to.025 = 2.05$

$\bar{R}^2 = 0.54$ $\quad WD = 2.00$

(5.1) $\Delta Y_t = 1257.8 + 0.68\Delta E^*_t + 0.32\Delta E^*_{t-1}$

$\qquad\qquad\qquad\qquad (2.0) \qquad (0.89)$

$- 0.22\Delta E^*_{t-2} - 0.52\Delta E^*_{t-3} + 0.25\Delta M1_t$

$\quad (-0.61) \qquad (-1.86) \qquad (0.38)$

$-0.89\Delta M1_{t-1} + 1.64\Delta M1_{t-2} + 0.88\Delta M1_{t-3}$

$-(-0.98) \qquad (1.58) \qquad (0.90)$

$-1257.87\ WD$

$\quad (-0.68)$

$F^* = 1.98$ $\quad R = 0.69$

$D.W = 2.00$ $\quad R^2 = 0.48$

(5.2) $\Delta Y_t = 1588.4 + 0.67\ \Delta E^*_t + 0.44\ \Delta E^*_{t-1}$

$\qquad\qquad\qquad\qquad (1.52) \qquad (1.1)$

$-0.17\Delta E^*_{t-2} + 0.13\Delta E^*_{t-3} + 0.30\Delta M2_t$

$(-0.45) \qquad (0.43) \qquad (0.43)$

$-1.14\Delta M2_{t-1} + 0.92\Delta M2_{t-2}$

$(-0.18) \qquad (1.35)$

$+ 0.42\ \Delta M2_{t-3} - 1576.73\ WD$

$(0.57) \qquad (-0.85)$

$F^* = 1.92$ $\quad R = 0.68$

$D.W = 2.00$ $\quad R^2 = 0.46$

$$(5.3)\quad \Delta Y_t = 1721.72 + 0.24\Delta E^*_t + 0.15\Delta E^*_{t-1}$$

$$(0.5) \qquad (0.25)$$

$$+0.16\Delta E^*_{t-2} - 0.66\Delta E^*_{t-3} + 1.35\Delta H_t$$

$$(0,4) \qquad (-1.43) \qquad (1.55)$$

$$- 1.10\Delta H_{t-1} + 0.26\Delta H_{t-2}$$

$$(-1.05). \qquad (0.34)$$

$$+ 0.28\Delta H_{t-3} - 1714.77WD$$

$$(0.20) \qquad (-0.92)$$

$F^* = 1.86$ $R = 0.67$

$D.W = 2.00$ $R^2 = 0.46$ $D.W. = 2.00$

$$(6.1)\quad \Delta Y_t = 1799.05 + 0.20\Delta(R^*-E^*)_t - 0.64\ \Delta(R^*-E^*)_{t-1}$$

$$(0.59) \qquad (-2.21)$$

$$-0.59\Delta(R^*-E^*)_{t-2} + 0.13\Delta(R^*-E^*)_{t-3}$$

$$(-1.64) \qquad (0.72)$$

$$+0.92\Delta M1_t - 0.86\Delta M1_{t-1} + 0.52\Delta M1_{t-2}$$

$$(1.30) \qquad (-69) \qquad (0.43)$$

$$+1.70\Delta M1_{t-3} - 1775.15WD$$

$$(1.31) \qquad (-0.94)$$

$R = 0.66$ $F^* = 1.71$

$R^2 = 0.44$ $D.W. = 2.00$

$$(6.2)\quad \Delta Y_t = 1964.27 + 0.17\Delta(R^*-E^*)_t + 0.34\Delta(R^*-E^*)_{t-1}$$

$$(0.53) \qquad (1.26)$$

$$-0.54\Delta(R^*-E^*)_{t-2} + 0.64\Delta(R^*-E^*)_{t-3}$$

$$(-1.54) \qquad (3.76)$$

$$+0.89\Delta M2_t - 0.94\Delta M2_{t-1} + 0.29\Delta M2_{t-2}$$

(1.62) (-1.22) (0.36)

$$+0.73\ \Delta M2_{t-3} - 1929.33WD$$

(0.79) (=1.03)

$R = 0.67$ $F^* = 1.77$

$R^2 = 0.44$ D.W. = 2.00

$$(6.3)\quad \Delta Y_t = 1694.73 + 0.22\Delta(R^*-E^*)_t + 0.42\Delta(R^*-E^*)_{t-1}$$

(0.88) (1.91)

$$-0.58\Delta(R^*-E^*)_{t-2} + 0.50\Delta(R^*-E^*)_{t-3}$$

(-1.87) (3.57)

$$+ 1.78\ \Delta H_t - 0.72\Delta H_{t-1} + 0.15\hat{\Delta}H_{t-2}$$

(3.07) (-1.13) (0.27)

$$+ 1.10\hat{\Delta}H_{t-3} - 1692.21\ WD$$

(1.05) (-0.97)

$R = 0.72$ $F^* = 2.39$

$R^2 = 0.52$ D.W. = 2.04

$\bar{R}^2 = 0.30$

The figure in brackets under the parameter estimates are the corresponding t-ratios. R is the coefficient of multiple correlation which measures the degree of association of the regressors taken jointly, and the regressand. R^2 is the coefficient of multiple determination which is the proportion of the total variation in Y explained by fitting the regression.

It is an indication of the goodness of fit or the explanatory power of the equation. F* is the variance ratio used to test whether the joint influence of the regressors on the regressand is statistically significant. The Durbin - Waston Statistic (D.W.) is useful for testing autocorrelation.

