

**MONEY AND ECONOMIC GROWTH
IN NIGERIA**

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Doctor of Philosophy
at the University of Leicester

by

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The emergence of Nigeria from the monetary anarchy of the turn of the century set forth historical processes for the establishment of modern monetary institutions. This was achieved at the cost of limited growth of currency in circulation because of sterling exchange standard without any fiduciary element in it and the domination of the commercial banking industry by the expatriates. The subsequent establishment of the Central bank of Nigeria and the control of the commercial banks still left the monetary instruments and institutions in an under-developed stage. A feature of that could be the complementarity of money with the physical capital, where a typical saver-investor had to do so only in the form of money with very little access to credit market, which itself was inadequate. The choice-theoretic basis of such a relation has been investigated and then tested for the period, 1960-1987. The results confirm the complementarity between narrow money and physical capital, whereas broad money turned out to be a substitute because interest rate could be earned on some deposit parts of it. The test also suggested an upward shift of the macro production function during the oil boom, and backward shift during the depression. The supply of money in the post-civil-war period has been analysed in the demand/supply format of money and of monetary base. The tests confirm the lack of interest-elasticity of demand/supply of money, though there is now a hint for such response. The endogeneity of money supply has been suggested in one set of results. The stability of the system is shown to depend on the partial adjustment of money only, and the results confirm that condition. Such findings have been used for a closed and open macroeconomic model for policy discussions, which ends with an enquiry into the stability of the open model.

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Chapter 1 Introduction

A. An Outline

Money and economic growth in Nigeria is a vast subject, even for a short sub-period of her recent economic history. For a study here of such a subject, therefore, one has to be selective and choose a particular theme and investigate that in great detail. The theme chosen is the role of money in some micro- and macroeconomic relations and how money stock itself has been determined in the country. Since money is at the centre of all modern economies, an analysis involving money has to follow the broad economic environment of the time. My main emphasis is the period after independence, or more particularly, the time after the creation of the Central Bank of Nigeria. But a proper understanding of the monetary structure of the post-CBN era can only be achieved if one looks at the background to the final emancipation of the country's financial independence with the establishment of her own central bank.

This takes me to the second chapter of the thesis where I look into the historical context of the monetary and financial structure and also its recent trends. Before the West African Currency Board was established in November, 1912, Nigeria was going through a period of monetary anarchy. By the turn of the century, there were records of eight different mediums of exchange in West Africa, led by the British silver coins, all used for the purposes of accomplishing monetary activities. The demands by the colonial governors for a share in the seigniorage profits such a conquest of one's currency in a foreign territory would bring forth, led to the eventual establishment of the West African Currency Board, with its own currency for the region. Its easy convertability, supported by hundred per cent backup of Sterling

reserves smoothed the foreign trade of the country at the cost of the rest of the economy. This pound sterling exchange standard, without any fiduciary element in it, restricted the expansion of the monetisation of the economy and thus stunted its growth for decades to come. Such an utterly inefficient arrangement to the dependent territory for the benefit of her colonial masters could only be dispensed with when the country would have her own central bank and such was the case with Nigeria. There was a prolonged debate about the suitability of such a move where the instruments of monetary control were not already available and the Currency Board was considered by many to be an adequate institution to cater for any monetary or financial need of the country. But the political arguments in terms of the forthcoming independence of the country carried more weight than any economic logic and the Central Bank of Nigeria came into existence in July, 1959.

On commercial banking the expatriates dominated the industry for a long time and thrived on the profitable foreign trade business. Because their head offices were in London, they could ignore the threats on their economic survival which all the local banks had to endure in the absence of a central bank. The easy convertability of the Nigerian pound into the British, enabled the foreign banks to invest their excess reserves in the British Government bonds and bills. Some of the local banks also ventured into long term investments, which the nature of their deposits never allowed. On top of that, mismanagement, lack of sufficient training for many local bank staffs and also their political manipulation led to many failures and the subsequent increased reputation of the foreign banks at the cost of the locals. There were some attempts by certain regional governments to

patronise the domestic commercial banks, but they were never in a competitive position against their foreign counterparts, who always dominated the industry. The optimal social strategy was to create facilities and instruments for the development of local money markets and that could not be achieved, without first having one's own central bank.

Next in chapter two, I summarise the recent trends which cover a period of three decades. They roughly fall into three distinct periods of (i) pre-oil, (ii) oil boom, and (iii) depression era. In the initial period, I note the development of the CBN in its first few years. A central banker at the time argued in defence of the frequency of the central bank amendments and decrees in the early stages, since the traditional tools of open market operations were not yet available due to the lack of monetary instruments and the infancy of the money markets. The first real challenge to the CBN came towards the end of this period when they were asked to devise ways and find out how to pay for the civil war. During these early years, one of the major undertakings of the central bank was to develop a money market for Nigeria and in this mission the bank did rather well. Various money market instruments, like treasury bills and certificates, call money and commercial bills were ushered in and/or nurtured to growth during this period. On commercial banking, the period also marked the initiation of a number of legislations, all intended to make the foreign banks more relevant to the rest of the economy, as well as the foreign trade, and also to infuse a sense of order and discipline into the indigenous banks. This steady process of an evolution to a money and credit market was suddenly disrupted by a fortunate 'shock' from the demand side in the form of an enormous world demand and, therefore,

increase in the price and production of the Nigerian crude. The oil boom brought forth a structural change in the economy, which disrupted the entire resource allocation process and put the public finance of the country on such a predominant position that a slight mishandling of its expenditure side was bound to have far-reaching consequences. And so it had. Money supply and price level increased very rapidly during the oil boom era, without any great increase in the rate of growth of real national income. On the money market instruments it had a disastrous effect, due to the sudden irrelevance of the public sector borrowing requirement. Since most, if not all, of the oil revenues were due to the federal government, largely in the form of royalties and profit tax, the oil boom era was entirely designed by the public sector expenditure policy. The inflationary spiral that was to follow was the direct result of monetising the entire oil revenue, leading to a doubling of the money stock in a year, in some cases. There were a few other policy issues during this period which, though they contributed to the ill-effects of oil boom, did not have to follow from it. First is the case of the administered interest rates, which were kept so low for a long period of time that when one takes account of inflationary expectations, the real interest rate would turn out to be negative. This must have adversely affected people's willingness to save, and therefore, the supply of loanable funds. The other policy issue was the exchange value of naira. It was fixed at a high parity with the currencies of Nigeria's main trading partners, like the UK. This made imports cheap and ruined the prospect of many infant industries and particularly of agriculture. This was a typical example

of what came to be known as the "Dutch Disease",¹ which I will take up in a later section of this introductory chapter, in the Nigerian context.

The last phase of the recent trend was the down-turn and the depression of the Nigerian economy. This happened with the collapse of the oil price and the reduced quota for the Nigerian crude, dictated by the OPEC. The last part of chapter two documents this gradual decline of the economy and the socio-political adjustments the country had to endure to put up with such a fast drop in real income. In chapter three, the monetary and related impacts on the development process during the post-CBN era are hypothesised and tested quantitatively. Since there are various facets of such an influence, it is divided into four different aspects, namely, (i) Growth and Investment; (ii) Money in the Development Process; (iii) Inflation, Growth and the Savings Ratio and (iv) Financial Repression and Economic Growth. In each case, some well-known relations are formulated and tested in the context of the fast changing structure of the Nigerian economy as depicted in the second half of the last chapter. This was tackled by the use of some dummy variables, in the absence of sufficient number of annual observations under each phase. One unusual result in the first section was the apparent absence of any relation between the investment-income ratio and the rate of growth of income. When export is added on to investment, to make allowance for the special features of the Nigerian economy during most of our sample period as depicted in the earlier Chapter, there is not much

¹ The first theoretical exposition of the "Dutch Disease" came up in W. Max Corden and J. Peter Neary, "Booming Sector and De-Industrialisation in a Small Open Economy", The Economic Journal, 92, (December 1982) pp.825-848.

improvement. Since such relations are always observed in time series and cross-section studies on developing countries, and there is a sound theoretical reason behind them, such an anomalous result may cast doubt on the published measures or observations on the rate of aggregate investment. The rest of the chapter on various other relations involving growth rate of money, inflation rate and some other variables indicate consistency between the proposed hypotheses and the evidence on them. Taken together, all the four sections provide a quantitative summary of the behaviour of the Nigerian economy during this period. For example, one could assess what was the growth rate of money which would maximise the growth rate of income and of per-capita income and what would be the income growth rates, if indeed such high monetary expansion was to be implemented in a normal year. The non-linearity of the proposed relations would indicate, among other things, that the maximum possible growth rate of income may not be the optimal one to aim for, since that may be associated with the high inflation rate. The evidence reported in chapter three supports such an underlying relation between money and the price level. Again, for a stable demand for real balance it may be argued that part of the total investment can be financed by printing money without any inflationary impact. Also, for an observed inflation rate, it may be possible to assess how much of the aggregate investment was financed by the government printing money in the relevant year. Such exercises have been undertaken in chapter three to give us some quantitative idea of the inflationary financing of growth in the period. An alternative hypothesis of money being a complementary asset to physical capital in an economy which suffers from financial repression, a hypothesis that would lead to policy recommendations for the non-inflationary finance of growth has

also been tried in this chapter, though indirectly. The more direct testing of this important theory has been taken up in chapter six. Finally, in chapter three a measure for financial intermediation has been used to assess the effect of its spread on the investment-income ratio.

In chapter four, I undertake a survey of the research works on the monetary aspects of the Nigerian economy. This would put in perspective the hypotheses proposed and tested in the subsequent chapters, as would chapters two and three in providing the rationale for the assumptions behind those hypotheses.

The demand for money had been thoroughly investigated by several authors and there may be a consensus of opinion on certain results on this topic. In most such investigation there was no evidence for the interest-elasticity of demand for real balances, however defined. In many cases, the elasticity of demand for real balances with respect to permanent income came around unity, as expected. In a majority of cases the broader definition of money including time and savings deposits performed better than any other definition, and had been suggested and, by now accepted, as the proper definition of money in Nigeria. On the supply of money, there have been money-multiplier and portfolio approaches to its analysis, both of which had been tested by S.I. Ajayi. There are some examples of bringing in the demand for and the supply of money together in a simultaneous treatment of the money market, but the theoretical and empirical inadequacies of those works left some room which the present dissertation is proposing to fulfil. Chapter four also surveys some works on the production function at the industry level with the aim of using the relevant type for the aggregate production function of the macroeconomy in Nigeria. The

chapter ends with a summary of a macroeconomic model for Nigeria where the authors treated the demand for and the supply of money separately, along with the other basic macroeconomic relations.

Chapter five looks into the theoretical problem of finding out the microeconomic basis of a possible complementarity relation between money and physical capital, proposed by R.I. McKinnon. It uses the theories of J. Hirshleifer to analyse the intertemporal choice involving consumption, saving and investment. With the assumption of primitive credit market, the theory can be adapted to explain the demand for money, or more particularly, the speculative demand for money. If such is the case, that is, money is not a substitute asset to real capital, policy decisions to foster economic growth would be different. For example, inflationary finance of growth may not be workable in such a situation. Thus, the true nature of this complementarity has important consequences and a hypothesis to explain that overtime, in the manner of McKinnon and Hirshleifer has been proposed in chapter five.

In chapter six, I undertake an econometric testing of the hypothesis, developed earlier, in the form of an aggregate production function. The test is conducted on the basis of the Cobb-Douglas form. The choice of the Cobb-Douglas form has been decided on two counts : (i) Earlier works on the Nigerian manufacturing industries have shown that the CES is the appropriate form only in a minority of cases; (ii) the restrictive theoretical implication of the C-D form may not be relevant to the purpose of the test. The test is conducted directly in the sense that the capital elasticity of output is calculated with and without money as an argument in the production function. If those estimated elasticities do not vary significantly, in such an

experiment, the hypothesis of complementarity may be regarded as being consistent with evidence. Such experiments may need to be conducted in a way where other influences on the output change, like technological improvements, induced or independent, have already been accounted for. Again, in the context of the post-CBN Nigeria, the structural changes during and after the oil boom periods cannot be easily ignored. All these possibilities have been considered in the different experiments in chapter six, both for the narrow and wide definitions of money.

Chapter seven takes up the determination of money stock in Nigeria in a model involving demand/supply of money and also of the monetary base. This is first set up in a simultaneous equation model involving three equations. The three endogenous variables, real balance, monetary base (real), and real income are determined in this model, with the emphasis on the monetary aspects of the simultaneity. The first equation is presented in the form of an adjustment process for the demand for money, where moves towards equilibrium in real balance would influence real income itself. Thus, an excess supply of money would lead to greater expenditure, and therefore, income, whereas excess demand for money would have the opposite effect. The second equation brings out the elements of money-multiplier, where any change in the high powered money would lead to a change in money stock, not by a proportional amount in this case. The third equation sets up the supply of high powered money, where the endogeneity of the money supply process is emphasised by the presence of income as an argument in it. The parameters estimated from this model can be used to check the stability conditions of the background structure of the system in the form of demand/supply of money and base money in the economy. This has

been accomplished for all the three tests for the two over-lapping periods.

The first set of tests has been conducted for the period 1971-77, whereas the second one encompasses the whole period, 1971-87. For the longer period, the test has been conducted also in log form, thus restricting the coefficients to measure constant elasticities. Since the first period refers to a more homogenous structure of the economy than the other, one would expect different types of response for the endogenous variables in the two cases. The endogeneity of the money supply has been hypothesised, as already indicated, by expecting effective demand (income) to influence the stock of high-powered money. This has been confirmed in the first set of results, whereas in the second set comprising the entire period which is likely to contain drastic changes in the economic structure, the evidence is not in favour of the hypothesis, significantly. The positive influence of foreign assets on the determination of high-powered money has been the most robust result in all the three sets of regression equations reported in chapter seven and confirms the importance of the foreign trade sector on the stock of money supply throughout the entire period. Income elasticity of the demand for money calculated for the long-run on the basis of the coefficients estimated in chapter seven are considerably greater than those calculated in chapter three. This may be explained by the proxy variable for income used in the quarterly models of chapter seven compared to their actual annual values in chapter three. Again, in chapter seven, the positive interest elasticity of the supply of money comes out most prominently in the logarithmic version of the longer-period test than any other. On the demand for money, however, such positive response for the broad money

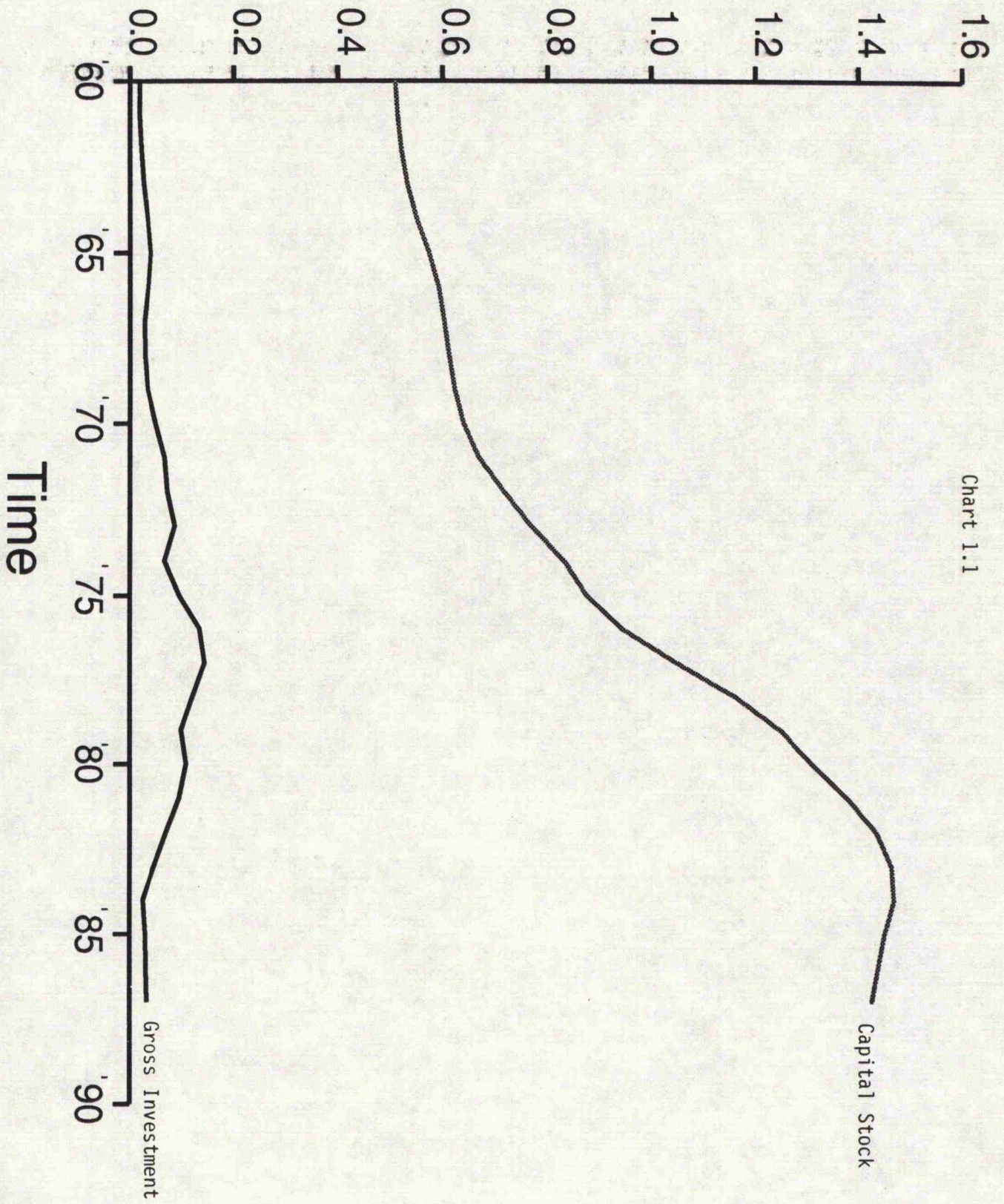
case can be explained by the own-rate response dominating the opportunity cost element in it.

In the concluding chapter, I put together the results of the study in the context of policy prescriptions. Some of the policy issues may not be directly related to the theoretical and/or empirical chapters and results of the thesis, but one can reflect on them from the broader perspective of the entire work. Since it is mainly an essay in applied economics, I feel the study to have remained incomplete if policy issues for the future are not discussed. Chapter eight is prepared in that spirit, though it may not always be directly related to the earlier chapters.

B. Some Time-Series

In this section I present the time-series graphs of some of the relevant variables analysed in chapters six and seven. In chapter six, the time-series values are in their annual magnitudes, whereas for chapter seven, they are quarterly. In chart 1.1, both capital stock and gross investment are presented in the same units, which makes it difficult to compare their variations. But such would be the case for any country, since capital stock is the cumulative sum of net investments, once one can start from a benchmark. For Nigeria, as will be discussed in the relevant section in chapter six, there is the further problem of getting data on capital stock. The data behind the graph for capital stock in chart 1.1, is constructed on the basis of a supposed value for the capital-output ratio for 1959-60 and then using the gross investment for each period to calculate the capital stock at the end or the beginning of a year, after using some rate for depreciation. As we can see from the capital stock, it has been rising through most of its period, the rate of growth accelerating during the

unit 1 = N 100 billion in 1980 prices



Units: (i) For Money and Investment 1 = ₦ 100 million
at 1980 Prices
(ii) For Income 1 = ₦ 1 billion at 1980 prices

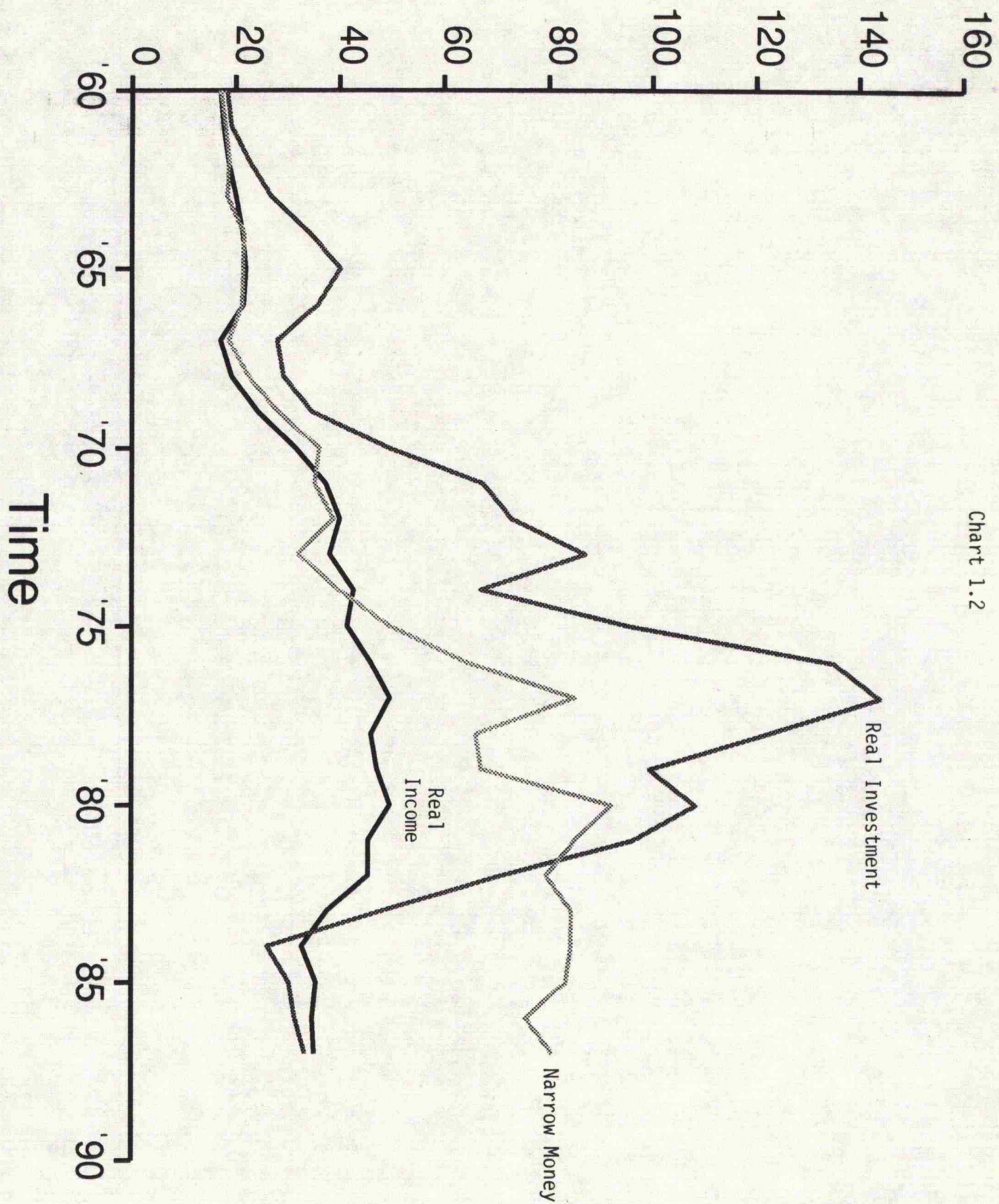
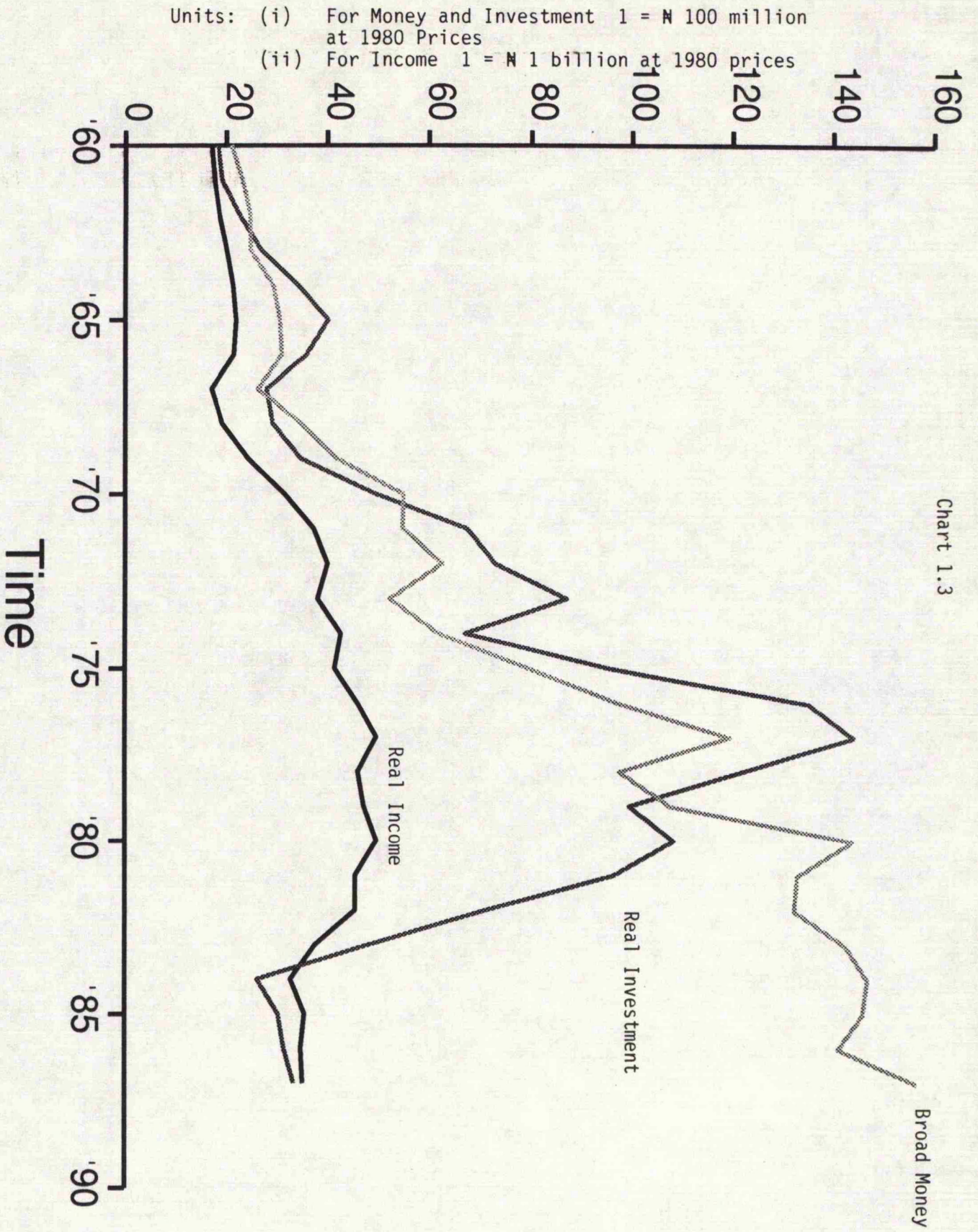
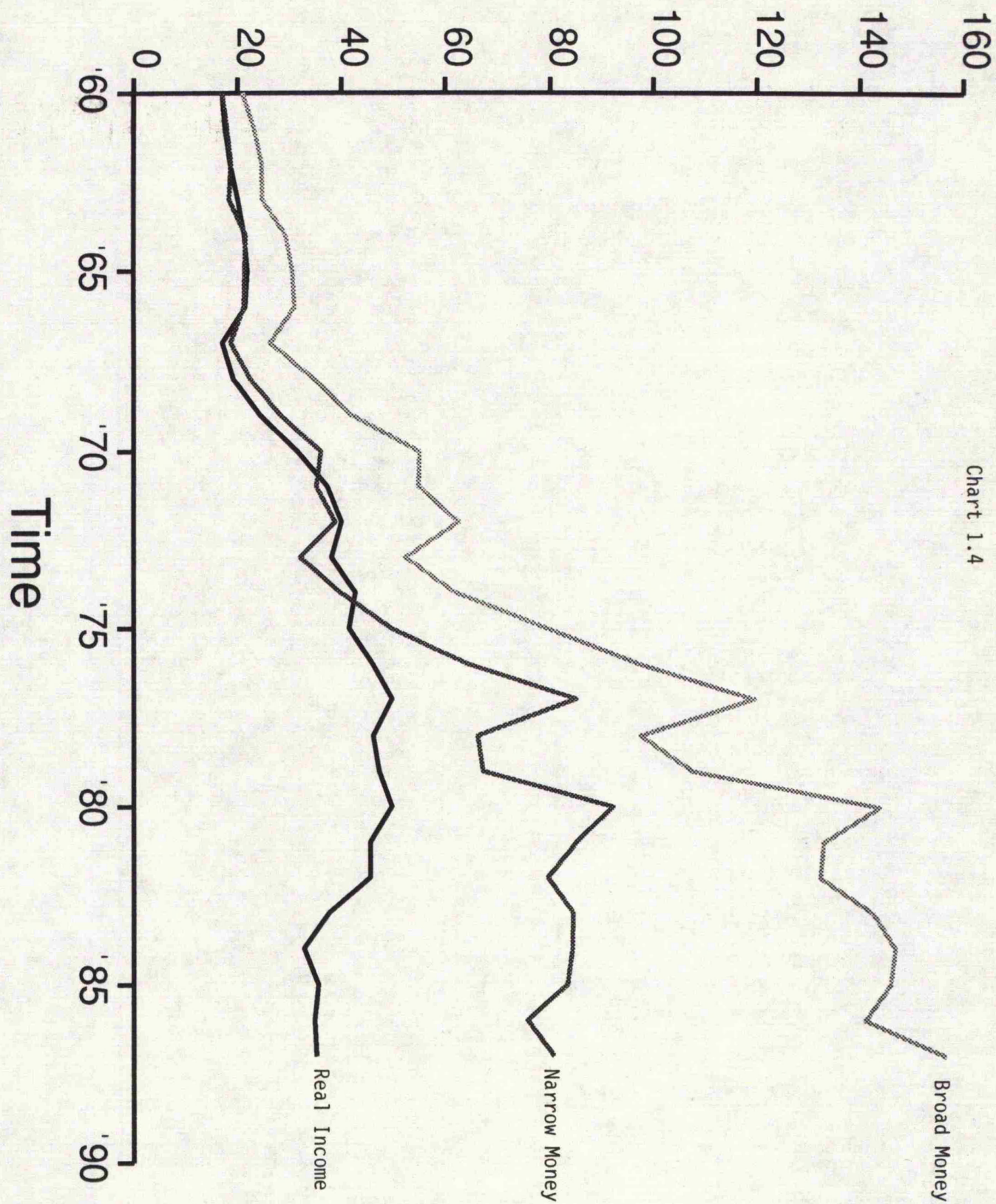


Chart 1.3



Units: (i) For Money and Investment 1 = N 100 million
at 1980 Prices
(ii) For Income 1 = N 1 billion at 1980 prices



oil boom period. This is also exhibited by the rise in gross investment during this period (1970's). The depression of the economy set in motion a decline in the rate of investment, which was so low towards the end of our period that it did not recover the supposed depreciation, thus resulting in an actual fall in the capital stock. In charts 1.2, 1.3 and 1.4, I present the narrow and broad monies, income and investment. The other variable used in chapter six for the aggregate production function analysis, namely total employment, is not used in this graph. It had to be an index, calculated on the basis of employments in some sectors of the economy. The details of the weights and other assumptions are presented in the relevant sections of chapter six. The graphs in these three charts give us an impression of how they have been varying together. A thousand-fold increase in the scale of the vertical axis for these charts compared to the first, allows us to see the fluctuations in real gross investment.

The association between investment and narrow money looks closer than that for the broad money, whereas no such clear relationship is observed for real income. The oil boom elevated the level around which real income had been fluctuating in the 1970's. But the fast drop in it, with the setting of recession and the subsequent depression, can be seen in its historical perspective. For example, the steady growth of the economy during the 1960's, ignoring the dip for the civil war, if retained throughout the period without the oil boom, could have reached the same level towards the end of our period, as the actual level registered after the fortunes of the 1970's and the misfortunes of the 1980's.

Let me now present four other charts on the data for the subject matter of chapter seven. The relevant variables there are (i) income,