5.2 Examination of Algebraic Signs of Parameter Estimates

The sign of the coefficients of some of the explanatory variables of the regression equations estimated in this research is a cause of worry. The coefficients of the fiscal explanatory variables E and E* (current and total government expenditures) bear wrong signs. However, the alternative explanations for this development are:

1. It may be a warning, inter alia of incorrect definition, specification or interpretation of this variable.
2. It could be that an aspect of the problem has not been unveiled (Rao and Miller, 1971, 44-46)
3. It could be that the explanatory variable is misconcieved to influence the dependent variable in a particular direction, whereas, such an explanatory variable is actually made up of components which influence the dependent variable in opposing directions.
4. It could be that the explanatory variable is influenced by movements in some components of the dependent variable.

5. It could be that the data is erroneous such that the impact signs of the aggregated components of the explanatory variables may not be homogenous.

However, two of these alternative explanations for wrong signs are tenable in the context of this econometric research.

There is the tendency that movements in the components of the gross domestic product influence the fiscal and monetary variables such as government expenditure and money supply M1 and M2. The danger is that if this is proved to be largely true then our model breaks - down, since the independent variables are no longer truely exogenous and violate the exogeniety assumption of the model. We also notice that some of the coefficients of E and E* are positve and most of the coefficients of M1, M2 and H are positive, although quite a few of the coefficients of the lagged fiscal and monetary variables are negative. Therefore, the above explanation does not completely explain the problem. In view of this, an important consideration about data used in this research is made, and this could be the source of the wrong sing considering the unreliability of statistical data in Nigeria.

Furthermore, if specification and interpretation of the coefficients are correct, a coefficient can still attain a wrong sign because of the sampling distribution of the estimates. If this is the case, we generally observe the coefficient to be not significantly different from zero statistically and has the wrong sign, then some aspect of the problem has not been unveiled. Instead of throwing away the variable, it is better to retain it in the equation so that other researchers may be able to explain the apparent inconsistency. When the variable with a wrong sign is superflous in the sense that its deletion does not affect the other coefficients and does not decrease R^2, then this problem is not serious (Rao and Miller, 1971, 46).

However theoretically, the results are consistent with the view of the modern quantity theorists which holds that spending, taxing and borrowing policies of the government may have through interest rates and wealth effects different impacts on economic activity under varying conditions. Many monetarists have pointed out that the government expenditure multiplier with a constant money stock is positive for a few years but zero in the long run. The argument usually advanced is the crowding-out effect: that government expenditures, when unaccompained by monetary expansion, 'crowd out' a significant volume of private expenditures (Ajayi, 1974, 564).

Example:

$$(6.3)\quad \Delta Y_t = 1694.73 + 0.22\Delta(R^*-E^*)_t$$
$$+0.42\ \Delta(R^*-E^*)_{t-1} - 0.58\ \Delta(R^*-E^*)_{t-2}$$
$$+0.50\ \Delta(R^*-E^*)_{t-3} + 1.78\Delta H_t - 0.72\Delta H_{t-1}$$
$$+0.15\Delta H_{t-2} + 1.10\hat{\Delta H}_{t-3} - 1692.21WD$$

5.3 Test for Structural Stability of the Coefficients of the model as sample size increases - The Chow TEST

This test is aimed at investigating the stability of the coefficient estimates as the sample size increases and the equality between coefficients obtained from different samples. In the former case, we want to find whether the estimates will be different in enlarged samples and whether they will remain stable over time. There may have occurred, events which change the structure of the relationship, for example, changes in tax laws, civil war etc. Such random events could make the coefficients unstable. This test requires that we compute the F* ratio thus:

$$F^* = \frac{\left[\sum e_p^2 - (\sum e_1^2 + \sum e_2^2)\right]/K}{(\sum e_1^2 + \sum e_2^2) / (n_1 + n_2 - 2K)}$$

(Koutsyannis, 1977, 164)

where e_p^2 = unexplained variation of the pooled sample 1960 - 1989

e_1^2 = variation for 1960 - 1969

e_2^2 = variation for 1970 - 1989

n_1 = Sample size for 1960 - 1969

n_2 = sample size for 1970 - 1989

k = number of explanatory variables.

The result of our Chow test for both stability of and equality between coefficients is presented below. It shows that the structural coefficients are stable and the functions from the different samples do not differ significantly. This is because $F^* < Fo.05$.

Illustrations: Chow test.

Using equations 6.1 and 6.2

(6.1) $e_p^2 = 2960.40$

$e_1^2 = 41.56$

$e_2^2 = 351.87$

$k = 7$

$n_1 = 10$

$n_2 = 20$

$$F^* = \frac{(2960.40 - (41.56 + 3515.87)/7}{(41.56 + 3515.87)/(10 + 20 - 2(7))}$$

$F^* = -3.84 < Fo.05$ at 7/16 d.F = 2.59

$-3.84 < 2.59$

$\therefore \quad F^* < Fo.05$

Therefore we accept that structural coefficients of the equation are stable and the functions from the different samples

do not differ significantly.

(6.2) $e_p^2 = 2940.21$

$e_1^2 = 29.30$

$e_2^2 = 3413.78$

$k = 7$

$n_1 = 10$

$n_2 = 20$

$$F^* = \frac{(2940.21 - (29\text{-}30 + 3413.78)/7}{(29.30 + 3413.78)/(10 + 20 - 2(7))}$$

$F^{11} = -3.34$ Fo.05 at d.F 7/16 = 2.59

$F^* > Fo.05$

We accept that the Structural coefficients of the equation are stable as the sample size increases and the function from the different samples do not differ significantly.

5.4 Tests for Multicollinearity

Klein's Test for Multicollinearity

According to Klein (1962:64) in a model with two explanatory variables, if the overall multiple correlation of the relationship $R_yX_1X_2 \ldots X_k$ is greater than or equal to the simple correlation between any two explanatory variables, then there is no problem of multicollinearity in the model. Put differently, if $R_yX_1, X_2, \ldots X_k > rxixj$, there is no problem of multicollinearity.

where:

$R_y X_1, X_2 \ldots X_k$ = multiple correlation

rxixj = simple correlation.

However in a model with more than two explanatory variables, the partial correlation is used.

Hence if,

$$R_y X_i X_j X_i X_2 \ldots X_k > rxixjxix2..xk$$

This means that multicollinearity is not a problem in the model But if

$$R_y X_i X_j X_i X_2 \ldots X_k < r\ xi\ xj\ xi\ x2 \ \ldots X_k$$

This means that multicollinearity is a problem in the model

Where:

$R_y X_i X_j\ X_i\ X_2 \ldots X_k$ = Multiple correlation

rxixjxix2 $\ldots X_k$ = Partial correlation.

From the results of our multicollinearity test presented in the table below, the equations are free from multicollinearity.

Table I

Results of Multicollinearity tests

Equation No	Multiple R	Partial R	Test Result
6.1	0.66	0.32 0.16 0.37 0.26 -0.28 0.17 0.35 -0.11 0.32	FM
6.2	0.67	0.34 0.18 0.33 0.31 -0.28 0.17 0.35 -0.11 0.32	FM
6.3	0.72	0.50 0.11 0.22 0.19 -0.28 0.17 0.35 -0.11 0.32	FM

FM = Free from serious multicollinearity.

5.5 Statistical test of Significance; the F and t tests.

The two sets of tests of significance are carried out for each each equation:

1. The F-test, to establish the significance of the joint impact of the explanatory variables.
2. The t-test, to establish the significance of the impact of individual explanatory variables. In any given regression equation with K regressors, there are K parameters that are estimated and their coefficients are b1, b2 ... bk. The tests are conducted at 95% confidence level. For the joint test of significance, the 'null' and alternative hypotheses are respectively,

H_o: $b1 = b2 = b3 = \ldots = bk = 0$

H_1: $b1 \neq b2 \neq b3 \neq \ldots \neq bk \neq 0$

Our decision is guided by a comparison of the observed F-ration, F*, and the theoretical F-ratio, Fo.05 which has as degrees of freedom, $V_1 = K - 1$ and $V_2 = n-k$;
where n is the sample size and k is the number of parameters estimated. Therefore, if $F^* > Fo.05$, Reject Ho
This means that the explanatory variables have a significant point influence on the regressand;
but if, $F^* < Fo.05$, Accept Ho
This means that the joint influence of the explanatory variables on the regressand is not significant.

For the significance of the impact of the individual parameters, two - tailed tests are conducted by comparing the observed t - ratio t* for each of the regressors, with the theoretidal t-ratio t o.05/2 which has degrees of freedom n-k. The observed t_ratio for each parameter estimate is the result of dividing that estimate by its standard error. The null and alternative hypotheses are, respectively

Ho : bi = 0

Hi: bi $\neq$ 0

Therefore, if, $t_i^* > t\ (0.05/2)$, Reject Ho.

This means that the i th explanatory variable influences the regressand significantly;

but if, $t_i < t(0.05/2)$, Accept Ho.

This means that the ith explanatory variable does not influence the regressand significantly.

Table II

Results of Statistical Tests of Significance

Equation No.	F*	Fo.05	Result		t*	to.025	Result
2.1	5.91	2.74	S	Et	-1.27	2.05	NS
				Et-1	-0.48		NS
				Et-2	-5.27		NS
				Et-3	-2.19		NS
				M1t	5.0		S
				M1t-1	5.1		S
				M1t-2	4.6		S
				M1t-3	-2.96		NS
2.2	4.78	2.74	S	Et	-3.54	2.05	NS
				Et-1	-3.79		NS
				Et-2	-4.31		NS
				Et-3	-2.45		NS
				M2t	3.84		S
				M2t-1	-4.67		S
				M2t-2	3.58		S
				M2t-3	-0.31		NS

S = Significant

NS = Not significant

At 95% confidence level, the F-tests show that the joint influence of the explanatory variables on the gross domestic product (GDP) is statistically significant for all the equations tested. On the other hand the t - tests show that in the current period t, the impact of the monetary variables is statistically significant in all the equations tested. However, the impact of the monetary variables becomes insignificant in the lagged periods. However the impact of the fiscal variables is insignificant in the currrent period but significant in the lagged periods. Note also that the coefficient of the war duommy report in our results in 5.1 is statistically insignificant.

TABLE III

5.6 SPEED OF ADJUSTMENT AND HALF-LIVES

1960 - 1989 CURRENT DATA

S/No	Coefficient of Lagged Dependent Variable	Speed of Adjust-ment	Half-lives	Record	Model
1	0.35	0.65	0.66	8months	$\Delta YT = bo + b1\Delta M1T + b2\ \Delta YTLI$
2	0.35	0.65	0.66	8months	$\Delta YT = bo + b1\Delta M2T + b2\ \Delta YL\ I$
3	0.23	0.77	0.47	6months	$\Delta YT = bo + b1\ \Delta HT + b2\ \Delta YTLI$
4	0.43	0.57	0.83	10months	$\Delta YT = bo + b1\ \Delta ET + b2\ \Delta YTLI$
5	0.46	0.54	0.89	10months+ 3weeks	$\Delta YT = bo + b1\ \Delta RT + b2\ \Delta YTL$
6	0.62	0.38	1.44	1yr. + 5months	$\Delta YT = bo + b1\ \Delta RMET + b2\ \Delta YT$
7	0.37	0.63	0.70	8months+ 2weeks	$\Delta YT = bo + b1\ \Delta EST + b2\ \Delta YTL$
8	0.47	0.53	0.92	11months	$\Delta YT = bo + b1\ \Delta RST = b2\ \Delta YT$

The above table shows the speed of adjustment and half-lives which shall be used later in evaluating our hypothesis. It is important to note that the closer the adjustment coefficient, is to one the faster is the speed of adjustment.