Chart 1.5

Naira Million for Monies
Industrial Output Index for Income

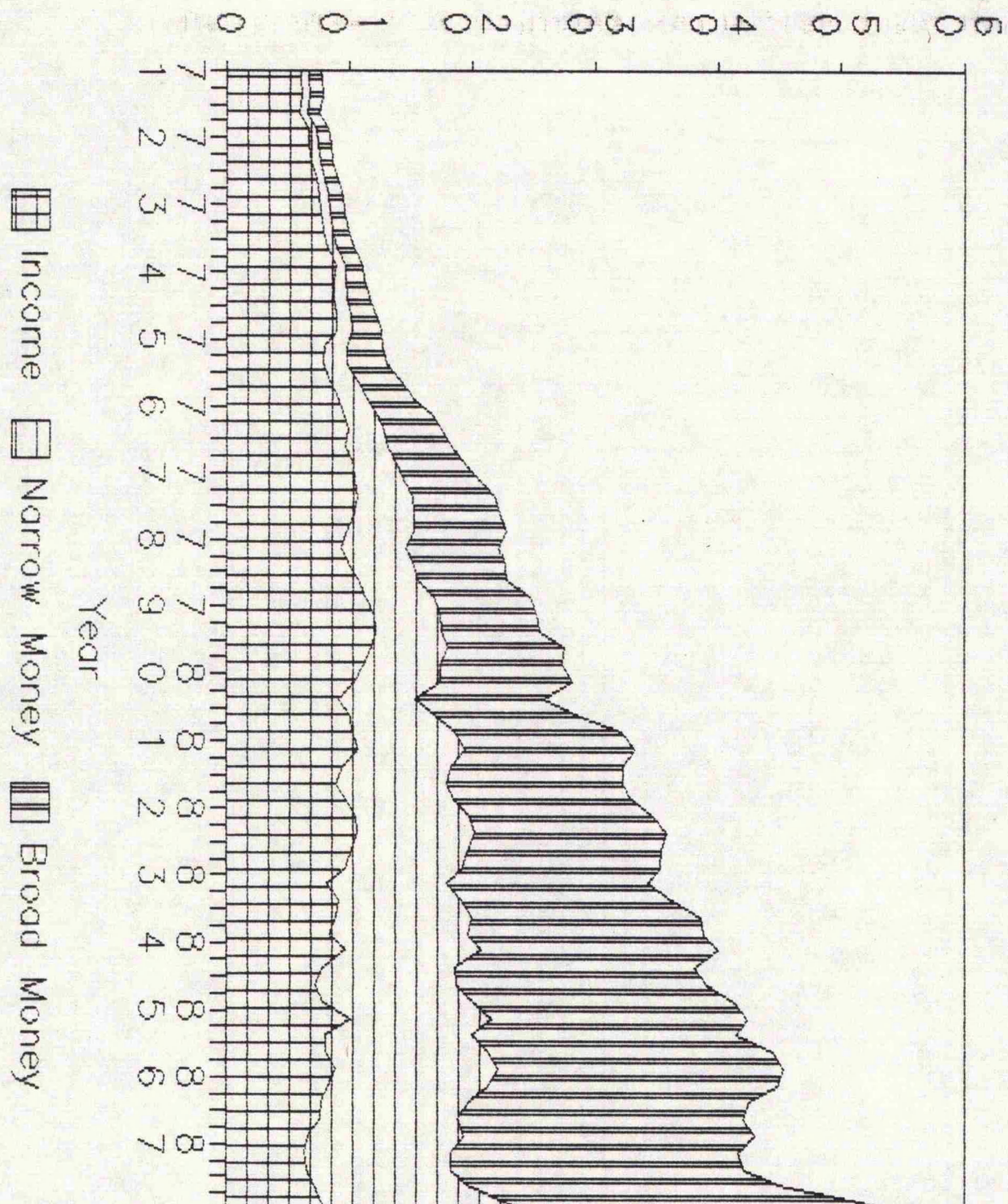


Chart 1.6

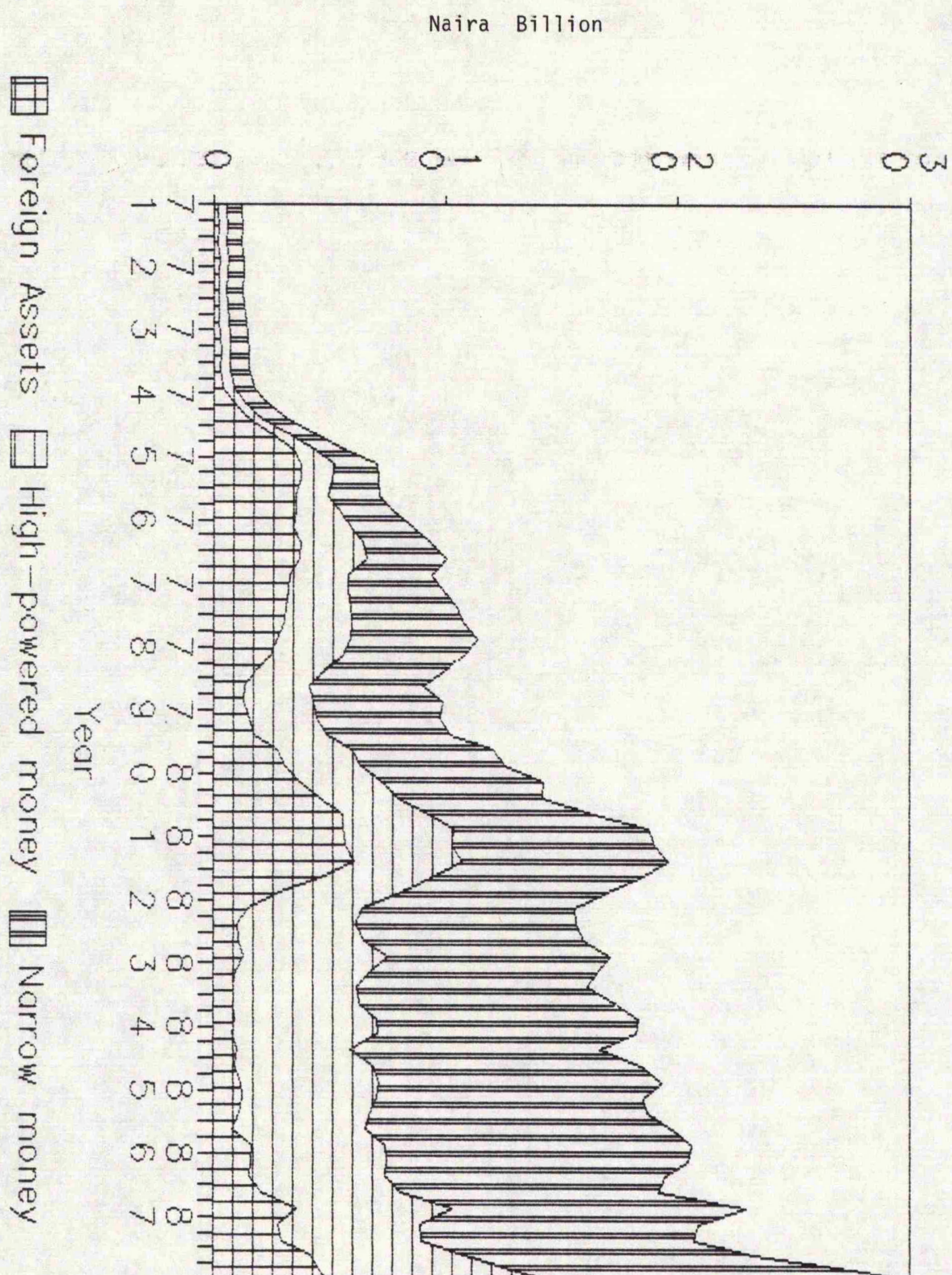


Table 1.7

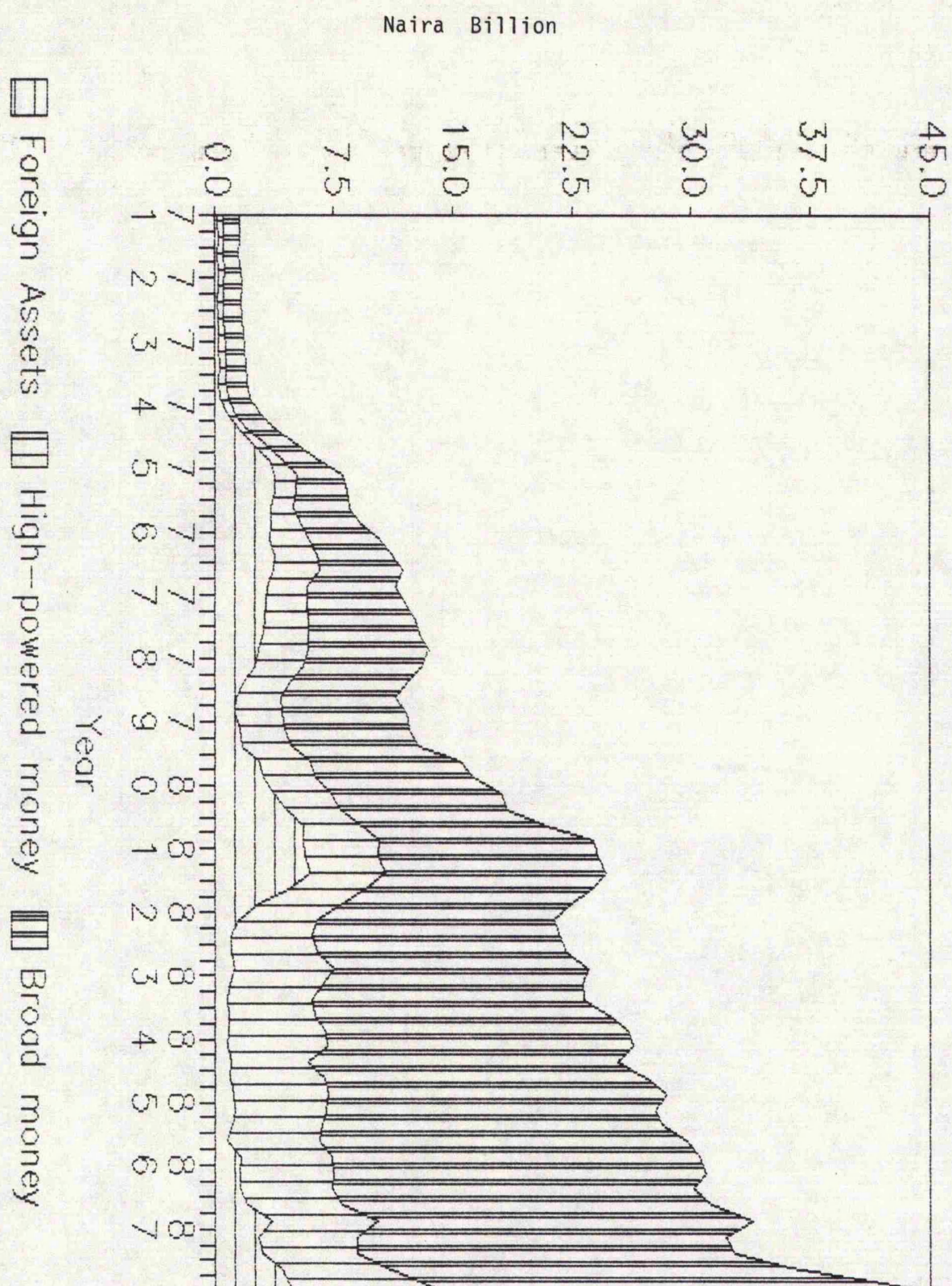
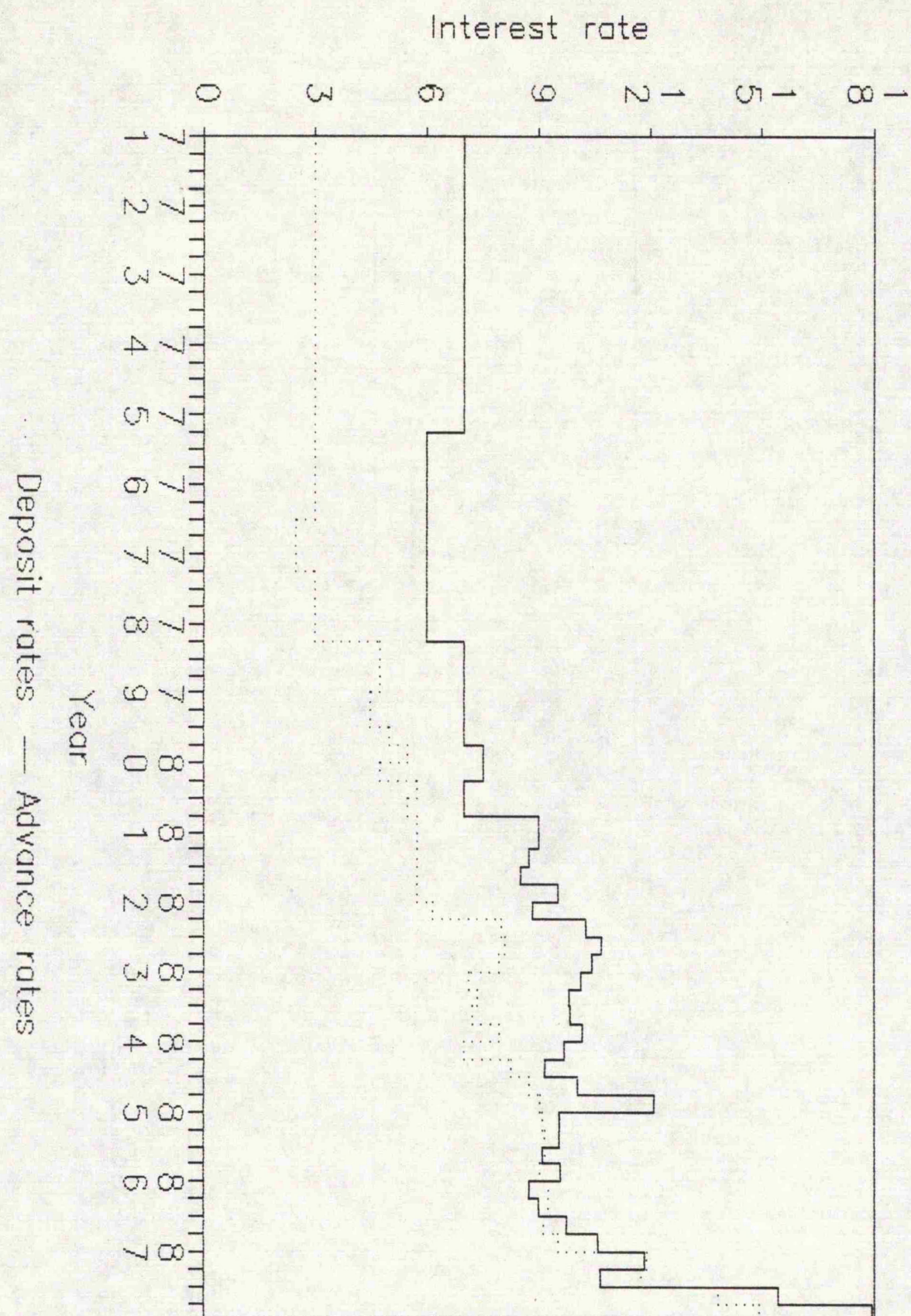


Chart 1.8



(ii) narrow and broad money, (iii) high-powered money, (iv) foreign assets and (v) deposit and advance rates of interest. They are presented in different combinations in charts 1.5 to 1.8. In chart 1.5, the shades for narrow and broad money look very similar, as they ought to, but both of them are of different types to that of income. This is also observed in chart 1.4 above, where the annual values of the same variables are graphed. When I put together high-powered money and foreign assets with either definition of money (charts 1.6 and 1.7), no obvious pattern is discernible. Finally, in chart 1.8, we can see how the deposit and advance rates increased to rather high levels towards the end of our sample period. Deposit rates are sometimes above the advance rates, which is quite feasible, since demand deposits do not incur any interest cost to the banks and the advance rates are those for the "first class" advances. These high interest rates may be nearer to their equilibrium values compared to the low rates of the earlier years, when savings must have been adversely affected due to the negative real return on one's deposits in an inflationary situation.

C. Some Related Issues

As already indicated, the main theme of the study is the influence of money on output and how money itself is determined in Nigeria. But certain aspects of the economy in the recent past are of great importance in understanding its nature, though they are not investigated here. One such phenomenon is known as the 'Dutch Disease', when an accelerated growth of a sector of the economy may provide certain obstacles to the development of others. The second feature, which I am not investigating here, is the analysis of the balance of payments and the exchange rate. Both these aspects are

quite close to what I am studying and can not be avoided, even for my special theme. But they are not in the models which are hypothesized and tested. It is appropriate here, therefore, to provide some analysis of those phenomena and indicate their relevance to the main theme of the thesis. Let me take up the second one first.

(a) Balance of Payments and the Exchange Rate

In October 1980, the market rate for Naira was \$1.89 and by November 1988 it fell to \$0.19, i.e. 10% of its former value. This dramatic drop in the exchange rate has been caused mainly by the drop in the production and price of oil, which was more than 90% of the total value of Nigerian exports during that period. The fastest drop in the dollar value of naira happened between 1985 and 1986 when the average annual market exchange rate fell from a parity with dollar to 30 cents. During most of our sample period Nigeria was following a fixed exchange rate regime. The parity with £-sterling was maintained after the creation of the CBN until 1973 when the Naira was devalued. Huge increases in oil revenues produced enormous balance of payment surplus during 1973-74 and 1979-80, but the growth of imports led to deficits in 1976-78. By September 1978, the foreign exchange reserves stood at little over one and a half billion naira which could pay for six weeks of imports on the current rate. Situations improved after that, due to a thorough import supervision scheme and the federal government's success in raising funds in the international markets. Nigeria's problems on balance of payments in the 1980's have been described in chapter three. With all the signs towards devaluation, Nigerians refused to accept that and tried a system called the Second-Tier Foreign Exchange Market (SFEM) starting from 29th September, 1986. This was a combination of pegged systems for "preferred transactions",

like debt servicing and freely flexible market rate where the forces of demand and supply would determine the foreign value of naira. this was finally abandoned and the naira is now floating freely, approaching 40 nairas to a dollar in the market place.

Since most of our time period in chapter seven coincided with the fixed exchange rate regime, let me use the appropriate Mundell² model on the Nigerian experience during that time. This would exhibit the lack of co-ordination between the monetary and exchange rate policies of the time. In a fixed exchange rate regime, an increase in world demand or in world price, like the case for Nigeria during the oil boom in the mid-1970's, would shift³ the IS and BP curves to the right. The impact effect of that with unchanging domestic prices, would be a rise in the interest rate, an increase in real income and a balance of payments surplus. The BP curve would shift further to the right than the IS curve would, because the only leakage for the former is import while for the latter they are saving, tax and import. The impact effect, however, indicates the intersection of the new IS curve with the original LM curve. But the LM curve will not stay fixed, it will shift to the right with the increase in money supply due to the balance

² R. Mundell, "The Monetary Dynamics of International Adjustment under Fixed and Flexible Exchange Rates", Quarterly Journal of Economics, Vol.74, May, 1960.
_____, "The Appropriate Use of Monetary and Fiscal Policies for Internal and External Stability", I.M.F. Staff Papers, March, 1962.

³ Since the IS/LM/BP curves analysis is part of the standard analytical tools, and the basis of the case under consideration is explained in all intermediate texts on macroeconomics I feel free to use them without actually drawing the corresponding diagram(s) assumed behind the discussion.

of payment surplus. As the LM curve is shifting to the right, it is increasing real income still further, but reducing the interest rate from its high level reached at the impact effect. The balance of payments stays in surplus during these adjustments, but comes to balance in the eventual equilibrium. Thus, the equilibrium after this foreign shock to the system will be reached under all the given assumptions, with a fall in interest rate and a rise in real income at the new intersection of the new IS, LM and BP curves. If we change some assumptions in this model like the domestic prices rising at the same time, then the new IS, LM and BP curves will all shift backward and the state of the final comparative static equilibrium will depend on the extent on the domestic price rise.

Let me now relate the recent Nigerian experience to the above analysis. The foreign shock set in motion the above process, but the domestic price level could not be held fixed. This meant a smaller rise in income than would have been the case with unchanging domestic prices. The BP curve in the Nigerian context is likely to be rather inelastic. On top of that, the administered interest rates were usually held low compared to both what could have been the domestic equilibrium rate and the world rate. Thus most of the assumed response on the BP curve for Nigeria would have worked through the net export schedule, with very little, if any, effect from capital inflows or outflows. This would lead to a situation of balance of payments surplus with rise in real income. But the balance of payment situation could be reversed, if the "shock" in world price and demand were to shift the IS curve backward to the left. Such was the case with Nigeria in the first half of 1980's when both the price of oil and Nigeria's production quota for the OPEC fell drastically. This would

mean a fall in income in the above paradigm and indeed such was the case for Nigeria. The corresponding bigger shift of the BP curve upward would mean a longer time back towards a new lower level of income, and this time the disequilibrium had to be coped with a deficit in balance of payments. When such was the case with Nigeria and naira remained utterly overvalued for years and years and all the succeeding policy makers, political and military leaders and sometimes even some of the economists in the country refusing to accept the economic fact and logic of the situation because devaluation was deemed as destruction or defeat! The chronology of this struggle and debate with the international bodies like the IMF, is to be presented in chapter three below. Here I would like to point out the anomalies of the policy decisions of the time.

On money supply the monetary authorities in the country responded to the balance of payments situation symmetrically. During surplus times, they readily monetized the surplus fully in creating extra high-powered money, but during deficits they arranged to increase the domestic credit (i.e. mainly by the CBN on the basis of extra federal government securities) to compensate for the drop in the sources side of the monetary base. It may be noted at this point that in the recent Nigerian case, since the federal government earned most of the foreign exchange from exports, even a long-term sterilization was possible in the event of a surplus. In the case of deficit, we just saw how they "sterilized" the dampening effect on the monetary base. Thus the textbook case of the monetary authorities not being able to determine the stock of money in a fixed exchange rate regime, may not apply to Nigeria during this period and thus they had a degree of freedom in policy making which is denied to most other countries with pegged

exchange rates. But they did not have any such freedom in retaining a high exchange value of naira, first with no limitless foreign assets and second with limited opportunity to raise funds and borrow indefinitely from international markets and organisations. This was the anomaly of the monetary and exchange rate policies.

(b) The Dutch Disease

The accelerated growth of one sector of an economy may lead to stagnation or even decline in another. IN the Nigerian case the obvious example is that of the predominance of the oil sector and the relative decline of the Agriculture and Manufacturing sectors in the recent years. Max Corden and J. Peter Neary (op.cit., 1982) have provided rigorous economic logic behind such possibilities under certain assumptions, some of which may be appropriate for the Nigerian scene. They "..... are primarily concerned with the medium-run effects of asymmetric growth on resource allocation and income distribution" (ibid, p.825). One of their results was that "... a boom in one part of a country's traded goods sector" could lead to de-industrialisation. For this result they needed the assumption of labour being the only mobile factor of production between the sectors while the other assumption of no international capital mobility may be not very far from what actually happened in the Nigerian case. A look into the Nigerian data on the sectoral division of the GDP may indicate what did happen. This is by no means any kind of test of the above theory but only a curiosity to note the sectoral income distribution before and after the oil boom. Usually, the hypothesis is made on the common sense logic that the high value of naira made imports cheap and prevented the growth of the import-substitutes in the country. But a model which explains that prospect after allowing for all possible

resource reallocations is reassuring to a researcher whether in the quest for a proper econometric test or just casual empiricism. Let me now look at the data under the latter motivation.

Table 1.1 Some sectoral growth of the GDP at Current Factor Cost

Years	1960	1965	1970	1975	1980	1985
Sectors						
Agriculture	709 (63.5)	846 (54.3)	2576 (48.8)	4048 (27.6)	11479 (20.8)	24379 (37.2)
Manufacturing	54 (4.8)	109 (7.0)	378 (7.2)	1169 (8.0)	4063 (7.4)	4216 (6.4)
Total GDP	1117 (100)	1558 (100)	5281 (100)	14655 (100)	55167 (100)	65467 (100)

Source: Federal Office of Statistics, Several Publications

Note: All the years refer to the fiscal years starting in April of the year. Numbers within parentheses are the respective percentages.

In Table 1.1, I present the contribution towards the GDP at five-year intervals, coming from the Agriculture and the Manufacturing sectors. In the decade before the oil boom, there seems to be nothing unusual in the way those two sectors had been progressing, for a developing country, with a large share of GDP in Agriculture, and small one for Manufacturing. But a drastic drop in the share of the Agriculture sector in 1980 compared to 1975 and also a fall in the share of Manufacturing may be what has been termed as the Dutch Disease. A fall in the real return to the factor specific to the non-booming sector like Agriculture labour was causing large migration to the urban areas. The manufacturing sector also declined relatively. If I am to interpret "..... 'decline'..... as a fall in the size of a sector relative to the outcome in the absence of a sectoral boom." (Max Corden and Neary, *ibid.* p.842), the case for Nigeria all through the 1970's for Agriculture and Manufacturing and even through 1980's for Manufacturing serves as a typical example of the "Dutch Disease". Between 1980 and 1985 the price index as per the GDP deflator increased by 58.7 per cent while the nominal growth rate for the Manufacturing sector was a mere 3.8 per cent, thus registering a real decline of 54.9 per cent. One can claim this to be a typical example of the oil boom leading to de-industrialisation".

I end this introductory chapter by recapitulating what follows in the rest of the thesis. After a descriptive summary of the historical background and the recent trends, a set of statistical tests has been undertaken on the post-CBN Nigerian experience of the monetary and economic growth, financial intermediation, inflation and of saving and/or investment-income ratios. This is followed by a survey of the recent research works on the principal themes of the thesis which are

presented and tested in chapters five, six and seven. They are, (i) a hypothesis for the financial repression and (ii) a model for the determination of the money stock. In the concluding chapter, the results from the earlier parts are presented together, along with some discussions on the policy matters which may directly or indirectly follow from the thesis.

CHAPTER 2 - HISTORICAL BACKGROUND AND THE RECENT TRENDS OF THE NIGERIAN MONETARY SYSTEM

A. Introduction

This chapter provides a broad historical perspective and also a descriptive account of our main period of interest, i.e. the post-independence period and the era of the Central Bank of Nigeria. Here we seek to understand the development and demise of various monetary arrangements and institutions and the trade and economic needs which made their appearance possible and their extinction, inevitable. In the case of Nigeria, the colonial context is of paramount importance: how the native traders and the expatriate community of businessmen and administrators needed some form of monetary arrangement and also, how they helped the process of its evolution. The colonial masters operating from the distance of London, were themselves not sure of the institutions they would eventually be required to evolve; and which in the end, would turn out to be the blue print of the currency and financial arrangements for the colonies throughout the length and breadth of what was then the British Empire. It may be realistic to assume that the authorities in London were interested exclusively to evolve a monetary system or a currency board which would enhance the international trade from a particular colony to Great Britain. If, in the process, the development of the domestic economy was helped or hindered, the issue remained irrelevant, as we would see in the documented communications between the contemporary civil servants. On

the other end of the scale, we look at the history of that time of the colonial contacts with the military and economic superpower as the dissemination of some monetary infrastructures which could open up the local economies throughout their various regions and raise their economic potential manifold. This may be the unavoidable byproduct of the trade facilities that London wanted foremost. But the evaluation of the monetary history (or of any other social infrastructures, e.g. the spread of railways in India or of the English language in Nigeria and in India) ought not to lose sight of the fact that the acquisition and use of financial structure of considerable maturity and promise, could have taken much longer to grow domestically, unaided, otherwise. We now start tracing the monetary history of Nigeria in the light of the above preference or prejudice. In this endeavour we interpret historical events as depicted in the published works rather than provide some evidence for them.

B. Before the Currency Board

There is a hypothesis that the COWRIE currency system worked smoothly for West Africa for centuries until its collapse caused by enormous influx of that commodity money into the area brought about by the European merchants.

O A Nwani¹ summarised the findings of some earlier works to point out:

"The scarcity of the supply of cowrie shells in West Africa created a diabolical opportunity for England, Holland, Portugal and France to trade in cowries".

1. O A Nwani, "The Quantity Theory in the Early Monetary System of West Africa with Particular Emphasis on Nigeria, 1850-1895", Journal of Political Economy, 1975, vol. 83 no. 1, Communications, pp 185-193.

The cowrie currency zone of West Africa experienced excess supply of money during a period which is traced back to 1680 and beyond. For example, in 1721, import of cowries into West Africa was estimated to be above 127 million units. In exchange for these billions of brittle shells of the types CYPRAEA MONETA from the Maldiv Islands and CYPRAEA ANNALUS from and around Zanzibar, over the years the European traders were taking away palm produce, kola nuts, ivory and stocks of human capital in the form of slaves. There must have been a considerable element of what can best be described here as a seignorage profit after making allowance for the costs of gathering, shifting and stocking vast amounts of shells and also for the reduction in its value due to the consequent inflation. There was a considerable reduction of the exchange value of cowrie both in relation to other means of exchange like Sterling and to commodities like ox, nuts and chickens. The sheer physical difficulty with the handling of the cowrie currency in the mid 1890's in places like Accra, Whydah and Lagos can be illustrated by some prices like: 2000 cowries = 1s (Sterling) in Accra; = 6d in Whydah and Lagos; and 1 ox = 60,000 cowries and 1 chicken = 333 cowries. These prices recorded some inflation rates which were much higher for a range of goods in both domestic and international demand like palm oil and kola nuts than for goods in domestic demand alone like oxen and chicken. As a rate of inflation the period 1850-1892 recorded some price rises which was never as spectacular, as for example, the hyperinflation of the early 1920's experienced in Austria, Germany, Hungary, Poland or Russia. But the effect of

inflation on the cowrie currency system was devastating specially when one needed to procure, store and sometimes carry vast amounts of these small brittle shells for routine transactions of day to day life. To quote O A Nwani (ibid. p 192).

"... the collapse of the cowrie currency system was attributable to the large importation of cowries by some European countries into West Africa from 1600 and continuing to 1900, the suppression of its use as currency in the area by the European Colonial governments, and the inflation that resulted, leading to a flight from it."

The problems with a particular type of commodity money would eventually lead to social demand and therefore, evolution of some other form(s) of commodity money. In the case of West Africa, by the turn of the century they were (i) bottles of gin, (ii) brass rods, (iii) cowries, (iv) slaves, (v) British silver coins, (vi) French 5-franc pieces, (vii) United States eagles and doubloons (gold coins) and (viii) Maria Theresa dollar. The currency of these money units varied in different parts of West Africa. It was in this context of monetary anarchy and disorder Mr Chamberlin, Secretary of State for the Colonies, suggested a separate currency for West Africa in January 1898.

By the end of the century British silver coins were the leading medium of exchange among its competitors and its imports into West Africa were growing year by year. This development encouraged some colonial Governors like Sir Henry McCallum of Lagos and Sir W Maxwell of the Gold

Coast to suggest a share of the seigniorage profits - the differences between the face value of coins and their cost of production, storage and distribution - for their respective territories. The chronology of the communications between London and the West African Colonies and also between the Colonial office and the Treasury, has been documented by W T Newlyn and D C Rowan.²

Mr Chamberlin suggested to the Treasury (i) either a share of the seigniorage profits for the West African territories or (ii) the introduction of a separate currency for West Africa. The first proposal had the added attraction of a possible reduction in the West African "... demands for assistance from Imperial funds." (Newlyn and Rowan, p 28).

The response to all these requests by June 1899 betrayed ignorance of elementary Economics and Statistics knowledge possessed by their Lordships of the Treasury.

On Statistics:

"My Lords do not view with favour the proposal to take advantage of the predilection of African natives for silver coins as a means for passing an unlimited quantity of Imperial tokens into that continent. Experience has shown that the possibility of ultimate return of such coins to this country is by no means remote, as is suggested in the letter under reply. They could not view that contingency without apprehension as to the effect which might be produced upon the currency, and even, it might be, upon the finances of the United Kingdom." (Newlyn and Rowan, p 29).

2. W T Newlyn and D C Rowan, Money and Banking in British Colonial Africa, Oxford, 1954.

It may be obvious to a neutral observer, contemporary or otherwise, that the probability of "ultimate return" of sufficiently large amount of silver coins - large enough to cause crisis in the finances of the United Kingdom - must have been very remote indeed!

The only evidence that comes to mind for that period in the imperial country would be the crash of the Liberator Building Society³ in 1892, the biggest in the country at the time. One can only guess that the recent memory of this Liberator crash could have influenced the Treasury towards such statistical fantasy.

On Economics:

".... the Treasury was unable to 'recognise, any ground of justice for the claim' and was unwilling to admit that 'the difference between the coined and metallic value of silver was a clear profit to issuing mint!'" (Newlyn and Rowan, p 28).

The seigniorage profit was substantial every year and the Treasury claimed the profit was possible ".... solely out of the measures adopted by the Imperial Government to regulate the issue of its silver coins."

It is possible that the face value of a coin could be arbitrarily fixed so low in comparison to the market value of its metallic content that people may find it profitable to melt the coins for their metallic value. The suppliers of these coins, therefore, have some responsibility to control the amount of the coins so that its face value remains always well above its metallic value. That was the

3. S J Price, Building Societies - Their Origin and History, Franey & Co Ltd, London, 1958.

case at the time with the Sterling silver coins, both in London and West Africa even though in West Africa a very small proportion of the coins were buried or used as ornaments. But so long as the face value of the coins were well above their metallic value, seigniorage profit was being made and it accrued to the owners of the issuing mint. The colonial office estimate of this West African profit for 1898 was "at least £150,000" out of a new silver coin issue of face value of "no less than £309,250."

In the face of this economic illogic and statistical nonsense from the Treasury, Mr Chamberlin of the Colonial office started on his second alternative: the creation of a special West African currency.

Newlyn and Rowan (op. cit.) documented in details the communications between the Colonial office, the Treasury and the Colonial Governors over the years through the Barbour Committee, the Emmott Committee of 1911 until the setting up of the West African Currency Board in November, 1912. What comes out clearly in this historical process of finding a suitable currency system for West Africa, to a neutral observer after nearly a century, is the total disregard of the local needs:

- (i) ".... to discover ways in which the use of currency by Africans could be extended";
- and (ii) ".... to ensure that the existing subsidiary currencies were suitable to African needs" (Newlyn and Rowan, *ibid.* p 44).

The Emmott Committee's terms of reference were put in a way whereby the main economic policy problems were

".... essentially corrected with the interests of those engaged in external trade, the remittance of funds on a large scale and the import and export of capital." (Newlyn and Rowan, *ibid.* p 44).

C. The West African Currency Board

The WACB was established in November, 1912 and went through some revisions of its regulations in 1915, 1924 and 1949. The Emmott Committee's motivation for the proposed creation of the currency board were threefold:

- (i) to ensure the convertability of the West African currency into sterling at a predetermined exchange rate;
- (ii) to provide ways for the West African governments (Nigeria, Gold Coast, Sierra Leone and Gambia) to share the seignorage profits of the currency issue; and
- (iii) to start the issue of West African currency notes.

Let us first summarise the working of the board in terms of these goals over the years and then attempt an evaluation of its performance.

I **Convertability**

To quote the regulation (1949 version):

"The Board shall issue at its main centres at Accra, Bathurst, Freetown and Lagos, in the Constituent Territories, to any person who makes demand in that behalf coin or currency notes equivalent to the value (at the rate of Twenty shillings West African

currency to one pound sterling) of sums in sterling with the Board in London."

Alternatively, subject to some provisions (on minimum limits of values and on certain procedures),

"The Board shall pay to any person who makes demand in that behalf sterling in London equivalent to the value (calculated as aforesaid) of coin or currency, notes lodged with the Board at its aforesaid centres in the Constituent Territories."

This regulation made the two currencies quite indistinguishable from each other and had to be achieved, as we shall see, at an enormous cost to the region. The sterling exchange standard can be visualised from the sterling reserves the Board kept as a percentage of its currency liability. Only in the early twenties it was slightly below 100 per cent, whereas in the forties and fifties, it was hovering around 110 per cent, reaching its maximum in 1935 to over 126 per cent. Thus, the WACB did no banking function in terms of creating money in the region - it was totally dependent on the foreign trade. Again, due to the lack of local securities at the time, the Board's investment were made in British Government and British Local Authority Securities. These investments grew from £29.5 m in 1945 to over £60 m in 1950. On the merits of the workings of such an

arrangement, Prof G O Nwankwo⁴ quoted two contemporary British financial experts:

J L Fisher (1956): ".... the 100 per cent sterling coverage ensured the exchange stability of the West African currency in terms of sterling while the automatic link with sterling ensured that in times of financial stress Nigeria could look to London for help which 'is a most important financial consideration.' Besides, since the reserves were invested in London, accruing interest swelled the external income of Nigeria, while at the same time the reserves remained immediately available for payments because bills could be discounted and securities readily sold at need. In effect London acted 'as the international money market for Nigeria ... and confidence in the currency was maintained."

J B Loynes (1957):

"The system has preserved at all times a stable value of the West African currency in terms of sterling. It has given expert management at very small cost furthermore it has provided a currency which is known and accepted even in outlying parts of the huge and diversified area which it serves."

These comments were usually quoted as examples of anti-central bank lobby during the debate on the possibility of establishing a central bank for Nigeria. But what they maintained as the merits of the WACB, could not be denied, seen against the monetary anarchy in

4. G O Nwankwo, The Nigerian Financial System, MacMillan, London, 1980.

Nigeria during the turn of the century. This is not to say that the Board could not have performed better. The Board after all, was designed to serve first and foremost the interests of Britain in general and of the British traders in particular. It did not, though it could, initiate economic development in Nigeria at a much earlier date and at a faster pace than what actually happened, through monetizing the region more. The interests of Britain were supreme, as it would be expected of an institution devised by them. The stabilizing effect on the local currency, which the two commenators described, may be regarded as a by-product of the grand international currency strategy that had been masterminded to harvest the gains from foreign trade with the colonies.

The convertability ease of this currency arrangement led to the concepts like 'localised currency', 'seasonally migratory money' a 'shuttle money'. All these refer to the seasonality of the demand for money in Nigeria under the WACB regime. The demand for money was usually low during the slack agricultural period between May to September. To quote J Mars⁵

5. J Mars, 'The Monetary and Banking system and the Loan Market of Nigeria:' in Mining, Commerce and Finance in Nigeria, edited by Margery Perham, Faber and Faber Ltd, London, 1948.

"The Cocoa crop arriving in October causes the demand to rise, and by November the increase in palm-oil deliveries is causing a huge increase in demand, which is later on sustained by the arrival of the ground-nut crop. In April the demand for money begins to dwindle. Thus, from November until the end of March the money needed is on an average 32 per cent higher than the average amount of money needed from May until September inclusive."

Again, the implication of the smooth and almost automatic convertability meant that

".... whenever the localised currency increases the increment is virtually obtained at the expense of a commodity loan by Nigerian produces to London." (J Mars, op. cit. p 190).

Again, "(i)f the various ways in which increases in the localised currency came about are analysed in detail it can be shown that in almost every case the increment entails an ultimate sacrifice of export goods and services, no matter whether money is brought in by the activities of exporters, importers or the government." (J Mars, op. cit. p 190).

II Seigniorage Profits

Because of the high reserve ratio for the sterling backing of the West African currency the major source of income for the Board was not the difference between the face value and the metallic value of the coins, as was expected before. The Sterling exchange standard resulted in the Board keeping more than 100 per cent reserves in British Government securities and the dividends on such

securities provided it with its main source of income. The idea of reserves of 100 per cent or more came from the possible large demand for redemption and that danger dictated the nature of portfolio of the Board's assets. Nearly⁶ half of its assets (30 June, 1950, Balance Sheet) was in securities which were "shorts" (ie 1-5 years to maturity). To quote

W T Newlyn

"With so large a proportion of its assets in SHORTS, Board is clearly in a very strong position to meet possible demands for redemption." (p 434).

The overhead costs of the Board varied between only £3,000 to £7,000 during 1944/5 to 1950/1, because it had very few currency centres. For example, in a vast country like Nigeria they were spread very thinly with centres in Lagos, Ibadan, Kano and Port Harcourt. Bank of British West Africa carried on the Board's functions in Nigeria. The main costs of the Board were the 'cost of currency manufacture' and the costs for insurance and transportation of funds between the various centres. The low average yield of the reserves has been pointed out by some commentators as due to the predominance of short securities to guarantee the liquidity of such reserves and hence the low profit. We have to note two

6. W T Newlyn, "The Colonial Empire" in Banking in the British Commonwealth, edited by R S Sayers, Oxford, Clarendon Press, 1952.

things here: (i) Redemptions and (ii) Profitability. Redemptions were nil between 1916/17 to 1918/19 and again between 1941/42 to 1948/49. The highest redemption was nearly £7 m in 1920/21 which reduced the currency circulation in West Africa from over £13 m to £8.6 m, even after allowing for nearly £2 m new issue [Newlyn (1952), Table 2, p 430]. There was a steady period for redemptions between 1923/24 to 1934/35, peaking during the early depression years of the mother country. But issues in those years, except 1930/31, somewhat compensated for the resulting drop in currency in circulation. So, these trends, again reflected the foreign trade sector of the economy which could easily do with a little more cash or an ever increasing dose of monetization. W T Newlyn's (op. cit.) redemption table may be cited as some excuse for (a) large reserve backing and (b) the predominance of the "shorts" in the Board's assets portfolio. But, again, the justification for a cent per cent backing or more could only be presented in terms of an arrangement which concentrates totally on the foreign trade sector at the cost of the rest of the economy.

On the profitability of the Board's performance, it would have been a great deal better for the region as a whole, if it was seeded with tens, if not hundreds of currency

centres all over the land. This would have increased the Board's overheads, freight and insurance costs enormously, thus turning the modest profits into huge losses which the arrangement could easily absorb by bringing in a little fiduciary element in the money supply. Yet, we must remind ourselves, that the West African currency Board, like any other at the time was not meant to be an exercise either in economic development or in international monetary co-operation, but a plain and simple case of monetary subjugation of what W T Newlyn would call "The Colonial Empire".

III Currency Notes

The experience with the currency notes during the pre-central-bank WACB-era in Nigeria has to be seen in the broader context of the use of money among the Nigerians in general and the expatriate traders in particular. Until 1916 there was no currency note for West Africa as such, and the WACB introduced currency notes for £5, £1, 10s, 2s and 1s in that year. Notes of the smaller denomination were introduced as a temporary measure because there was already pressure on the British Mint to supply coins in the UK itself. These notes were not liked by the Africans either and they were withdrawn after the end of WWI when the pressure on the Mint relaxed and more coins were made

available. Also in 1920 the Board replaced the West African silver coins by alloy coins ".... mainly to discourage hoarding and melting down which was the fate of too large a proportion of the silver coinage" (J Mars, *op. cit.* p 181). But because of the basically small value of a typical exchange among the locals, the board felt themselves obliged to provide 100 per cent coin cover for the currency in circulation. This caused problem as the demand for various types of money varied not only among "expatriate" and domestic traders, but also among the commercial centres like Kano and Lagos and the far flung places of the region. The board's inability to supply enough coins for the currency notes caused an increase in its price in terms of currency notes. J Mars (*op. cit.* p 182) noted the case of Dan Tata, then only a Kano merchant ".... reported to have exchanged between £10,000 and £20,000 of notes for coins at the rate of £1 paper for 17s 6d in coin in 1937". Again, in the Western Provinces in the 1920's ".... one could pick up £1 notes for twelve shillings in coin. A labourer who received his monthly wage of £1 in the form of a note was at a great disadvantage since, no one would change it for him".⁷

Perhaps the most telling comment on the

7. H L Ward Price, Dark Subjects, London, 1939, pp 251-2.

relative lack of 'liquidity' of the notes was noted by H L Ward Price (op. cit.); when

".... one African trader, failing to obtain change for £100 in notes, left them behind on his departure and never returned to claim them".

W T Newlyn and D C Rowan (op. cit., p 57) summed up the situation as follows:

"Notes were originally advocated as a means of simplifying remittance problems. It seems, however, that their efficiency in this respect must have been reduced by the uncertainty of conversion, while considerable losses may have been inflicted on African traders, farmers and labourers."

If we look at the general context of the particular interest the Board was first safeguarding the actions of the Board can easily be explained. But there were problems, to pursue even these limited objectives, ".... by the Board's failure to foresee the rise in crop prices ... (bringing) about a collapse of convertability in Kano" (Newlyn and Rowan, op. cit. p 57). It could not be explained fully in terms of the ".... disinclination of Africans to use paper money" (J Mars, op. cit. p 182) because their typical transaction needed coins rather than notes. The choice of anything in life, (currency types included) depends on tastes and preferences and also on exchange constraints. It is a pity that the Board failed also in this vital part of its job for so many years, in not being able to provide Nigeria with sufficient amount of coins.

Thus, the West African Currency Board's operation in Nigeria kept the foreign value of the Nigerian currency stable at the cost of the growth of the real money supply for all those years. Real money (like roads, hospitals, schools etc.) performs the very important economic function of facilitating exchange - smoother exchange would have increased productivity and opened up new avenues of human ingenuity and drive which lies dormant in any society. This lack of a proper degree of monetization of the economy must have affected economic development of Nigeria during this period and thus stunted her growth for generations under the stringent rules of the imperial monetarism.

D. The Controversy over a Central Bank in Nigeria

The first documented proposal for a central bank in Nigeria can be traced to J Mars' (op. cit. p 212) work, where it is contained in only a few sentences. The reasons for its establishment were enumerated as follows:

- (i) countercyclical control of the deposit money with the commercial banks by manipulating the legal cash ratio to the deposit liabilities;
- (ii) provision of loan to some banks in temporary difficulty with liquid assets;
- (iii) sterilization of the overflow of the West African currency into Nigeria through open

market operations which, however, would require the existence of a government bond market;

- (iv) Mars recognised the lack of such markets in Nigeria at that time but remained optimistic about its appearance in the future through projects like

".... financing self-liquidating electricity works, pipeborne water supplies, drainage systems to create some gilt-edged local loans which might become so popular that they would attract most of the money which would otherwise be hoarded". (J Mars, op. cit. p 212).

- (v) A central bank would also select the most suitable exchange rate for Nigeria, how much import control is right for the country and also decide on the optimal timing for the repayment of long-term debts, domestic and foreign. It is refreshing to note that the CBN of today, after nearly half a century since the above aspirations were raised, are involved with the similar problems and issues as Dr Mars foresaw, it ought to, except, with sterilization. The CBN did not see sterilization as a policy measure not because the gilt-market was still in its infancy. The case for sterilization was paramount during the oil boom period and its operation so easy, government itself being the beneficiary of these tremendous inflow

of funds, that it still remains a puzzle why the government of the day did not pursue that policy. It had been pointed out to be one of the important reasons why Nigeria needed to have a central bank of its own and when this rather suitable scenario arrived, the foresight of the first Nigerian monetary economist was not made use of!

C V Brown⁸ describes the chronology of this debate. Sir Cecil Trevor's Report⁹ on the possibility of setting up a central bank for the Gold Coast had some relevance for its neighbour, Nigeria. The Report came out against such a venture.

W T Newlyn and D C Rowan (op. cit. p 224, 225) correctly point out the limitations and irrelevance of the arguments in the Trevor Report in the contemporary context of West Africa. The Gold Coast central bank could choose a sterling-dollar - or gold-exchange standard: whichever was most suitable at the time and in any case, that issue was quite distinct from the issue of establishing a central bank. On that point, if one followed the wisdom in the Trevor Report, there would be no central bank for either Ghana or Nigeria, even towards the end of the twentieth century, since in

8. C V Brown, "The Nigerian Banking System", George Allen & Unwin, London, 1966.

9. Sir Cecil Trevor, "Report on Banking in the Gold Coast and on the Question of Setting up a National Bank", Accra, 1951.

neither country there is yet a well-developed bond and gilt-edged securities market!