Table IV

Beta Coefficients

Equation No.	Period	D(R*-E*)	DM1	DM2	DH
6.1	t	0.16	0.42		
	t-1	-0.15	-0.29		
	t-2	-0.38	0.11		
	t-3	0.47	0.35		
	Sum	0.10	0.59		
6.2	t	0.13		0.62	
	t-1	0.08		-0.54	
	t-2	-0.35		0.13	
	t-3	0.24		0.24	
	Sum	0.10		0.45	
6.3	t	0.17			0.58
	t-1	0.10			-0.23
	t-2	-0.38			0.01
	t-3	0.19			0.23
	Sum	0.08			0.59

CHAPTER SIX

ANALYSIS OF REGRESSION RESULTS.

6.1 Evaluation of Hypothesis I

Hypothesis I states that fiscal policy exerts a greater impact on gross domestic product GDP than does monetary policy.

A test of this hypothesis involves an examination of the size of the beta coefficients for the various fiscal and monetary variables in the equations. The size of the beta coefficients is directly compared as a measure of the relative impact of each variable to variations in GDP in the current and lagged periods as shown in the table above.

From the table the beta coefficients for changes in the monetary variables are greater than those for changes in the fiscal variable in the current period. A summation of the beta coefficients for all the period, current and lagged, shows that the impact of Monetary Policy on GDP is greater than the impact of fiscal policy on GDP. Therefore we are compelled to reject hypothesis I and accept its alternative.

6.2 Evaluation of Hypothesis II

Hypothesis II states that the response of GDP to fiscal policy is more predictable than the response to monetary influence. This implies that the regression

Table V

t - Values

Equation No	Period	D(R*-E*)	DM1	DM2	DH
6.1	t	0.59	1.30		
	t-1	-2.21	-0.69		
	t-2	-1.64	0.43		
	t-3	0.72	-1.31		
	Sum	-2.54	2.35		
6.2	t	0.53		1.62	
	t-1	1.26		-1.22	
	t-2	-1.54		0.36	
	t-3	3.76		0.79	
	Sum	4.01		1.55	
6.3	t	0.88			3.07
	t-1	1.91			-1.13
	t-2	-1.87			0.22
	t-3	3.57			1.05
	Sum	4.49			3.21

coefficients relative to their standard errors - t-values - relating changes in government expenditure or budget deficit/surplus to changes in GDP, should be greater than the corresponding measures for changes in monetary variables. The greater the t-value, the more confidence there is in the estimated regression coefficient and hence, the greater is the reliability of the estimated change in GDP resulting from a change in the variable. These t-values are presented in the table above.

From the above table the t-value of the monetary variables is substantially larger than the t-value of the fiscal variable in the current period and diminishes in the lagged periods. Evidently the response of GDP to monetary variables is more predictable than to fiscal variables. Therefore we are compelled to reject hypothesis II and accept the alternative.

6.3 Evaluation of Hypothesis III

Hypothesis III states that fiscal policy influences GDP faster than monetary policy. An examination of the speed of adjustment and half-lives presented in 5.6 shows that the adjustment coefficient for the monetary variables is closer to one than that of the fiscal variables. This means that monetary variables influence GDP faster than fiscal variables. For instance, for the monetary variable we observed the following function

$$\Delta Yt = bo + b1\Delta M_{2t} + b2\,\Delta Y_{t-1} \qquad (1)$$

Similarly for the fiscal variable we observed the following function

$$\Delta Y_t = bo + b1\Delta(R\_E)_t + b2\,\Delta Y_{t-1} \qquad (2)$$

In both equations the crucial factor is the coefficient of the lagged dependent variable b2. This is because the higher the coefficient the lesser the speed of impact since (1-b2) is the speed of adjustment. From table III the adjustment coefficient for the monetary variable is 0.65 while the fiscal variable has 0.38. Therefore the impact of monetary policy on GDP is faster than fiscal policy. Furthermore, considering the half-lives we notice that while it takes monetary variables 8 months to react on economic activity, it takes fiscal variables 1½ year to have significant impact on the economy. Therefore we are compelled to reject hypothesis III and accept its alternative.

Summarily we assert that test results are consistent with an alternative set of hypotheses. The impact of monetary policy on GDP compared with fiscal policy is greater, more predictable and faster.

CHAPTER SEVEN

IMPLICATIONS OF THE RESULTS

7.1 Monetary Policy Implications.

Evidently, our empirical results show that the impact of monetary policy measures on economic activity is greater, more predictable and faster than fiscal policy measures. The immediate implication of this outcome is that the policy maker is compelled to have greater faith in the effectiveness of monetary policy; in the formulation of any economic stabilization policy package. A further implication of this result is that in Nigeria, monetary policy facilitates the growth of total domestic output through the availability of credit for productive investment both in the public as well as in the private sectors of the economy. In the public sector, this is done by the Central Bank through the acquisition of Government Development Stocks, Treasury Bills and Treasury Certificates. In the private sector, this is done by the availability of credit through direct loans and advances (Olaloku, 1984 P. 196). Again, flexibility it has been pointed out is one of the important features of monetary policy. The timing of monetary controls therefore benefits from the fact that the Central Bank of Nigeria could take more expeditious action once the

need for control has been established than is possible for a legislative body to initiate fiscal policy. Furthermore, the application of the various instruments of monetary policy to control the supply of money or credit to the economy explains the potency of monetary policy to bring about economic stabilization in Nigeria. For example the demand for particular types of products may be regulated by controlling the terms of credit that apply specifically to those products (Uzoaga, 1985, P.164) Consumer credit and housing loans are examples of types of credit that are subjected to selective credit controls. Essentially selective credit controls are necessary because it regulates activites in some areas of the credit market which are unaffected by general controls. It also regulates certain types of credit which are essentially speculative which, if unregulated would cause instability in the economy. Furthermore, imperfections in the credit market associated with the supply of credit, favour the consumer as against investment borrowing. However, selective credit control brings the economy closer to an optimum combination of consumption and investment than would be achieved by market allocation of credit. Finally it is evident, that monetary policy is capable

of influencing the economy of Nigeria with a view to bringing about stabilizing changes in the economy.