After the Trevor Report of 1951, came the Fisher Report in 1952, by Mr J. L. Fisher¹⁰, an adviser to the Bank of England. Fisher Report was quite complementary about the role and the advantages of the West African Currency Board. His negative recommendation for a central bank in Nigeria, was based on, among other arguments, the following reasons:

- (i) "The financial environment hardly exists at present for a central bank to function in Nigeria other than semi-automatically as a bank of issues: and it is highly doubtful if a central bank could be adequately staffed at the moment A central bank would also be expensive." (Fisher Report, p 18).
- (ii) "We have seen that it is possible that a central bank might help to improve the standard of indigenous banking. But it is better to build the financial structure from the base upwards rather than try to build from the top downwards." (Fisher Report, op. cit. p 17).

All these caution contained in the Trevor Report and in the Fisher Report were abandoned in favour of the promise and foresight in the works of the two academics, namely Newlyn and Rowan, when a mission from the International Bank for

10. Report by J L Fisher on:

"The Desirability and practicability of establishing a Central Bank in Nigeria as an instrument for promoting the economic development of the country." Government Printer, 1956, Lagos.

Reconstruction and Development came to Nigeria in 1953 to advise them on the same issue. The political dimension of the debate for the first time, received paramount importance in the IBRD Report.

"In spite of these advantages it is clear that the West African Currency Board will have to undergo changes in the near future. Nigeria and the Gold Coast are moving rapidly towards self-government and it will not long be possible to group under one currency board self-governing territories which will not necessarily want to pursue identical internal economic and financial policies." (IBRD Report, p 91).

Again,

"The currency board system as now applied is, however, open to criticism on another account - it does nothing to train Africans in monetary management. ... For this reason, above all, the mission feels that an early change in the currency arrangement is desirable." (IBRD Report, p 92).

Even though the IBRD Report shared many of the views contained in the Fisher Report about the lack of the monetary institutions in Nigeria at the time to make many of the workings of a central bank effective, the mission recommended in favour of the establishment of such a bank, because of the reasons reported above. But what still remains as a mystery is the time-lag to action. The World Bank submitted its report on September, 1954, the government accepted its proposal; yet it was not

until 1st July, 1959, when the Central Bank of Nigeria came into existence! Part of this delay could be explained in terms of the gap for the waiting period for the independence of the country on 1st October 1960.

E. The Central Bank of Nigeria

In this section I look into the establishment of the CBN, rather than its functions in the subsequent years. An evaluation of the functions of the CBN and also of the commercial banks and other monetary institutions in the post-central bank era, will be taken up in the next chapter.

The World Bank mission in its Report proposed only ".... the early creation of a "State Bank of Nigeria" with limited functions." The Federal government asked a Bank of England official, Mr J B Loynes to report on the best way to found a central bank for Nigeria. That resulted in the Report by Mr J B Loynes, on the Establishment of a Nigerian Central Bank.

Mr Loynes' terms of reference¹¹ were as follows:

"Having regard to the political and economic development of Nigeria, to the existing organisation of banking and currency and to the importance of maintaining monetary stability at home and the credit standing of Nigeria abroad;

11. Report by Mr J B Loynes on "The Establishment of a Nigerian Central Bank, the Introduction of a Nigerian Currency and other Associated matters", University of Lagos Library edition, 1957, p 1.

and in the light of the recommendation of the 1953 Mission of the IBRD - to advise on:

1. the establishment of a federal institution to perform appropriate central banking functions;
2. the introduction of a Nigerian currency; and the administration of such a currency so as to preserve its external value and its acceptability within the country;
3. the relationship of the Federal institution to the Federal and Regional Governments, to Government institutions, to the commercial banks and to the public; and
4. the role of such an institution in the development of a local money and capital market."

Mr Loynes' Report led to the Central Bank Ordinance of 1958 which resulted in the establishment of the Central Bank of Nigeria on 1st July, 1959. In many ways Mr Loynes' terms of reference were restrictive and that reflected in certain features of the ordinance. For example, C V Brown (op. cit. p 140/141) pointed out ".... objectives of Nigeria's Central Bank are among the most conservative in the Commonwealth. Only Ghana had equally static objectives. The central banks of India, Malaya and Rhodesia and Nyasaland had moderately dynamic objectives while those of Pakistan, Australia, New Zealand, Jamaica and Canada had objectives as dynamic as those of the Bank of Ceylon".

Let me, therefore, compare the objectives of the central banks of Nigeria and Sri Lanka. For Nigeria:

"The principal objects of the bank shall be to issue currency in Nigeria, to maintain external reserves in order to safeguard the international value of that currency, to promote monetary stability and a sound financial structure in Nigeria and to act as banker and financial adviser to the Federal Government." (Central Bank Ordinance, Section 4, 1958).

For Sri Lanka:

- "1. The stabilization of domestic monetary values.
2. The preservation of the par value of the Ceylon rupee and the free use of the rupee for current international transactions.
3. The promotion and maintenance of a high level of production, employment and real income in Ceylon.
4. The encouragement and promotion of the full development of productive resources of Ceylon."

(Ceylon Monetary Law Act, No 58 of 1949).

Mr Loynes has been criticised by Professor Nwankwo (op. cit. pp 4-7) for being as conservative as Mr Fisher before him, because both of them saw "nothing very wrong with the WACB". In fact, in the case of Sierra Leone¹² in which he recommended in favour of an enlarged currency board or 'Monetary Institute' rather than an institution designed to evolve into a central bank" (C V Brown, op. cit. p 138). It may be noted here that Sierra Leone went against the above recommendation and established a central bank.

12. "Report on the Future of the Currencies of Sierra Leone and the Gambia", Government Printer, Sierra Leone, 1961.

Mr Loynes' caution can be traced back to his term of reference requiring him to be in line with the earlier IBRD Report, which recommended ".... the early creation of a 'State Bank of Nigeria' with limited functions." "There may be another reason:

".... Loynes, like Fisher again, belonged to the old and orthodox school of thought which was based on a very narrow concept of the functions and techniques of central banking." (G O Nwankwo, op. cit. p 5).

As an example, of Mr Loynes' conservatism and caution, which led to the limited objective for the proposed central bank we can look at some of his argument as follows:

"Nigeria does not possess a securities market; and internal public issues by Government are virtually unknown The ability and need of Governments, the banks and traders to draw on or employ resources abroad may affect local money conditions more than central bank action. Moreover, other factors, such as the state of the export trade and the policy of Marketing Boards will also continued to make themselves felt." (Loynes Report, op. cit. p 69).

As a reaction against these traditional views of the role of a central bank many commentators have quoted Professor Sayers' famous lines¹³ against such behaviour:

"The central banker sat in splendid isolation twiddling his thumbs The central bank must

13. R S Sayers, Central Banking after Bagehot, pp 113-115.

be venturesome in the kind of business it is willing to handle, even at the cost of making some mistakes."

However, I feel history has been a bit unkind to Mr Loynes who tried to cope with his narrow terms of reference, and yet came out with a blueprint for a central bank in an environment where indigenous commercial banking was trying to establish itself as a viable alternative to their expatriate counterparts. Loynes is on record to have said:

"I believe that a central bank in Nigeria should be able to build for the future, in the knowledge of its lasting powers and responsibilities. It seems both an act of good sense and of confidence to legislate for a long period ahead rather than to impose a narrower framework which the bank may soon outgrow." (Loynes Report, op. cit. p 4).

The first governor of the CBN (Mr R P Fenton) along with the most senior officials, all came from the Bank of England, but by 1963, all of them were replaced by Nigerians. So the earlier concern about the staffing problem at the top was unnecessarily exaggerated. Let us now look at the relationship of CBN with the government. But before we do so, it may be noted here that only the first few years of the initial stages after the establishment of the CBN is to be reviewed in this chapter on the historical background of the recent monetary experience of Nigeria. The rest of the review will be followed up in the next.

The relationship between the central bank of a country and the leaders of the ministry of finance

or of the Treasury, as it is sometimes called, is of paramount importance in the macroeconomic management. In fact, they are, together, the monetary authorities of the country and jointly responsible for what may be called the monetary policy. When they act together in the best interest of the country, as they see it, there may not be any problem in the monetary management, even though the policies they jointly pursue may be ill-advised or ill-executed. But when they are in conflict problems may arise as to the type, and direction of the optimal monetary policy. In such a case the statutory stipulation would indicate which organ of the monetary authorities would have the last word. In the case of the UK, we know, the Treasury is all-powerful whereas in the USA the Federal Reserve has some degree of independence in conducting the monetary policy of the country. Which system is better suited to a country who have not yet evolved the sophistication of the money markets in either of the two, and may still be dependent on its central bank to initiate much of the monetary institutions and instruments for economic development, is a matter of taste, history and of course, of the aspirations of its people. There may be some justification in such a case, to empower the central bank with the ultimate authority on money matters, since they may be supposed to have a longer view of the economic need of the country compared to a transient elected

government or a set of military rulers whose foresights may not be far-reaching. Because of this type of understanding or intuition, may be, the Board of Directors of the CBN specifically excluded government representation.

Yet, an Advisory Committee was there only to represent the government opinion on various monetary matters. But in the Budget speeches the first minister of finance frequently used the "first person singular" on proposing monetary policy, which the statute specifically indicated as in the domain of the CBN. There, was, however, no real conflict in the early years of the CBN between itself and its 'ministerial' partners to conduct the monetary policy of Nigeria. To quote C V Brown (op. cit. p 144).

"Indeed the impression is one of quiet cooperation. It appears as if Mr Roy Fenton, the former Governor of the bank, and Mr R A Clark, the former Permanent Secretary of the Ministry of Finance, worked closely, together and that these two men were in reality the 'monetary authorities'; however, both left Nigeria during 1963 and both have been replaced by Nigerians. It is hoped that their successors will continue to work closely together. If, however, there were a conflict the Ordinance suggests the Central Bank should win, but in reality this can by no means be certain."

Indeed, it was not, as the subsequent events unfolded the reality of the situation. It is not the close co-operation of a set of personalities

(of whatever nationality) which would dictate the relation between the two potentially competing institutions for the ultimate monetary power. When the crunch comes, like it did during the civil war or more recently, during the oil boom, the cosmetics of civil co-operation between these two pretenders for monetary power are bound to evaporate, and the central bank always has to give in to the treasury who represent the power of people for the day. Nigeria was no exception. They tried to fudge the issue by forming the Federal Executive Council which would adjudicate the right policy in the case of conflict. But we can now say from this vantage point of history that irrespective of the personalities involved in this three-tier monetary management, the treasury always has the actual (political) power on policy and the statutes could have been better written by appreciating such reality. We will come back to this issue at the relevant point in the next chapter.

The CBN ordinance, 1958, restricted the external value of the Nigerian pound with the British, but this obvious limitation to the power of the central bank was lifted in the 1962 Amendment in favour of appropriate changes. Another unusual provision of the 1958 ordinance was the high proportion (60 per cent) of the central bank liability (mainly currency in circulation) to be held only in gold or sterling assets and this was the minimum required reserve ratio, so to say,

for the first five years. It is an unusual restriction for the supply of high-powered money imposed on the supreme monetary authority of a country. But if we look at it in the historical context of the WACB days of 100 per cent or more cover for the local currency and also in the light of the total inexperience of central banking in the country along with a bad track record of commercial banking by the local bankers, this requirement may be judged today, as correctly cautions rather than unusually restrictive. The 1962 Amendment made matters less restrictive by reducing the ratio to 40 per cent and also allowing dollar assets to be classified as part of the external reserve. Also in the early years after the establishment of the CBN (1962 to be exact), the ministry of finance endeavoured to collect all the foreign exchange holdings of the federal and regional governments, marketing boards, insurance companies and commercial banks into the hands of the CBN and also to reduce such holdings to a level as may be needed for a few months' import bill "in the overall national interest" (1962 Budget Speech by the minister of finance, Chief Festus Sam Okotie-Eboh). Such moves for centralisation had to be in the overall national interest and was supported earlier in certain quarters¹⁴, though opposed by Mr Loynes.

14. H M A Onitiri, "The Central Bank of Nigeria and the Problem of Domestic Monetary Stability", Nigerian Institute of Social and Economic Research, Conference Proceedings, December 1958.

In their dealings with the other banks the CBN was awarded the usual central bank status of being the banker to the other banks, home and abroad, organise clearing-house activity, deciding on rediscount rates and undertaking open market operations. But, due to the paucity of monetary instruments and the relative lack of transactions with cheque payments, such powers were not that significant compared to its power to regulate the required minimum liquidity ratio on different types of deposits with financial institutions of different sizes, and also to decide the composition of assets types to be classified as liquidity reserve.

The CBN was also given powers to deal in what in Britain would be called local authority bills and securities. Mr Loynes had his reasons not to recommend that for Nigeria for the Regional Governments to mop up some local savings for local development.

Finally, the currency introduction involving over a billion coins and notes was smoothly organised by the CBN within a period of a little over three years after its establishment. But C V Brown (op. cit. p 150) notes a unique opportunity lost for the decimalization of the currency during this period.

F. Commercial Banking in Nigeria

The historical background for commercial banking in Nigeria is divided into two periods: before and after the establishment of the CBN. Some of the authors already referred to in the discussions above have undertaken a thorough scrutiny of commercial banking during this period. This section, therefore, summarises their findings and also comments on various points, culminating in a model, which describes the private and social costs and benefits of the marketing of loanable funds in Nigeria during the pre-CBN era.

One of the earliest documented commentary on banking in Nigeria came from J Mars (op. cit. pp 207-213), who pointed out the basic need and inadequacy of such institutions of his day. Mars recommended the creation of financial institutions which will specialise in the supply of medium-term and long-term loans to the local enterprises. He recognised the inadequacy of the commercial banks to finance such long-term needs from their deposits and expected insurance companies to invest in such ventures.

J Mars was writing on these future aspirations for the development of Nigeria, as early as the mid 1940's and exhibited some insight in the problem which was lacking in the works of many later writers, who were obviously biased due to their patriotic fervour. It was far too easy to blame the expatriate banks for not providing enough funds for medium and long-term investment in Nigeria,

specially when they were mopping up most of the deposits in the country because of their better reputation on security and efficiency compared to their local competitors. By their very nature, the foreign commercial banks were in the business of short-run funds and, as indicated above, the source for long-term finance had to be sought elsewhere. Much of the debate on the nature of the portfolio of the expatriate banks has been around this problem and the adventures of many indigenous banks met with a sticky end because of channelling their resources to finance longer-term loans than the nature of their banking business would warrant. Let us look at the history of the time in the light of the above first principle, noted in the earliest writing on the issue by the first monetary economist from Nigeria.

Professor G O Nwankwo divides (op. cit. p 45) our period into (i) The Free Banking Era (up to 1952) and (ii) Pre-Central Banking Era, 1952-1959. The free banking era, as the name suggests, is characterised by the lack of any kind of banking legislation. The first bank was established in Nigeria in 1892, called the African Banking Corporation and by the time of the 1952 Banking Ordinance there were three expatriate banks and many indigenous banks.

The three expatriate banks were: (1) Barclays Bank, DCO (established 1917); (2) Bank of West Africa (established 1894) and (3) British and French Bank (established 1948). All these banks

underwent change of names during this period and also subsequently. The National Bank of Nigeria has been the first indigenous bank which succeeded (established 1933). The Nigerian Penny Bank (failed in 1946), the Industrial and Commercial Bank (failed in 1930) and the Nigerian Mercantile Bank (failed in 1936) all contributed to the bad reputation of the home-grown banks, by surviving only for a short time and thus costing their customers all their deposits with them.

Mr G D Paton of the Bank of England was appointed in 1948 to investigate banking activities in Nigeria and his report was formulated into the 1952 Banking Ordinance - the first legislation on the subject in Nigeria.

The Paton Report itself might have led to an indigenous banking boom. According to the statement made by the Financial Secretary at the Federal House of Assembly in 1952, as many as 185 banking companies were registered between 1947 and 1952. According to Professor O Teriba¹⁵:

"Its foreknowledge and premature disclosure in Lagos business circles led to the spate of beat-the-law registrations of indigenous banks, culminating in the abortive native banking boom of 1951-52."

But Professor G O Nwankwo (op. cit. p 47) comes up with the opposite view and claims that the Paton Enquiry of 1948 was itself the effect rather than

15. O Teriba, "Nigeria's Indigenous Banks," Bankers' Magazine, August 1969, p 79.

the cause of the banking boom. According to him, 145 out of the 185 new registrations were made in 1947. This may be a reaction, according to Nwankwo, to the discrimination by the expatriate banks against the local customers.

G O Nwankwo¹⁶ cites the example of India during 1939 to 1947 when commercial bank offices increased from 1951 to 4819!

"The contrast between India and Nigeria during this period is that while there was a 'lax' banking legislation in India, there was no legislation at all in Nigeria. In such a vacuum, it is not surprising that anybody who had been dreaming of establishing a bank would rush to register one as soon as he could lay his hands on any sum at all." (op. cit. p 47).

But this speculative bubble of the banking boom did burst almost immediately and by 1955 only three of them survived, along with the national Bank of Nigeria. They were: (1) the African Continental Bank; (2) the Agbonmaybe Bank and (3) the Merchants Bank. These four indigenous banks were competing with the three expatriate banks in the mid 1950's. Yet even the survival of these last form depended on massive state support and also on the backing of the major political parties.

At this point, it may be appropriate to bring in the competitive position of the expatriate banks. In an era when there was no central bank and also no financial instruments in which the local banks

16. G O Nwankwo "Indigenisation of Nigerian Banking", Bankers' Magazine, July, 1972, p 16.

could hold their excess liquid assets, the foreign banks had some unusual advantage. They could hold their funds in British government bonds and bills (the steady parity of the Nigerian and British pound helped) and also use their London head quarters as the lender of the last resort, if such needs arose. The local banks had no comparable commercial bills to fall back on, neither did they have a central bank who could help them in distress. So their liquid funds lingered in barren isolation from the productive potential of the Nigerian business community and people.

On top of this competitive disadvantage, the political dimension of the issue made life more difficult for the banks. The ruling parties in the Eastern (NCNC) and Western (the Action Group) regions at that time ostensibly professed to help the indigenous banks by channelling massive amounts of government funds into them, whenever they could. But the banks were then used to pursue the political aims of the relevant party in power. Professor Nwankwo, however, points out that one should not evaluate the social product of the local banks in purely financial terms and assess their contributions in terms of the benefit to the whole community.

But a price had to be paid and the point to investigate here is that if the price had been too high for the benefit, the society received. The externalities generated by the failing local banks in propping up local business which may not be

touched by the expatriate, is not a pure external benefit to the Nigerian economy. The cost is not "merely" the lost savings of the depositors, or of the government funds which could have been better invested at the market rate of return. The cost is also the bad reputation each demise of an indigenous bank generated on the commercial banking ability by the Nigerians. This may be one of the reasons why a free and independent country like Nigeria has to put up so long with foreign controlled commercial banks who have been endowed with an embarrassing level of excess liquid funds while the successive doses of federal government advice, legislation and threat go unheeded for their investment into desirable national projects.

Let us bring in the relevant costs and benefits together, both private and social, in analysing the structure of the banking activity of the time.

The market for loanable funds in Nigeria at the time could be depicted in terms of the usual demand for and supply of it. But, during this time in history, the investment demand for funds may be only for projects related to the foreign trade, whereas the savings in the form of bank deposits, may initially be housed mainly with the expatriate banks. The deposit and loan interest rates may be assumed to be held (administratively) well below the equilibrium values for them. The situation on loanable funds can then, be presented in terms of figure 2.1.

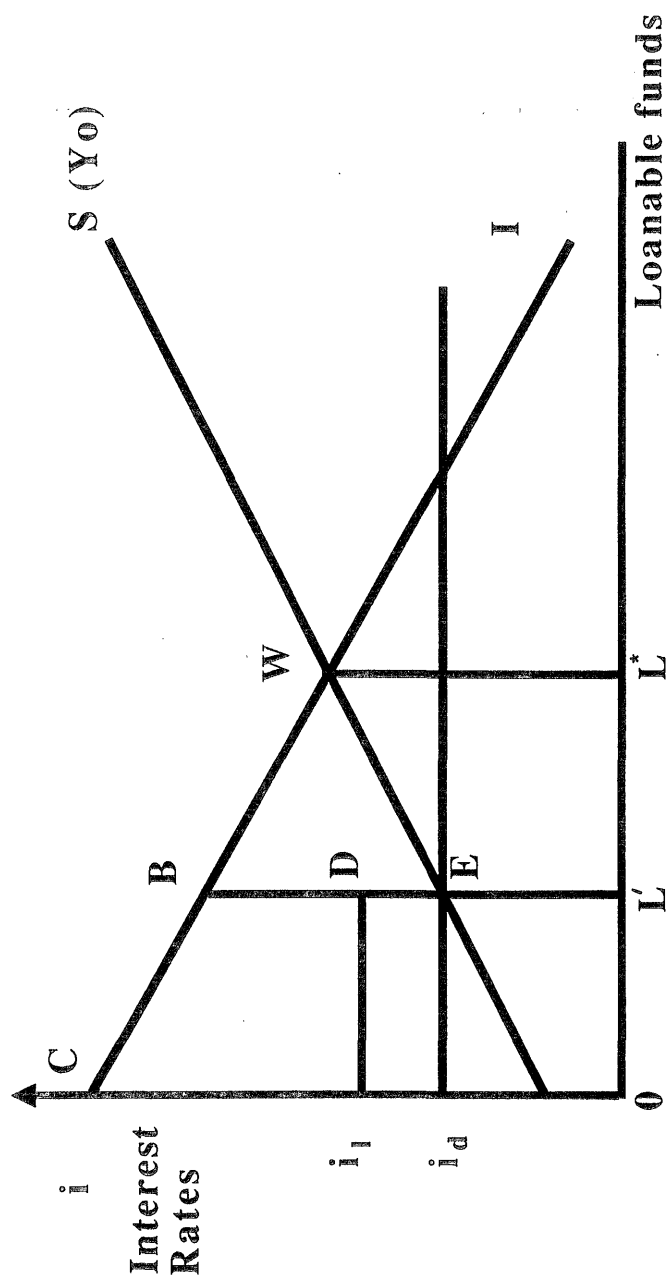


Fig. 2.1 Market for loanable funds with expatriate banks only

At oi_d deposit interest rate OL' would be the saving in a year when income is at Y_0 . Investment (all in export related projects) could only be OL' , at most. If the borrowers of the loans are to pay oi_1 interest rate per unit, their total benefit (revenue) from investment would be $OL'BC$ whereas their total interest payment, $OL'Di_1$, giving them a surplus of $CBDi_1$. The expatriate banks would make a gross surplus of I_1DEi_d . The depositors (savers) will receive an interest income (or equivalent utility measure in case of savings being mainly in non-interest bearing current account deposits) of $i_dEL'O$. Thus the total benefit to the society ($OCBL'$) may be split up into three categories of recipients: Savers (oi_dEL'), banks (i_dEDi_1) and the investors (i_1DBC). This is well below the maximum social Welfare at point W , which could be achieved if interest rates are allowed to find their equilibrium levels.

Let us now bring in the changes meant to be generated through the establishment of indigenous banks. This has two aspects: (i) on the supply of loanable funds and (ii) on the demand for loanable funds. The indigenous banks aspired to inculcate the banking habits among the Nigerians all over the country, including the rural areas and thus increase total saving for the same amount of national income. This could dent the high propensity to consume among the Nigerians, (see Newlyn and Rowan, op. cit. p 121) specially when the indigenous banks would profess to keep their

deposits secure and may even offer some return on it if the savings are kept with them for a long-enough period.

On the demand side the appeal to patriotism is more direct. The projects proposed by the Nigerian businessmen and women were not considered favourably by the expatriate banks and only an indigenous bank with the feel for the potential of the people and the projects would see their profitability in the long-run. In terms of the diagram in figure 2.1 above, the investment projects which are outside the export sector, would now have to be considered. Assuming, they are not more profitable than the export-oriented project with the highest internal rate of return, the possibility of looking into all types of investment ventures in the country, would only make the aggregate I-function in figure 2.1, more elastic. The aggregate Saving function would also become more elastic there, with the advent of the indigenous banks in the scene, collecting deposits from the farthest reaches of the country where no savings have been sought to be tapped before. We can now present this scenario in figure 2.2 below, where the consequences of the bank failures are also analysed. Whatever be the reason of such failures, for example, stiff competition and superior reputation of the existing expatriate banks, the political meddling of the banking business or the lack of indigenous short-term financial instruments, the benefits were enjoyed by

some whose costs were paid for by others. The cost may not be restricted only to the period of the particular banking operation - it could linger on in terms of the negative goodwill for the indigenous banks as a group in the minds of Nigerians, may be for generations.

The introduction of indigenous banks would move the actual saving and investment from OL' to OL'' and the social optimum from OL^* to OL^{**} in figure 2.2 on the next page. With no bank failures, this change in the market structure in banking would increase total social benefit from $CBL'O$ to $CB'L''O$. That was the idea and hope and aspirations of the pioneers in indigenous commercial banking in Nigeria. But as we know from the documented history indicated earlier, the fact was different - many indigenous banks did fail to operate and many savers lost their deposits. So the indigenisation of some sectors of the economy were bought by:

- (i) the gross surplus element ($DD'E'E$) of many of the indigenous bankers dwindling to zero, and some cases to negative figures;
- (ii) the interest (or the utility of owning liquid assets i.e. $EE'L'L'$) for many depositors with most of the indigenous banks not being earned, because;
- (iii) the deposits themselves being lost forever due to the failure of the relevant banks;
- (iv) the failure of many of the indigenous banks would shift the saving function, $S'(Y_0)$ back

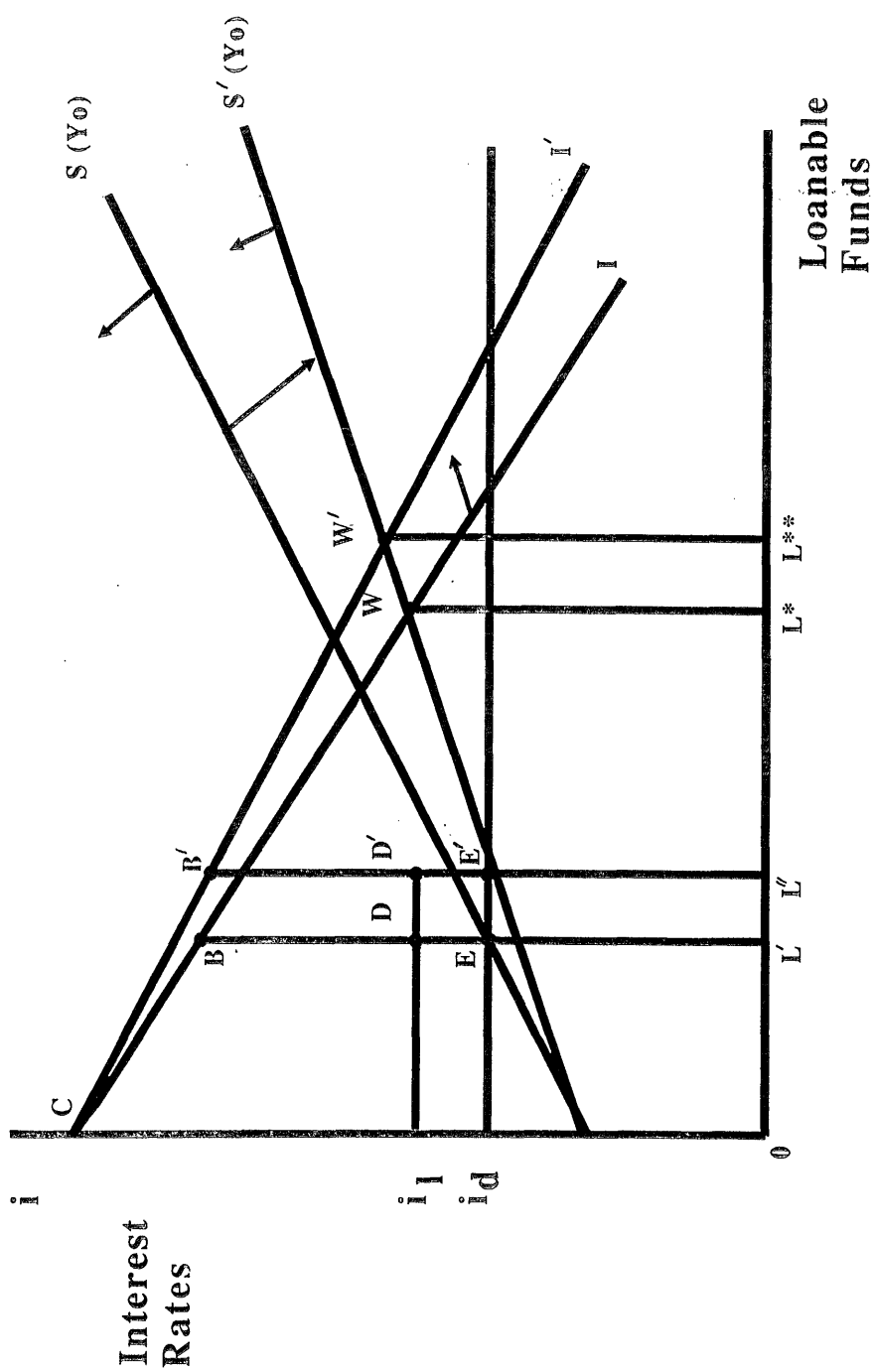


Fig. 2.2 Market for loanable funds with foreign and domestic banks.

towards $S(Y_0)$ indicating the restoration of
of the dominance of the expatriate banks
and;

- (v) the frequency and the magnitude of bank
failures shifting the original savings
function $S(Y_0)$ itself, backward - leading to
higher propensity to consume than the
country was used to.

It may appear, therefore, that the pioneering
group of business entrepreneurs who thrived with
the patronage of the rest of the community had to
be nurtured and nourished at a cost which could not
be shown to be necessarily less than the social
benefits they bestowed on the Nigerian economy, and
may very well be a great deal more.

Let us now look at the microeconomic basis for
the existence of some of the indigenous banks in
the face of competition from their expatriate
counterparts, who had a lot of advantages at that
point in Nigerian monetary history. For this I
could use the dominant firm model of oligopoly
where the expatriate banks would be regarded as a
covert cartel or collusion of price-leaders and the
high cost domestic banks as price-followers in the
market for loanable funds. The marginal cost for
providing loans may be related to the deposit
interest rate, but the marginal cost itself is much
less for the expatriates than for the locals,
because of all the reasons enumerated above: (i) no
central bank; (ii) to short-terms financial
instruments for the locals to put their idle funds

in; (iii) the access of the London head-quarters and the money markets for the expatriates. The price for the loan may be related to the loan interest rate and the minimum price is set by the price-leader. The price would contain in it the type or nature for the collateral, the time-horizon within which the capital has to be repaid with interest and, of course, the loan interest rate itself. There may be a whole range of prices for a whole set of loanable funds applicable to the indigenous and the expatriate banks. Similarly, the cost could also be at variance, depending on the type of the loan and of the bank from which it is sought. But in the model below, where we would like to capture the essence of the loan market structure at the time, I assume one price for all, but different cost, or more specifically, marginal cost structure. The model is depicted in figure 2.3.

Let us assume DD' to be the 'industry' demand curve for capital funds in the economy. The industry is composed of three expatriate banks, working in a tacit collusion dominating the market and setting the price and also of many indigenous banks who have much higher marginal costs but have to accept the price set by the leader(s). The leader(s) then, to maximise profit, carve out the demand left for them at each price assuming the followers would behave as price-takers and follow a supply curve as given by SS' . This leaves the leader(s) with a kinked demand curve D_{LED}' with

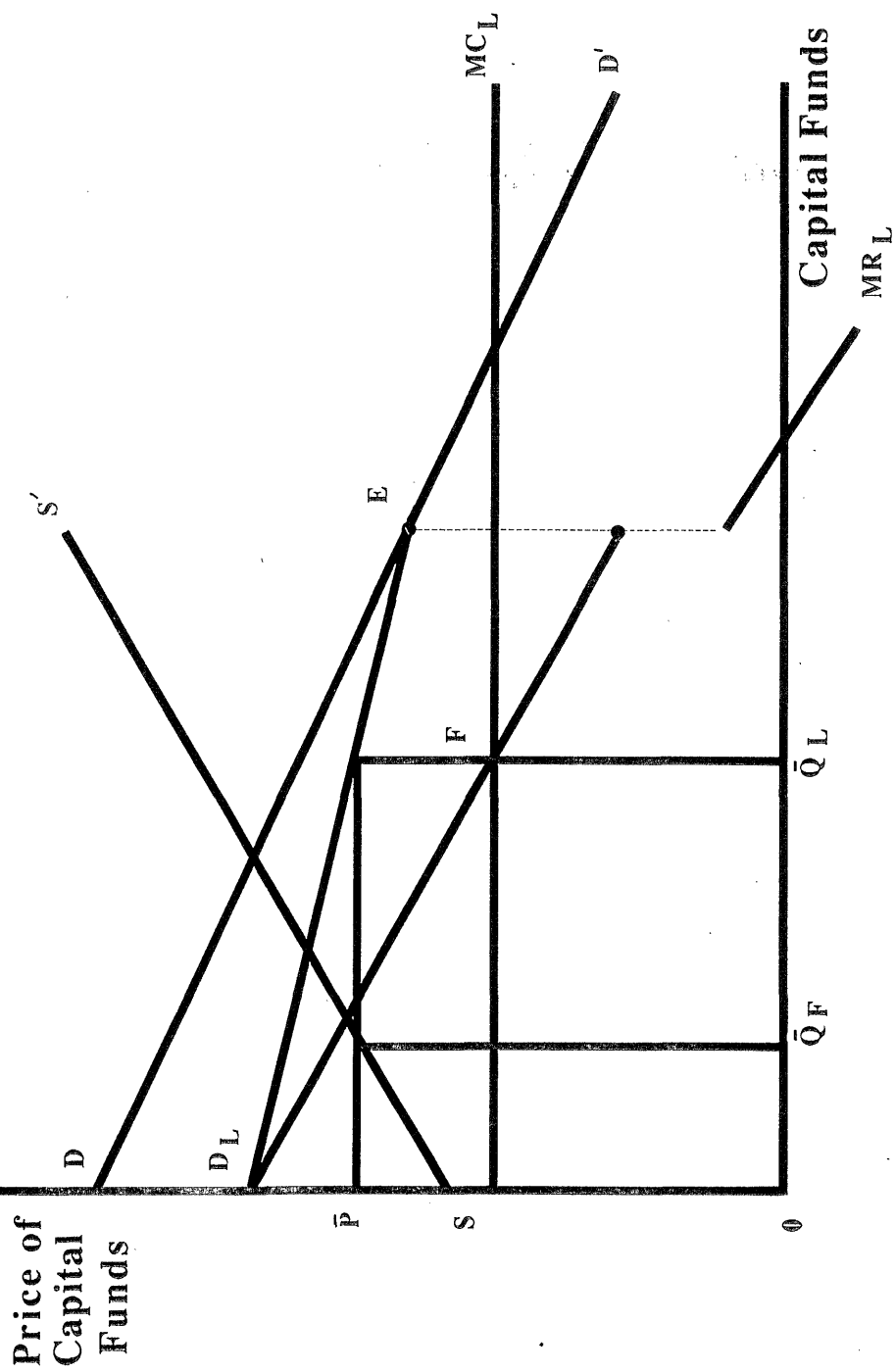


Fig. 2.3 The market structure for the Capital funds when the expatriate banks dominate the market.

the corresponding MR_L - curve, with a discontinuous section at an 'output' point corresponding to the kink at E.

To set the profit-maximising price and the corresponding output, the leader(s) would equate MR_L to MC_L (assumed here constant, for convenience) at F. This leads to the equilibrium price \overline{OP} , at which the leader(s)' share of the market is $\overline{O_F O_L}$ and the followers' share is $\overline{O O_F}$.

As we can see in figure 2.3, a sufficient drop the MC_L could push the followers out of the market and this could have been the fate for many followers. The difference in the MC_L and the marginal cost of the small indigenous bank is relative and if this small firm has to attract deposits by offering (let us say) interest on current account (as it did happen in some cases) and also by promising loans on a dubious project, the difference in the two marginal costs could be substantial. This would then lead to a situation, eventually where the leader(s) could raise deposits at a much cheaper cost than this particular follower and with its source of deposits cut off, it would not have very long to survive. Such might have been the cause of the failure of many indigenous banks.

To stop such a fate awaiting the existing indigenous banks, the governments (regionals at that time) put in substantial deposits with some of the lucky ones. This has the effect of pushing the

SS' in figure 2.3, downward, thus making the survival of some of the followers possible. Yet, even without the destabilizing effect of political exploitation of such banks and their subsequent mismanagement, the inherent comparative advantage of the expatriate banks could never be challenged effectively, without the backing of a central bank, requiring proper monetary or liquidity and portfolio discipline from the home-based banks and offering in return the sanctuary of last-resort lending and providing the scope for short-run financial assets to put their liquid reserves in. As we know now, the appearance of the CBN was just in time to guarantee the survival of the remaining indigenous banks on socially optimal strategies. Otherwise, more and more public funds would have been ".... thrown down the drains through the established indigenous banks" (Nwankwo, op. cit. p 51) even without the political exploitation and mismanagement being repeated, to prop up inherently inefficient institutions in the name of nationalism.

G. An Overview

In the historical perspective of our period of interest of the CBN era, I started as early as the COWRIE currency system which was the medium of exchange for a large part of Nigeria, less than a century ago. We saw how the economic need of the time for foreign trade induced the creation of certain monetary institutions in the country, which

Nigeria did not have any chance to evolve, if left in the isolation of her own devices. But that was not to be, and the economic superpower of the time saw to it that the colony from which the benefits of foreign trade had to be exploited, be endowed with a monetary and financial structure which would lubricate the course of that foreign trade. It may not even be a matter of historical curiosity to guess the state of the monetary anarchy if British silver coins were not to win the battle for the mediums of exchange. Whichever industrial power were to colonise the country, its currency system would have been adopted, to the neglect of all the others. Thus, monetary anarchy could not have lingered for long, and an eventual winner was bound to have emerged in the battle of currency, following the quest for political power. In this historical case, as in many others of the time, Great Britain and its currency emerged to dominate the economic fate of the country, without much opposition from the others.

We have seen how the quest for economic emancipation gradually directed the locals, for the right type of currency and the right type of institutions. But all through the period, until the creation of the CBN, there was continuous conflict between the interests of Nigeria and those of Great Britain. Commercial banking prolonged the economic domination of Nigeria even after her political emancipation. That was made possible, because of the lack of success of indigenous banks

to win over any significant market share. This failure may not be entirely due to the disadvantages of the late entrants into the market, but was inevitable because of the inherent advantages of the expatriate banks through their foreign links and of the disadvantages of the locals mainly because of the absence of a central bank. The social cost of the domestic currency being linked successfully to the pound sterling must have been enormous in terms of the lost extra output over decades, which the slow monetisation of the economy brought forth due to the inadequate supply of real balances throughout this period.

H. The Recent Trends

Let us now look at the monetary experience of the Nigerian economy since the inauguration of the Central Bank of Nigeria in July, 1959. This is again, a very broad scenario of recent historical events of the economy where monetary and real aspects cannot be artificially separated. Neither is it possible to understand the political economy of this region comprising three major tribes and many minor ones, when the country has been going through alternative doses of military rules and Western style democracies, without appreciating the north-south divide basically on the Muslim-Christian religious denominations. The situation is further complicated by civil war for nearly three years, an oil boom era which lasted around a decade to be followed by a collapse of oil price and production initiating a steady decline of national income and general living standards which is still continuing today. We concentrate on a single theme, however, throughout these fast changing socio-economic plots in portraying the development of monetary institutions and instruments and of money itself in their interaction with various kinds of stimuli and shocks during these periods.

The whole period of nearly thirty years can be divided into three sub-periods: (i) the first ten years ending with the civil war in the last three; (ii) the oil boom era and (iii) the depression years. In each sub-period, we look into the monetary events of the time in terms of: (i) the CBN and the money and capital markets and (ii) the commercial banks. If we look at the growth figures for the national income, the three periods also fall into three distinct patterns: in the first period (1959-60 to 1969-70), real income was increasing at an annual average (simple) rate of nearly 4.5 per cent whereas it went over 5 percent (i.e. for 1970-71 to 1980-81) during the oil boom era.