7.2 Fiscal policy implications.

Evidently, our economic results show that the impact of fiscal policy measures on economic activity is less than that of monetary policy, less predictable and slower than monetary policy. This result is tenable because, in Nigeria, inspite of the growth of public expenditure, the volume of revenue consistently falls short of government fiscal requirements to under take various expenditure programmes. Therefore the financing of government expenditure through tax revenues and possibly borrowing from the private sector reduces the magnitude of impact of fiscal policy - government expenditure on the economy. Apart from the budgetary constraints of fiscal measures, another thrust of the validity of this result is that legislative processes cause delays in the implementation of government budgetary proposals each year.

This validates our empirical results. Again one criterion by which a stabilization policy may be evaluated it is capability to affect aggregate demand. Another is flexibility in administration and swiftness in producing.

their effects. Changes in tax rates may affect aggregate demand through either consumption or investment demand. The precise impact depends on which taxes are changed. Either personal income taxes or sales and excise taxes will reach a broad spectrum of the population and have a direct effect on disposable income and consumption. The effect of corporate income tax reciepts on disposable income depends on the change of company dividends. The stickiness of dividends relative to corporate income reduces the impact of the corporate income tax on consumption. The marginal propensity to consume of the groups affected by tax changes will also have a bearing on the relative effect of the various taxes. Furthermore, accelerated depreciation reduces the impact of the business income tax and therefore whatever restraining effect the income tax may have on investment (Uzoaga, 1985 , P.165). Finally it is evident that the impact of alternative fiscal measures on the growth of domestic output, prices and employment is limited. This could be why extensive reliance on the effectiveness of fiscal policy to bring about stabilization may be more expensive than any reliance on the effectiveness of monetary policy.

7.3 Economic Stabilization Implications.

The results of our empirical investigation which warrants the rejection of the three hypothetical propositions under examination and acceptance of the alternatives offered carry important implications for the conduct of economic stabilization policy. All of these implications point to the advisability of greater reliance on monetary actions than on fiscal actions. Inspite of this experimental outcome, monetary policy as a stabilizer suffers from a number of details. There is the uncertainty about the exact effectiveness of the monetary authorities' ability to tighten or liberalize credit conditions through general monetary controls. This uncertainty is supported by the availability of close substitutes for money such as highly liquid assets in the form of government securities and savings accounts. The availability of such close substitutes makes the demand for money more elastic and tends to cushion the impact of a change in the quantity of money. There is also the uncertainty about the effect of tightening or loosening credit on aggregate demand. In principle, monetary conditions can be made sufficiently stringent to achieve any desired reduction in aggregate demand either through

increases in interest rate or through credit rationing. In practice however there may be political limitations on how far a tight money policy can be pushed because of its discriminatory effects on certain classes of borrowers such as farmers, traders and small businesses (Uzoaga, 1985, P.163). Again, although the timing of monetary controls benefits from the fact that the Central Bank can take expeditious monetary action once the need for control has been established; yet monetary policy forms part of the government annual budgets alongside fiscal policy. Therefore, in Nigeria, both monetary policy and fiscal policy undergo the same legislative process of long delays in budgetary debate. Therefore it is evident that monetary policy may have no timing advantage in the phase of adoption of a new policy. Moreover, monetary authorities may hesitate to apply a policy action strong enough for short-term needs of the economy for fear of the effects of the policy after the state of the economy has changed (Sirkin, 1970, P. 274).

These defects in the effectiveness of monetary policy presents the need for a simultaneous application of fiscal and monetary policies so as to obtain a coherent strategy to stabilize the economy.

However, fitting monetary and fiscal policies together into a coherent strategy is further complicated by the international mobility of Capital (Mundell, 1963, P.475).

On the other hand, any decision to rely on the effectiveness of fiscal policy more than monetary policy is faced with many difficulties. Such a decision is based on the phase when economic expansion is needed. It leaves unsettled the question of which policy should be used when restraint is necessary to cool an inflationary boom. Here prices are the main objective; a tight policy is designed to reduce inflation. Thus when a restrictive policy is needed, monetary policy is particularly effective because the authorities do not want a recession when a tight policy is implemented. Furthermore, the reason is that a restrictive monetary policy will strenghten the currency and consequently have a strong and quick effect in restrianing inflation. Restrictive fiscal policy is less desirable, because of the small response, with much unemployment and only a little effect on inflation (Wonnacott, 1984, p. 401).

Evidently, if the government engages in an expansive fiscal policy, with greater deficit spending, it will have to borrow more on financial markets. If the money stock

is held constant, interest rates will rise. Investment will be crowded out lessening the overall stimulative effect. This drag on the effectiveness of fiscal policy may be eliminated if the Central bank follows an accommodative monetary policy; that is, if the central bank stabilizes the interest rate by purchasing government securites. Again, just as monetary policy may be designed to support fiscal policy, so fiscal policy may be designed to assist monetary policy. In particular, in the fight against inflation, the use of fiscal as well as monetary restraint will prevent excessively high interest rates and distress in such interest-sensitive sectors as housing. While monetary and fiscal policies may be used cooperatively in regulating aggregate demand, they may also be used in offsetting directions. For example, tight fiscal policy may be combined with expansive monetary policy in order to stimulate investment and growth without creating excessive aggregate demand. In a situation of economic instability, the most predictable results are achieved when a combination of monetary and fiscal policies is used to move aggregate demand toward its target (Wonnacott, 1984, P.403). Finally, in recent years, it has been recommended that fiscal policy, not monetary

policy will result in a stronger currency than will a monetary policy exerting an equivalent expansive effect on aggregate demand. With the currency having a higher exchange value, inflation will be less severe, as the prices of imports and export - competing goods are held down. Nevertheless, this case for fiscal policy leaves the problem as to what policy is to be used when restraint is needed. A strong currency may result in protectionism, which will work against the goal of price stability. Therefore, a clear economic stabilization implication is that an accommodative monetary policy is a good measure of the total thrust of any stabilization program.

7.4 Summary and Conclusion

The purpose of this research is to investigate the relative impact of fiscal and monetary policies on economic activity with a view to bringing about economic stabilization; over a long perid of Nigerian history. In order to accomplish the very purpose of this research we specified and estimated single equation models with distributed lags employing data for Nigeria over the 30 year period from 1960 to 1989. We chose various measures of fiscal policy, monetary policy and the gross domestic product GDP as a measure of economic activity.

Three alternative measures are used for the money stock, M_1 M_2 and H or the monetary base. For fiscal policy we used federal tax revenue (R), federal retained revenue (R*), current expenditure less transfers (E), government expenditure - current and capital less transfers (E*), current surplus/defict (R-E), and overall surplus/deficit (R*-E*).

Our empirical results have revealed that the impact of monetary policy on economic activity is greater, more predictable and faster than fiscal policy. The direct implication of this finding is that empirical explanation is given for greater confidence in the effectiveness of monetary policy to stabilize the economy. Evidently, this does not nullify the potency of fiscal policy. This is because we have indicated that despite the empirically tendered effectiveness of monetary policy; there is uncertainty about its overriding capability to stabilize the economy in all periods. This is why we recommend a joint contemporaneous state of fiscal and monetary policies otherwise known as fiscal - monetary policy mix for stabilization purposes.

BIBLIOGRAPHY

Agu, C. C. (1988) Nigerian Banking Structure and Performance: The banking system's contribution to Economic Development. Onitsha, African FEP Publishers

Ajayi, S.I. (1974) "An econometric case study of the relative importance of monetary and fiscal Policy in Nigeria", Bangladesh Economic Review, Vol.2, no.2, April

_____ (1978) Money in a Developing Economy: a portfolio appreach to money supply determination in Nigeria. Ibadan, Ibadan University Press

_____ and Ojo, O.O. (1981) Money and Banking: analysis and policy in the Nigerian Context. London, George Allen and Unwin

Almon, S. (1965) 'The distributed lag between Capital appropriations and expenditures' Econometrica, Vol.33, No 1, January

Andersen, L.C. and Carlson, K.N. (1970) 'A monetarist model of Economic Stabilization' Federal Reserve Bank of St Louis Monthly Review April No.52

_____ and Jordan, J.L. (1968) 'Monetary and Fiscal Actions: A test of their relative importance in Economic Stabilization' Federal Reserve Bank of St. Louis, Monthly Review, Nobember, No.34

_____ (1969) 'Monetary and Fiscal Actions: A test of of their relative importance in Economic Stabilization, Reply. Federal Reserve Bank of St. Louis, Monthly Review, November, No.34

_____ (1969) 'Monetary and Fiscal Actions: A test of their relative importance in Economic Stabilization, Reply. Federal Reserve Bank of St. Louis Monthly Review, April, No.37

Brimmer, A.F. and Sinai, A. (1986) 'The Monetary-Fiscal Policy Mix: Implications for the shortrun' American Economic Review Vol. 76, No 2, May

Central Bank of Nigeria (1959-1989) Annual Report and Statement of Accounts, Lagos, CBN
——— Economic and financial Review Lagos, CBN

Crews, J.M. (1973) 'Econometric Models: The monetarist and non-monetarist views compared' Federal Reserve Bank of Richmond, Monthly Review, February

Chellia, R.J. (1969) Fiscal Policy in Underdeveloped Countries. London, George Allen and Unwin

Christ, C.F. (1967) 'A shortrun aggregate demand model of the interdependence and effects of classical interest elasticities' American Economic Review, Vol. 52, No 2, May

De Leeuw, F. and Gramlich, M E. (1969) 'The Channels of Monetary Policy: A further report on the Federal Reserve O MIT. model', Journal of finance vol. 24, May

De Leeuw, F. and Kalchbrenner, J. (1969) 'Monetary and Fiscal Actions: A test of their relative importance in Economic stabilization, Comment' Federal Reserve Bank of St. Louis Monthly Review, No.37, April

Duesenberry, J S. (1974) 'Alternatives to Monetary Policy' American Economic Review, vol. 64, No 1, March

Eisner, R. (1969) 'Fiscal and Monetary Policy Reconsidered, Comment' American Economic Review Vol. 59, No.3, December

Elliot J.W. (1975) 'The Influence of Monetary and Fiscal Actions on Total Spending: The St. Louis spending equation revisited', Journal of Money, Credit and Banking Vol. 7, May

Friedman, M. (1969) The Optimum Quantity of Money and other essays
Chicago, Aldine Publishing Co.

_____ (1972) Have Monetary Policy Failed?
American Economic Review Vol.62

_____ and Heller, W. (1969) Monetary Vs Fiscal Policy; A Dialogue. Graduate School of Business Administration, New York University

_____ and Mieselman, H (1963) "The relative stability of monetary velocity and the investment multiplier in the United States 1897-1957"; in commission on money and credit and stabilization policies, Englewood cliffs, Prentice-Hall Rublishers

Gurley, J.G. (1972) 'Have Fiscal and Monetary Policies Failed?'
American Economic Review Vol. 62

Howrey, E.P. (1969) 'Distributed Lag and Effectiveness of Monetary Policy: Note", American Economic Review, Vol. 59, No.3

Keran, M.W. (1969) 'Monetary and Fiscal Influences on Economic Activity - The Historical Evidence'
Federal Reserve Bank of St. Louis, Monthly Review, February

Keynes, J.M. (1936) The General Theory of Employment Interest and Money New York, Harcourt Brace.