Since then it has been falling over 3 per cent per year, the biggest drop being 17 per cent in one year during 1982/83 to 1983/84! If we take the whole period - the creation of the CBN till the year 1987/88 - real income in Nigeria has been increasing at an annual rate of nearly 4 per cent which is below the rate the economy was progressing before the oil boom set the country on an accelerated growth path. Some might argue, therefore, the country could have done without the oil boom, while others could say that a different or better reallocation of resources ought to have enabled the economy to reach a self-sustained growth, where the exogenous shocks like the collapse of the oil price and/or quota production (dictated by the OPEC) could not lead it to a depth of a depression as it has done recently.

I. The First Ten Years

(i) The Central Bank

There have been a number¹⁷ of reviews on how the CBN fared in the first few years after its birth. Let me first describe that from the point of view of an insider, namely C.E. Nemedi (op.cit. 1974) of the CBN. He first defended the number of Central Bank Amendments and Decrees from 1962 through to 1969, because:

¹⁷

G.O. Nwankwo, 1980, op.cit. chapters 2,3,4,5; and C.V. Brown, 1966, op.cit. chapters 6,7,8,9, are the two representative ones. Among some unpublished ones, I may mention :

(i) C.E. Nemedi, "Monetary Policy in Nigeria : Tools and Effectiveness", Lecture given to the Economic society, Ahmadu Bello University, Zaria, Nigeria on 28th February, 1974.
(ii) M.A. Shahi, "The Development of the Nigerian Money Market : 1960-1976," Discussion Paper, Department of Economics, A.B.U., 1978.

"..... the traditional tool of open market operations has not been of ready and useful applicability in economies with unsophisticated financial systems and underdeveloped and poorly integrated financial markets.Even if the financial institutional constraints were removed, such a general and indirect tool has limited, if any usefulness to the economic circumstances in which Nigeria and similar developing countries found themselves. For instance, the need to stimulate economic development without abdicating the function of price stabilization, has made it inevitable to approach the task of monetary regulation through credit control."

Nemedia thus talked about control of bank liquidity in terms of variable required liquidity ratio, of cash reserve ratio and also of special deposits. But what was rather unusual from other countries, the CBN had the power to set limits on the portfolio of banks' investment patterns. This was done by the direct control of bank credit through credit ceilings and selective control. For example, the CBN had the power "..... of selective control of credit which (it could) exercise by prescribing a sectoral distribution of credit which the banks should adhere to within a specified period of time. These instruments have been found to be of greater relevance in the pursuit of the goals of monetary policy in Nigeria." (Nemedia, *ibid.* p.8)

Nemedia divided the period until 1974 in four different phases:

Phase I - Permissive Monetary Management: 1958-1964.

Phase II - Period of Monetary or Credit Restraint : Latter part of 1964 to October 1966.

Phase III - Period of Monetary Ease: November 1966 to June 1969.

Phase IV - Moderate Monetary Restraint : July 1969 till date. (i.e. February 1974).

The first phase had to be the CBN trying to establish certain monetary institutions and instruments in the country without which a central bank could not function. In this endeavour the CBN provided clearing facilities for cheques at various CBN branches in the major cities. Then it started the money market by issuing Treasury bills and offering rediscounting facilities. The call money scheme was started in 1962 for profitable investment of short-term surpluses and the Lagos Stock Exchange in 1961 to promote transactions in long-term capital funds.

The CBN also had to finance the development schemes of the government when the expected foreign aid to help out government investment projects did not materialise. This led to large public sector borrowing requirement and the CBN's financing of the budget deficit caused large increases in the money supply. In fact, narrow money increased by 31 percent between the end of 1961 to the end of 1964 and the broad money (inclusive of savings and time deposits) increased by as much as 37 percent during that period. This might have helped to "monetise" the economy better and led to a substantial increase in real income (nearly 22 percent) and was not as inflationary, as Nemedi thought it was.

The second phase of the CBN, according to this insider view, was involved with the tackling of some monetary problem of economy, for the first time. The problems, apparently, were those of containing inflationary pressures and solving deteriorating balance of payments situations. The rapid growth of the economy in the earlier phase increased demand which could not be satisfied by the relatively small manufacturing sector. Imports could have helped to bring supply in line with demand, but the diminishing foreign exchange resource came as constraint. In fact, the trade balance was in deficit in all the years

from 1961 to 1965, whereas the balance of payments deficits was at its highest at 90 million in 1963. The foreign exchange reserve fell to its worst level of 162.5 million at the end of 1963. The CBN took the following measures to tackle the problems:

- (i) A ceiling of 15% on the commercial banks' expansion rate on total loans and advances (reduced to 13% in 1966), and at the same time, allowing the central bank to expand credit to the limit of 17.6%. This was a kind of crowding out dictated directly by the authorities, rather than coming indirectly through 'open market operations' as would happen in more mature monetary environment.
- (ii) Selective credit control. The commercial banks had to undergo another 4% limit (within the broad 13% of 1966) on credit expansion towards imports of less essential consumer goods and of financing of hire purchase firms engaged in facilitating consumption expenditure. The idea was to divert resources away from consumption activities, towards productive sectors.
- (iii) Moral suasion by appealing to the banks to "exercise restraint in making loans for purely consumer expenditure" and
- (iv) increasing the CBN's minimum rediscount rate from 4% to 5%.

The tight monetary policy of the second phase was much too successful, leading to an actual drop in real income by 2% between the fiscal years 1965/66 and 1966/67. On top of that the socio-political unrest culminating in the civil war in the east curtailed government revenue and also led to the requirement of increased expenditure. All these events forced upon the monetary and the central government authorities of the country the decision towards monetary ease. The circumstances towards this turn round on monetary policy had been nicely summarised in the CBN annual Report at 31st December, 1966, as follows:

"By the middle of October (1966), however, it was possible to say whether or not the economy was performing at the desired level. Monetary indicators to the end of August had shown significant downward departures from the established norm. Additionally, opinion sampling amongst the businessmen and bankers in early October confirmed the picture portrayed by monetary indicators - that of strong recessionary influences. Long before the Central Bank took a final decision on the next direction of its policy, the Government confronted with a contraction of revenue and external aid receipts, made it difficult for the bank to realise its hope of 17.6 percent limit on the growth rate of credit to Government..... . When the problem of setting displaced persons, following the disturbances in September-November, placed additional burdens on the governments, and commentators were sparing no pains in trying to talk the economy into a "depression" the thinking in Government circles began to veer towards pump-priming." (CBN Annual Report, op.cit. pp 15-16).

The CBN thus lifted all the credit restraints, imposed earlier, hoping, however, that the banks would carry on discriminating against the financing of consumption expenditure and for the productive sectors. This monetary permissiveness resulted in the increase to the government sector by over 81 percent in 1967 and nearly 85 percent in 1968, whereas the corresponding figures for the private sector credit was -7.7% and +0.3%. This could not be helped because of the civil war but it did signal danger for the subsequent periods when the hostilities were over. The inflationary pressure of the enormous credit creation had to be dealt with and that ushered in the next phase of moderate monetary restraint. At the same time the beginning of the oil boom was gathering momentum - oil exports jumped to nearly N380m in 1969 from just over N103m in 1968 - and the balance of payments was

no longer a problem. The policy objective was the control of inflation and this the CBN sought to achieve by "..... stimulating the sectors responsible for producing the required goods and services. The rationale behind this is the belief that inflationary pressures can best be controlled by raising the levels of supply of goods and services to those of demand. Thus, while the stance of policy remained expansive, credit restraints to specific areas were demanded by the Bank". (Nemedia, op.cit. p.18)

Nemedia here made no comment about the accelerating rate of growth of money supply that the start of the oil boom era was beginning to bring forth. The obvious policy to control the rate of inflation would be to sterilize part of the enormous oil export revenues coming to the government sector and since it was coming to the central government, it was far too easy to accomplish, i.e. not to spend it all. Of course, to be fair to the Central Bank, the decision to spend or not to, from the enormous oil revenue stayed mainly with the treasury or the finance department of the central government. But one would expect the CBN to advise the 'treasury' on the consequences of the high rate of growth of money stock in the country. In fact the 1970 level of narrow money was 80% above its 1966 level and when Nemedia was delivering this speech late February in 1974 at A.B.U., the oil boom was well on its way. The 1973 oil export was N2890m; more than four times its 1970 level! It is quite surprising, therefore, that a central bank economist did not even mention this all important danger of inflation. If the CBN had the ability to persuade the government of the day to follow socially optimal monetary policy, the obvious thing to do was not to allow the enormous glut of foreign exchange to turn totally into naira in circulation and invest part of the surplus in foreign money markets. Of course, it provided the

country with the golden opportunity for investment in building up the social infrastructure in terms of roads, primary schools, colleges, universities, hospitals, ports etc. and much of it was actually accomplished. But what was missing, was a relatively stable price level, which on all counts is conducive to economic growth. We will take up this and related points in the oil boom section of our narration.

In the first ten years of its existence, however, the CBN has to be judged by its performance in initiating the money market and the related monetary institutions in Nigeria. As we already saw in the last chapter, the main debate on the desirability of a central bank for Nigeria concentrated on these very points - a central bank could be effective and useful so long as it has the monetary instruments and institutions to influence the rest of the economy with. On this list, first comes Treasury Bills.

Treasury Bills Ordinance of 1959 and T.B. Regulations of 1960 set Nigeria on to the path of modern banking. The Federal Government could borrow funds this way to finance its expenditures and at first the T.B. issues were restricted to only 10% of its estimated revenue. This was gradually increased over the years until in 1970 it was raised to 150% of the estimated "..... retained revenues of the Federal Government plus the gross revenues of the State Government" (Treasury Bills (Amendment) Decree 1970, Section (i).) On the importance of treasury bills as a popular monetary instrument in the Nigerian money market during this period, let me quote M.A. Shahi:

"Prior to the introduction of the Treasury bill, surplus funds of commercial banks in particular were invested abroad - mostly in the United Kingdom. Hence, in order to retain funds within the country as well as to attract funds from abroad, it was considered expedient to

TABLE 2.1 TREASURY BILLS: ISSUES AND SUBSCRIPTIONS 1960/61-1969/70
(N Million)

YEAR*	Total Issues	S u b s c r i p t i o n b y		
		Central Bank	Commercial Banks	Non Bank Public
1960/61	68.0 (100.0)	11.8 (17.4)	52.1 (76.6)	4.1 (6.0)
1961/62	122.0 (100.0)	27.1 (22.1)	58.6 (48.0)	36.4 (29.9)
1962/63	184.0 (100.0)	61.9 (33.6)	49.7 (27.0)	72.4 (39.4)
1963/64	212.0 (100.0)	96.4 (45.5)	40.0 (18.9)	75.6 (35.6)
1964/65	266.0 (100.0)	140.1 (52.7)	50.1 (18.8)	75.8 (28.5)
1965/66	302.0 (100.0)	149.3 (49.4)	51.3 (17.0)	101.4 (33.6)
1966/67	458.0 (100.0)	292.3 (63.8)	48.2 (10.5)	117.4 (25.7)
1967/68	634.0 (100.0)	451.8 (72.3)	80.1 (12.6)	95.8 (15.1)
1968/69	900.0 (100.0)	440.6 (49.0)	363.0 (40.3)	96.4 (10.7)
1969/70	1290.0 (100.0)	441.4 (34.2)	647.1 (50.2)	201.5 (15.4)

* Cumulative April - March.

Figures in parentheses are percentages to total

SOURCE: Central Bank of Nigeria: Economic and Financial Review,
Various Issues

TABLE 2.2 HOLDINGS OF TREASURY BILLS OUTSTANDING, 1959/60-1969/70
(N Million)

YEAR End*	Total Out- standings	Held by		
		Central Bank	Commercial Banks	Non Bank Public
1960	8.0 (100.0)	1.4 (17.5)	4.3 (53.8)	2.3 (28.7)
1961	18.0 (100.0)	3.8 (21.1)	8.2 (45.6)	6.0 (33.3)
1962	42.0 (100.0)	10.6 (25.2)	9.7 (23.1)	21.7 (51.7)
1963	42.0 (100.0)	4.5 (10.7)	5.8 (13.8)	31.7 (75.5)
1964	60.0 (100.0)	1.4 (2.3)	13.5 (22.5)	45.1 (75.2)
1965	70.0 (100.0)	4.4 (6.3)	16.4 (23.4)	49.2 (70.3)
1966	74.0 (100.0)	7.6 (10.3)	11.8 (16.0)	54.6 (73.7)
1967	128.0 (100.0)	39.4 (30.8)	32.6 (25.5)	56.0 (43.7)
1968	170.0 (100.0)	2.8 (1.6)	110.6 (65.1)	56.6 (33.3)
1969	260.0 (100.0)	16.4 (6.3)	193.6 (74.3)	50.5 (19.4)
1970	400.0 (100.0)	51.7 (12.9)	217.3 (54.3)	131.0 (32.8)

* Except for 1960 where figures are for April, all other years figures are for end of March.

Figures in parentheses are percentages to total.

SOURCE: Central Bank of Nigeria: Economic and Financial Review,
Various Issues

keep the rate of discount on Treasury bills sufficiently high. The Central Bank of Nigeria has taken a keen interest in the development of the market for Treasury bills since they were first issued. The Central bank's policy has been to encourage the holdings of these bills rather than rediscounting. It is for this reason that the Central Bank has tried to fix the rediscount rate on Treasury bills in such a manner that holders of such bills are not encouraged to rediscount them with the Central Bank immediately after their purchase. Thus the rediscount rate has generally been kept fractionally higher than the issue rate on bills to encourage financial institutions to put their surplus funds in this medium". (Shahi, *ibid.* p.6)

The first issue of £4 million worth of Treasury bills was implemented on 7th April, 1960, when 91-days maturity period bills were issued. By March, 1961, the total were at a level of £34 million. This was on a continuous upward trend as can be seen from Table 2.1.

Subscription to the issue of Treasury bills showed considerable fluctuation (see Table 2.1). In the early years (1960-63), the CBN took up an average 25% of the issues, whereas the commercial banks had more than half of the total issues in the first year, which performance was repeated by them only at the last three years of our sample period here. Among the Non-Bank Public Sector, some ".....statutory corporations and a variety of savings organizations". (C.V. Brown, *op.cit.* p.152) were prominent.

While the total issues in Table 2.1 indicate the cumulative value of Treasury bills during the particular period, it is the total outstanding amount of Treasury bills that would capture the reliance of the Federal Government on this type of finance at a point of time. This is presented in Table 2.2. The increasing dependence on Treasury bills is shown in the first column : Total value of Treasury bills outstanding increased steadily from 18m in 1961 to 400m in 1970. It may be noted from Table 2.1, the CBN took up the major share of total issues in six of the ten years of our sample period. But when we look at Table 2.2 we can see its actual holding of outstanding Treasury bills were always the least among the three groups, except in the years 1962 and 1967. This showed how the CBN had been able to diversify the holding of Treasury bills amongst the rest of the economy, especially the financial institutions. The share of commercial banks had been higher than any other group for half of our sample period.

Treasury certificates first came into existence in 1968 when the Treasury Certificate Decree allowed the Federal Government to borrow up to half of its expected revenue for the current year through this mode of finance. To quote G.O. Nwankwo (ibid. p.125) :

"This is another popular instrument in the Nigerian money market. It is a medium-term government security which matures after a period of one to two years and is intended to bridge the gap between Treasury Bill and long-term government securities".

Total issues and total outstanding values of treasury certificates for our sample period in this section are presented in Tables 2.3 and 2.4. Like in the case of Treasury bills, Treasury certificates were also successfully dispersed among other investors, mainly commercial banks. The attraction of the Treasury certificates relied mainly on their higher interest rate, and also like Treasury

TABLE 2.3 TREASURY CERTIFICATES: ISSUES AND SUBSCRIPTIONS 1968/69-1974/75
(N Million)

YEAR	Total* Issues	S u b s c r i p t i o n b y		
		Central Bank	Commercial Banks	Non Bank Public
1968/69	100.0 (100.0)	0.1 (0.1)	98.4 (98.4)	0.5 (0.5)
1969/70	162.0 (100.0)	16.9 (10.4)	139.3 (86.0)	5.8 (3.6)
1970/71	200.0 (100.0)	0.0 (0.0)	196.1 (98.1)	3.9 (1.9)

* Cumulative April - March.

Figures in parentheses are percentages to total.

SOURCE: Central Bank of Nigeria: Economic and Financial Review,
Various Issues.

bills, on their eligibility for rediscounting at the CBN and (for commercial banks), on their admissibility in the select group of financial assets for the legal liquidity ratio requirement. Along with Treasury bills, Treasury certificates provided another financial instrument for putting surplus funds of the commercial banks, but its amount, of course, depended on the Federal Government's need to borrow from the money market. With the advent of the oil boom period of the economy, when such need gradually evaporated, the government of the day in the 1975-76 budget declared its intentions to do away with new issues and with the maturity of the outstanding certificates this novel financial instrument in the Nigerian money market was nipped in the bud.

There was a call money scheme in Nigeria, introduced in 1960 and operated by the commercial banks outside the schemes of the CBN, though its magnitude was rather small. Therefore, one could say that until the introduction of the Call Money Scheme in July, 1962, the only domestic monetary instruments in Nigeria was the Federal Government Treasury bill. This could handicap the efficient running of the monetary policy by the CBN because, "..... the volume and direction of the call money movements is one of the important indicators of money market conditions" (Nwankwo, *ibid.* p.124). The introduction of the Call Money Scheme by the CBN opened up, yet another vehicle of investment for the commercial banks' surplus funds. The CBN played an important role in organising the scheme, until it was abandoned in July, 1974 for the same reason as for the demise of the Treasury Certificates.

While in existence, early participation in the Scheme was limited to commercial banks and later on other financial institutions (merchant banks) were ushered in. Call Money fund provided an interest rate

TABLE 2.4 HOLDINGS OF TREASURY CERTIFICATES OUTSTANDING 1968-1976
(N Million)

YEAR End*	Total Out- standings	H e l d b y		
		Central Bank	Commercial Banks	Non Bank Public
1968	20.0 (100.0)	0.2 (1.0)	19.2 (96.0)	0.6 (3.0)
1969	100.0 (100.0)	-	96.5 (96.5)	3.5 (3.5)
1970	212.0 (100.0)	14.9 (7.0)	188.3 (88.8)	8.8 (4.2)

* March, except for 1968 where figures are for December.

Figures in parentheses are percentages to total.

SOURCE: Central Bank of Nigeria: Economic and Financial Review,
Various Issues

which was decided by the CBN, and was usually one percent below the existing discount rate on Treasury bills, representing a profit to the CBN, less expenses, as already noted by C.V. Brown (op.cit. p.163). One distinguishing feature of the Nigeria call money scheme was that, unlike in a developing country like India or developed ones like the USA or the UK, where call money scheme grew up historically without much encouragement or initiative from the central bank, "..... it was the Central bank itself that took up the initiative in setting up the Call Money Fund under the Scheme in 1962 and also saw to its operation" (M.A. Shahi, *ibid.* p.15).

Financial institutions sometimes acquire certain monetary instruments designed to facilitate trade and production. Such instruments have come to be known as commercial bills, with varying degrees of maturity. The development of the commercial bill market had been rather slow in Nigeria. Until the mid 1970's a substantial proportion of foreign trade of Nigeria was with the United Kingdom. Further, the banking system in the country was dominated by subsidiaries of expatriate banks - the British banks occupying the foremost place. Therefore, in such a situation any bill that arose in the course of foreign trade was discounted in London where the head offices of these expatriate banks were located. This was generally true in the case of other Commonwealth countries as a result of their colonial ties. From its early years, the Central Bank of Nigeria made considerable efforts to develop the commercial bill market in the country with limited success. As most of the bills in Nigeria arose as a consequence of financing facilities extended to the regional marketing boards for handling major crops, in 1962 the Northern Nigeria Marketing Board of the time entered into an arrangement with the consortium of banks and acceptance houses for financing the export

Table 2.5 HOLDINGS OF COMMERCIAL BILLS 1961-1976
(N Million)

March	Total	H e l d b y		
		Central Bank	Commercial Banks	Non Bank* Public
1961	3.0 (100.0)	- (-)	3.0 (100.0)	- (-)
1962	2.7 (100.0)	- (-)	2.7 (100.0)	- (-)
1963	36.5 (100.0)	17.6 (48.2)	18.9 (51.8)	- (-)
1964	45.3 (100.0)	19.4 (42.8)	24.3 (53.61)	1.6 (3.6)
1965	40.1 (100.0)	3.4 (8.5)	35.3 (88.0)	1.4 (3.5)
1966	66.0 (100.0)	9.0 (13.6)	54.3 (82.3)	2.7 (4.1)
1967	90.0 (100.0)	26.7 (29.7)	61.8 (68.7)	1.5 (1.6)
1968	62.8 (100.0)	32.8 (52.2)	28.0 (44.6)	2.0 (3.2)
1969	55.3 (100.0)	49.6 (89.7)	4.9 (8.9)	0.8 (1.4)
1970	85.6 (100.0)	80.4 (93.9)	4.4 (5.1)	0.8 (1.0)

* Acceptance Houses and Merchant Banks.