Koutsyannis, (1977) Theory of Econometrics London, Macmillan Publishers

Leonard, F.H (1979) Macroeconomic Theory: Static and Dynamic Analyses New York, Random House Inc.

Lybeck, J.A. and Teigen, R.L. (1975) 'Monetary and Fiscal influences on Economic Activity: A note on Sweden'
Swedish Journal of Economics Vol.72

Mundell, R. (1963) 'Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates' Canadian Journal of Economics and Political Sciences, November

Newlyn, W.T. (1962) Theory of Money Oxford, Claredon Press

Obinna, O.E. (1985) Public Finance Obosi, Pacific College Press

Odedokun, M.O. (1988) 'The impacts of Fiscal variables, Financial variables and composition of financial aggregates on Nigerian economy". Savings and Development Quarterly Review No 2 Vol.12

Olalokun, F.A. et al (1984) Structure of the Nigerian Economy London, Macmillan Press Ltd.

Okah, C.O. (1985) 'Can the Central Bank Control Money Supply?' Central Bank of Nigeria Economic and Financial Review

Okun, A.M. (1972), 'Have Fiscal and/or Monetary Policy Failed?' American Economic Review, Vol. 62

Pindyck, R.S. and Rubenfield, D.L. (1976) Econometric Models and Economic Forecasts New York, McGraw Hill Inc.

Rao, P. and Miller, R.L. (1971) Applied Econometrics California, Wadsworth Publishing Co. Inc.

Saunders, P.G. and Taylor, D.J. (1976) 'The Demand For Money', in Topics in Applied Macroeconomics (ed) D. Hearthfield, London, Macmillan Publishers

Sethi, J.D. (1961) Problems of Monetary Policy in Underdeveloped Countries Bombay, Asia Publishing House

Shapiro, H.T. (1967) 'Distributed lags, Interest Rate Expectations and the impact of monetary Policy: An Econometric Analysis of a Canadian Experience' American Economic Review, Vol.57, No.2, May

Sirikin, G. (1970) Introduction to Macroeconomic Theory, Illinois, Richard D. Irwin

Teigen, R.L. (1975) 'Monetary and Fiscal influences on Economic Activity: Evidence from Denmark, Finland and Norway' Swedish Journal of Economics Vol.77

Ubogu, R.E. (1985) 'Potency of Monetary and Fiscal Policy Instruments on Economic Activities of African Countries,' in Savings and Development, Quaterly, Review, Vo. 9, No.4

Uzoaga, O.W. (1985) Money and Banking in Nigeria Enugu, Fourth Dimension Publishers

Vaish, M.C. (1977) Money, Banking and International trade, New Delhi, Vikas Publishing House.

Wonnacott, P. (1984) Macroeconomics Homewood, Illinois, Richard D. Irwih Inc.

Wonnacott, T.H. And Wonnacott, R.J. (1970) Econometrics New York, John Wiley & Sons Inc.

TABLE II

Regression Results

1970 - 1989

No	Period	bo	DE	D(R-E	DE*	D(R*-E*)	DM_1	DM_2	DH	R
2.1	t	2806.30	-1.83				3.53			0.84
	t-1		-3.70				-0.31			
	t-2		-4.38				3.53			
	t-3		-3.97				0.53			
2.2	t	3272.2	-3.38					2.60		0.82
	t-1		-3.58					-0.62		
	t-2		-3.97					1.93		
	t-3		-4.91					-0.49		
2.3	t	3624.14	-0.62						1.30	0.65
	t-1		-1.14						-0.46	
	t-2		-3.08						2.06	
	t-3								0.75	
3.1	t	3075.1	-5.29	0.28			-0.69			0.70
	t-1			1.22			-1.43			
	t-2			1.65			1.06			
	t-3			1.15			0.83			
3.2	t	3241.1		0.40				-0.45		0.69
	t-1			1.06				-0.87		
	t-2			1.70				-0.19		
	t-3			1.43				1.06		
3.3	t	3404.4		-0.13					-0.26	0.74
	t-1			0.98					-2.22	
	t-2			2.14					0.30	
	t-3			1.80					1.85	
5.1	t	2778.3			0.50		0.36			0.56
	t-1				0.21		-1.19			
	t-2				-0.90		1.20			
	t-3				-0.16		0.15			
5.2	t	3323.4			0.40			0.58		0.60
	t-1				0.29			-1.36		
	t-2				-0.61			0.68		
	t-3				-0.65			-0.28		
5.3	t	3482.9			0.11				1.17	0.60
	t-1				0.57				-1.10	
	t-2				0.24				0.30	
	t-3				0.34				-0.49	

No	Period	bo	DE	D(R-E)	DE*	D(R*-E*)	DM_1	DM_2	DH	R
		3632.2				0.21	0.78			0.59
6.1	t					-0.84	-1.05			
	t-1					-0.61	0.82			
	t-2					0.80	0.95			
	t-3					0.14		0.85		0.62
6.2	t	3754.6				0.69		-1.05		
	t-1					-0.53		0.16		
	t-2					0.35		0.14		
	t-3					0.16				0.67
6.3	t	3442.5				0.58			-0.88	
	t-1					-0.60			-0.14	
	t-2					0.32			0.57	
	t-3									

TABLE III

DATA 1960 - 1989 (₦'Million)

Year	Y	E	R	R-E	E*	R*	R*-E*	M1	M2	H	WD
1959	01940							215	265	289	0
1960	2400							241	296	336	0
1961	2378	232.4	131.4	-101.0	169.4	131.4	-38.0	243	314	341	0
1962	2516	255.4	136.5	-118.9	185.0	136.5	48.5	253	333	340	0
1963	2946	268.6	139.8	-128.8	217.7	139.8	-77.9	269	362	357	0
1964	3145	238.0	260.0	22.0	363.6	336.2	27.4	318	431	419	0
1965	3361	120.2	255.4	135.2	194.8	320.8	126.0	328	469	425	0
1966	3614	122.8	240.4	117.6	196.2	306.4	110.2	357	520	462	0
1967	2950	138.8	234.2	95.4	204.4	327.0	122.6	323	454	439	1
1968	2878	219.0	230.0	11.0	275.2	284.8	9.6	338	522	397	1
1969	3851	259.8	305.2	45.4	297.4	377.8	80.4	447	662	540	1
1970	5621	405.6*	327.2	-78.4	579.8	434.2*	-145.6	643	980	742	0
1971	7098	223.0	620.9	397.9	308.6	780.8	472.2	670	1042	778	0
1972	7703	434.0	829.8	395.8	639.6	1043.9	404.3	747	1204	839	0
1973	9001	537.8	1369.1	831.3	961.5	1695.3	733.8	926	1508	997	0
1974	16962	724.7	3530.3	2805.6	1817.2	4537.0	2719.8	1399	2372	1579	0
1975	20405	1474.7	3750.9	2276.2	4464.6	5514.7	1050.1	2595	4167	3261	0
1976	25449	1786.6	3530.3	1743.7	5713.1	6785.9	1052.8	3753	5732	4013	0
1977	28015	1962.5	5576.8	3614.3	9172.7	5846.2	-3326.5	5184	7459	5366	0
1978	28737	1630.5	5230.9	3600.4	6626.6	5178.1	-1448.5	5271	7873	5593	0
1979	39939	1881.9	8579.2	6697.3	9445.6	8371.1	-1074.5	6143	9845	5961	0
1980	49755	2271.6	8282.0	6010.4	9725.7	9040.0*	- 685.7*	9112	14275	9067	0

APPENDIX

TABLE 1

Regression Results

1960 - 1989 Data

No	Period	bo	DE	D(R-E)	DE*	D(R*-E*)	DM_1	DM_2	DH	R
2.1	t	1484.96	-1.8				3.6			0.85
	t-1		-3.94				0.4			
	t-2		-4.7				3.5			
	t-3		-3.5				-0.2			
2.2	t	1801.5	-3.4					2.65		0.83
	t-1		-3.9					-0.36		
	t-2		-4.4					2.21		
	t-3		-4.5					-0.19		
2.3	t		-1.27						2.05	0.71
	t-1		-1.84						0.29	
	t-2		-3.07						2.51	
	t-3		-4.73						0.77	
3.1	t			0.88			-0.12			0.75
	t-1			1.37			-1.69			
	t-2			1.71			2.47			
	t-3			0.88			0.68			
3.2	t-			0.31				-0.43		0.74
	t-1			1.15				-0.81		
	t-2			1.91				0.97		
	t-3			1.53				1.51		
3.3	t			-0.27					0.11	0.77
	t-1			1.04					-2.25	
	t-2			2.35					0.94	
	t-3			1.81					2.43	
5.1	t				0.27		0.25			0.69
	t-1				0.68		-0.89			
	t-2				-0.21		1.64			
	t-3				-0.52		0.88			
5.2	t				0.67			0.30		0.68
	t-1	1588.4			0.44			-1.14		
	t-2				-0.77			0.92		
	t-3				-0.13			0.42		

No	Period	bo	DE	D(R-E)	DE*	D(R*-E*)	DM_1	DM_2	DH	R
5.3	t	1721,7			0.24				1.34	0.67
	t-1				0.15				-0.99	
	t-2				0.16				0.26	
	t-3				-0.66				0.28	
6.1	t	1799.0				0.20	0.92			0.66
	t-1					-0.64	-0.86			
	t-2					-0.59	0.52			
	t-3					0.13	1.70			
6.2	t	1964.3				1.17		0.88		0.67
	t-1					0.34		-0.94		
	t-2					-0.54		0.29		
	t-3					0.64		0.73		
6.3	t					0.22			1.78	0.72
	t-1					0.42			-0.72	
	t-2					-0.58			0.15	
	t-3					0.50			1.10	

1960 - 1989 (Contd.)

Year	Y	E	R	R-E	E*	R*	R*-E*	M1	M2	H	WD
1981	52255	3519.7	5664.6	2144.9	12463.1	4607.9	-7855.2*	9844	15340	9991	0
1982	55679	3548.2	8090.7	4542.5	8747.5	7500.0	-1247.5	10049	16694	11026	0
1983	55226	3674.5	6316.1	2641.6	7680.4	6234.1	-1446.3	11283	19035	11898	0
1984	56716	3772.1	7197.0	3424.9	4928.7	7571.6	2642.9	12204	21243	12151	0
1985	65467	4085.8	9973.3	5887.5	6592.1	9715.0	3122.9	13227	23153	12695	0
1986	[illegible]	3051.4	8227.8	5176.4	5071.5	8505.0	3433.5	13039	23981	13470	0
1987	79270	7608.2	17280.0	9671.8	12203.2	16129.0	3925.8	14906	29995	17900	0
1988	82530	9113.2	18332.1	9218.9	14866.5	15588.6	722.1	20053	38450	20829	0
1989	85820	11919.6	33099.4	21179.8	19820.2	25762.2	5942.0	26397	46922	22326	0

Source: Central Bank of Nigeria:

Annual Reports and Statement of Accounts (different years)
Economic and Financial Review (different years)

CBN Lagos