Figures in parentheses are percentages to total

SOURCE: Central Bank of Nigeria: Economic and financial Review,
Various Issues

produce by inland bills of exchange. The Northern Nigeria Marketing Board, under this arrangements, was to meet its requirements for cash by drawing ninety-day commercial bills of exchange on the Nigeria Produce Marketing Company Limited, which acted as the exporter of all marketing board products. Those bills were to be accepted by the Nigeria Produce Marketing company, initially. Subsequently they were to be discounted by the marketing board with one of the participating commercial banks or acceptance house in the consortium. Such bills were further made "eligible" for rediscount at the Central Bank of Nigeria. This arrangement was extended in 1963 to bills drawn by the Western Nigeria Marketing Board. Other than these, the Central Bank also agreed to offer rediscount facilities to certain bills of exchange which were drawn on commercial banks or acceptance houses by "reputed licensed buying agents with substantial paid-up capital in respect of produce bought on behalf of the marketing board" within limits. The Central bank went a step further when it declared its intention to extend rediscount facilities, within limits, to bills of exchange drawn in respect of non-marketing board exports and essential imports as well, provided the bills concerned met the "eligibility requirements" of the Central bank.

The impact of all these measures and a few others, are reflected in the figures presented in Table 2.5, where we note that the total amount of bills increased from N36.5 million to N90.0 million during the period 1963-67, and the holdings of commercial banks accounted for nearly 69.0 percent in 1967.

If we go behind the summary data presented in Table 2.5 and look at the politics of the situation, we may have a better in-sight into

the stunted growth of this monetary instrument in the later part of our sample period. Let us follow G.O. Nwankwo in his summary of the situation:

"Unfortunately, the scheme began to crack at the beginning of the 1964-5 cocoa crop season when Nigeria and other members of the Cocoa Produce Alliance withdrew from the world cocoa market in an effort to get the cocoa produce manufacturers to increase the price of cocoa to at least N380 per ton. With this withdrawal, sales contracts which formed the basis on which bills were drawn under the finance scheme were no longer available. Consequently, the members of the consortium became unwilling to grant advances against, or discount bills drawn on, the security of the stocks of produce" (ibid. p.126)

Thus, the CBN was forced into a "no-win" situation. It could not possibly refrain from bailing out the Western Nigeria Marketing Board and had to grant it direct advances "..... to enable it to maintain the purchase of cocoa... which had been produced locally. (Nwankwo, ibid. p.126) But this had the immediate impact on the prospect of commercial bills as a viable monetary instrument. It was only a matter of time before the CBN had to take over the financing responsibility of the Marketing Board.

Eventually the commercial bill market received its major blow when in September 1968, the Central Bank of Nigeria (Amendment) Decree was passed. The Decree amongst other things, empowered the Central Bank to act as the "sole source of Marketing Board finance". So long as the CBN remained the only source of marketing board finance, other financial institutions were left to operate in the non-marketing board commercial bills. This could explain a slow development of this market during our sample period which led to the frustrating comment by Prof. Nwankwo: "And so ended the dream of a flourishing bill market in

the country". (ibid, p.126)

Let us now move on to the long end of the credit or money market and observe how the CBN helped develop the Stock Exchange. Without going through the legislative and other details which have already been documented in the old (C.V. Brown, op.cit. 1966) and the new (G.O. Nwankwo, op.cit. 1980) textbooks on the subject, let me here look into the performance of the Lagos Stock Exchange during our sample period. There were only 634 transactions in the Stock Exchange in 1970, involving government and industrial securities and this was after nearly ten years of its existence, registering an annual growth rate of around nine percent. But the disappointing part of it all was the proportion of the industrial stocks - in value terms it was as low as 1.1% of the total in 1969, and registering a double figure of this percentage (15.5%) only once in 1964. Government securities in the form of long-term development loans increased from nearly N12m in 1964 to only over N16m in 1970. One of the reasons for this slow growth can be traced to C.V. Brown's comment "..... how can the Central Bank expect anyone to buy 5 1/4 percent 1972 stock when it sells at the same price as 5 1/2 percent 1969 stock?" (op.cit. p.160). The other reason behind this failure rested on a commercial bank's unwillingness to buy more than "a token amount" because "..... sooner or later the Central Bank would realize the folly of supporting the market and this bank could not stand the risk of capital loss that this would entail" (C.V. Brown, ibid. p.161).

(ii) The Commercial Banks

It may be stated here specifically, though the message must have filtered through by now, that Prof. G.O. Nwankwo's monumental work on "The Nigerian Financial System" (Macmillan, 1980) has already covered most of the relevant points now under consideration. For example,

there are six chapters in Part two of the book, all devoted to the various facets of commercial banking in Nigeria up to the end of 1970's. In this section, therefore, I look into only some selected phases of the development of this most predominant monetary institution in any country including Nigeria, during the first ten years after the creation of the CBN and ending with the Civil War.

Nwankwo dubbed this period "Era of Banking Legislation 1959-70". Most, if not all, of these acts and decrees were follow up procedures from the establishment of the CBN and the subsequent adjustment of the financial set-up of the country to suit its needs. For example, the 1969 decree required all banks to be locally incorporated and to publish their balance sheets on their Nigerian banking business only - about time, one could say. There were many other important legislations in this period which were aimed at stabilising the indigenous banks for their long-term existence and committing the expatriates more towards the country of their business. The statutory transfer of 25% of the profits to reserves after wiping out bad and doubtful debts and raising the minimum paid-up capital to N 600,000 for the indigenous and N 1.5m for the expatriates, were cases in point.

All these controls, legislations and adjustments are to be tested against the dual criteria of deposits and loans, for after all, that is what a financial intermediary like a commercial bank is expected to procure or produce. In Table 2.6, we can see how total deposits, split up into three groups : (i) Demand, (ii) Time and (iii) Savings were changing overtime. There are various determinants of these three time series. They can be analysed in terms of the theories of demand/supply of money or even by the nature of savings function or of the portfolio behaviour of the non-bank sector of the economy. But whatever way we may look at these figures, the expansion of commercial banking facility

TABLE 2.6 NIGERIAN COMMERCIAL BANKS DEPOSITS AS AT 31 DECEMBER,
1960-1970

Year	Total Nm.	Demand deposits		Time deposits		Savings	
		Nm.	%	Nm.	%	Nm.	%
1960	137.0	82.2	60.0	17.9	13.1	36.9	26.9
1961	153.8	83.3	54.2	28.1	18.3	42.4	27.5
1962	173.9	90.6	52.1	34.8	20.0	48.4	27.9
1963	191.8	97.6	50.9	37.9	19.8	56.4	29.3
1964	230.1	115.7	50.3	46.2	20.1	70.2	30.5
1965	264.9	123.9	46.8	60.7	22.9	80.3	30.3
1966	297.1	134.6	45.3	73.2	24.6	89.3	30.1
1967	241.6	110.4	45.7	79.4	32.9	51.9	21.4
1968	330.5	146.9	44.5	108.8	32.9	74.7	22.6
1969	401.0	185.5	46.3	120.7	30.1	94.7	23.6
1970	625.8	289.0	46.2	207.0	33.1	129.7	20.7

SOURCE: Central Bank of Nigeria: Economic and Financial Review,
Various Issues

in the country is bound to affect their magnitudes in a situation where the economy is not undergoing any other structural change. In this perspective, we can argue that this period was rather homogenous, except the last part affected by the civil war. Total deposits have increased by nearly five times which must reflect a fast rising banking habit of the population even when the inflationary element has been taken care of. Another feature of Table 2.6 is the rising trend of time deposits and the falling trends for demand and savings deposits. Variations in these values are to be discussed in detail in the context of demand for money in Nigeria and I postpone any further discussion of these three time series until then.

The other side of the coin here is, of course, loans and advances and from these we can see how various sections of the economy are being financed by the commercial banks. From various publications of statistics on such topics by the CBN, one can see how one major sector like the Agriculture, Forestry and Fishing managed to attract only N 7m in loans and advances (2% of total loans and advances) in 1970 while the corresponding figure for 1960 was N 22.6m and 19.8% and for 1965 it was N 68.3m and 25.3%. This trend has been reversed for the Manufacturing sector which started with N 4.8m and 4.2% in 1960 and ended up with N 76.4m and 21.7% in 1970. Of course, how a commercial bank would diversify its resources depends on its profit motive and its perception of the best way to achieve that goal. A sector like Agriculture, Forestry and fishing may have high social rate of return in terms of rural employment, import substitution and income redistribution, per unit of Naira invested or lent to this sector. But a typical commercial bank, expatriate or indigenous, is expected to follow the projects where the private rate of return is high. Such was the case until 1965 when the profitable Marketing board trade bills

were to be financed. But after the CBN usurped this business from the commercial banks under strange circumstances (described earlier), this sector had been receiving very little financing from the commercial banks during our sample period.

The role of the commercial banks in co-operating with the CBN in the development of the Nigerian money market has already been discussed earlier and I do not want to go back to that subject here. But a point about the liquidity ratio may be mentioned here. The actual value for the excess liquidity ratio, i.e. - the excess over the statutory minimum (25%) - must have been very high throughout the civil war years. For example, during 1969 the actual liquidity ratio was never below 73% (of deposits) and it went up to 98.4% during February, 1970! The uncertainty during the civil war period would explain this high degree of liquidity preference on the part of the commercial banks. But during more sober times of the earlier years this ratio has been unusually high, hovering around 40 per cent. In fact, the problem was to become more acute during the two subsequent periods of our discussion and I postpone that discussion until then.

But even at this early period the problem was already there. Granted that a commercial bank has a desired level of excess liquidity¹⁸ to conduct its day-to-day banking business, it is in the interest of the banks themselves not to let it run too high. But the lack of sufficient number of longer-term bonds and the limited scope for investment in short-term ventures forced the banks to live with an embarrassingly high degree of liquidity. Here is the dilemma. Low interest rate on savings and time deposits, frequently indicating negative real rate of interest, did not help realise the savings

¹⁸. G.R. Morrison, Liquidity Preferences of Commercial Banks, University of Chicago Press, 1966.

potential of the economy. Yet, whatever deposits were held with the banks and demand deposits were about half the total towards the end of this period (see Table 2.6), could not be ploughed back into the economy substantially in longer-term investments. The commercial banks would argue, as already noted above, they would not buy the development bonds because the Central Bank was backing them too much which smelt of potential danger to them in terms of falling prices. There were not enough industrial stocks forthcoming. The commercial bill market was already almost closed to them, the CBN emerging as the big competitor. Thus, other than giving money away in granting loans for unsecured and/or risky projects, they had very few alternatives but to live with an unusually heavy cushion of liquid funds.

J. The Oil Boom

The second era of our post-CBN age emerged with the advent of what came to be known as the oil boom period of the Nigerian economy. This phenomenon provided a problem to the monetary authorities, the magnitude of which they could never comprehend before and the solution, even though quite straightforward and within the powers of the CBN operation, needed a prolonged political leadership of discipline such as the country has been observing recently after they refused to accept the I.M.F. loan. But the problem then was of the sweeter type: what was the best way to utilise a surge in export earnings, running into billions of naira for the long-term benefit of the country? It may be easy to ask such questions and debate on various paths or policies years after the event compared to a time when one has been living through it. Again, even if one like the CBN could or did ask that question in time, to protect the economy against an accelerated rate of growth of the money stock, and advise their political masters to sterilize part of the bulging billions for the good of the nation and

invest them abroad - if that would have been deemed to be the best policy - at the end of the day it was the decision of the federal government: how much to spend in any particular year. It would be an interesting piece of historical investigation to trace the ever increasing amount of government expenditure on various items, after every rise in the petroleum revenue, but that is not my intention here. My limited aim in studying the monetary history of the economy is to see how the oil boom might have affected the major monetary institutions in the country, i.e. the CBN and the commercial banks and what was its impact on the emerging money market instruments in the country.

I start at the last year of the civil war, the year before the oil boom is supposed to have started. Petroleum revenue¹⁹ accruing to the Nigerian government that year was N75.443m, which jumped to N218.942m the year after, registering an increase in the petroleum's share of total export from below 20% to over 40%. Both these figures went on increasing and in 1979-80 petroleum revenue was above ten billion naira which was around 90% of total exports and over 80% of Federal government current revenue. Let us compare this growth to that of money stock. Between 1973/74 and 1979/80 oil revenue of the government increased from N1.19b to N10.1b, a growth of 749%! Narrow money (M_1) during the period, 1973/74 to 1980/81 (allowing for some lag) increased by 896% and the broad money (M_1 + time and savings deposits) by 854%! This would indicate clearly that no attempt whatsoever was made by the CBN during the period to stop the flood of money getting into the economy. The result was an increase in the price level (as per GDP deflator) to nearly three and half times in 1980/81 compared to

¹⁹. Annual Reports of the Mines Division, and of the Petroleum Division, Lagos

its original level in 1973/74 and a rise in real gross domestic product by only 31% during that interval. All these data would give us a flavour of the oil boom in Nigeria and how its macroeconomy was reacting to it.

Let us now look into the CBN and the commercial banks a little closely during the period under scrutiny. First thing to note is a minor point in the CBN balance sheets : earlier up to middle 70's the units were published in N thousand, but later on as the sums became larger and larger, various columns for the different items in Assets and Liabilities were almost touching one another and the units were changed to N millions. This illustrates the magnitude of the structural change the monetary sector and the rest of the economy has been undergoing during this decade.

If we now take a particular item in the liabilities section of the CBN balance sheet, like the Federal government Deposit, the figure for December 1973 was N9.3m. It went up to N2088m in December 1974, reaching N2421m in april 1975 while coming down to N405m in December 1977 and going up again to N1875m in December 1980. These would indicate how the money stock was accelerating during the period; federal government gathering oil revenues in the form of (i) Rents, (ii) royalties (over 20% of total in 1979-80), (iii) Premiums, (iv) Profit tax, (nearly 60% of total in 1979-80), etc. and subsequently spending it on various items. Again, the different types of expenditure or the fiscal merits of the annual budgets are not our concern here. We would like to note, however, how the total revenue of the federal government, which were running into billions of nairas every year, were not accumulating steadily with the CBN, but were being spent almost totally as and when they came in their direction.

Let us take another item, this time on the assets side of the CBN balance sheet, total foreign assets (made up of (i) Gold, (ii) Foreign Treasury bills and Bank Balances, (iii) Foreign Government Securities etc). It was less than a third of the CBN total assets in early 1971. But as the oil boom gathered momentum it kept on rising, reaching 56% in December, 1973. The proportion of foreign assets to the CBN total assets in January, 1975 was as high as 94%. When we compare it to the money supply even for the wider definition, it was 38% larger than the value of the broad money, a feat never achieved when under West African Currency Board. But gradually, the taste for foreign goods and the high propensity to import caught up with this accumulation of foreign assets and by December 1978, it went down to 21%. The CBN's foreign assets as a proportion to its total assets went up again to nearly 60% by the end of 1980, as a result of the continuing oil boom and the oil revenue of the federal government more than doubling to N10.1 billion in one year between 1978-79 and 1979-80. The point being made here, however, is that the high proportion of the foreign assets of the CBN could have been a move for the better, so long as such assets could be politically managed to be sterilized partly, and not regarded as items eligible for the creation of extra money to be spent, in this case, by the federal government. But, as we all know, that was not to be and the collapse of the oil price and production set the country on a down turn from which it has not yet recovered. The change in the nature of the CBN balance sheet during that era, we would take up in the final part of the chapter.

Let us now look at the commercial banks during the oil boom period when such banking was basically nationalised. The argument for such an action is summarised by Nwankwo (ibid. p.75):

"Since they (the expatriate banks) concentrate on loans with the shortest maturity, the expatriate banks play a minor role in granting loans with larger maturities. It is therefore to influence the lending power of these expatriate banks in favour of Nigerians, and in the direction of the preferred sectors of the economy that the Federal Government decided to acquire interests in the banks."

Whatever criteria one may choose like assets in the banking system, proportion of bank deposits in the country, of loans and advances or liquidity ratio, the expatriate banks dominated the scene everywhere. By 1976, the federal government took up 60 per cent equity interest, raising it from 40% and in one stroke both indigenised and nationalised commercial banking in Nigeria, the state governments already owning the indigenous banks. Nwankwo supports it in the following words (ibid. p.83):

"A sector so crucial to the development of the economy cannot be left to the whims and caprices of private sector management, not to mention foreign management."

A look at the data on the performance of the commercial banks after all the changes in ownership and management leaves one in doubt about any substantial improvement. The liquidity ratio, it is true, no longer stayed in the high 60's (%) as it did in the early part of 1975 and came down appreciably towards mid 30's (%) during the second half of 1978. But after that it had been going upwards towards the second half of 1979 and stayed over 40% all through 1980. Perhaps this was unavoidable, to some extent. With limited scope for investment in longer-term ventures like industrial or development stocks, the banks had no other alternative than to remain over-liquid. It was not the banks' fault that the federal government did not have to raise funds in the credit market; for a while they had all the money they needed,

thanks to the oil boom.

This leads us to the question of the adverse impact of the oil boom on monetary institutions and instruments. We already saw how various short-term assets, like call money and treasury certificates were discontinued during 1974 to 1977. If we now extend that issue and look into the broader perspective of the cost and benefits of the oil boom era, we may call into question various aspects of the monetary management of the period. For, many Nigerians these days prefer to call it the era of oil doom, maybe implying thereby, more long-term harm was done to the country at the time than good and all they gained during the time was a phase of conspicuous consumption for a substantial section of the community. This is, of course, a very big question and can be approached in various ways depending on one's value judgement, whether one is a local or a foreigner and one's particular angle of vision for the topic. Let me, therefore, attempt an evaluation of the period in terms of central banking from the detached perspective of an observer, now distant both in space and time.

If a person wins some large amount of money in a lottery it is very likely to change her life style. The change may be gradual, if she is to invest the bulk of her winnings and use the interest or dividend to improve her permanent income, and therefore, permanent consumption. Alternatively, she may go on a spending spree as long as the money lasts, and be back to her earlier constraints on income and wealth afterwards. There is no logical way of deciding which alternative is intrinsically the better one. But if the person under consideration suffers from the Duesenberry-type utility function where the past peak level of consumption would be the standard against which the present level is to be judged, the sense of frustration may add to the cost of the second alternative.

Now, what is true for a single person is here also true for a country, unless the country is big and influential enough in the international money markets, like the USA. With the increase of the petroleum price since 1973 and the average production in Nigeria rising to a level of 2.31m barrels a day in 1979, both export and total government revenue were dominated by this sector of the economy. The increase in the net-export would lead to the increase in national income, via the multiplier effect. The real income did go up by 57.53% during this era (1970-71 to 1980-81) of oil boom, registering a simple annual growth rate of 5.23%. Part of this growth would also be attributed to other exogenous changes in the circular flow of the economy, namely investment (both public and private) and government expenditure in Nigeria. In a macro-economic model, it is possible to capture such effects separately and one is actually to be reported in the next chapter. What we would like to see here, however, is that how far the CBN and the Ministry of Finance could have checked the growth of money supply in the economy during this period.

During the whole of this era, more than fourteen-fold increase in money stock (M_1) led to nearly six-fold rise in the prices and the point we would like to discuss here, is whether the authorities could have managed that better, i.e. reduce the growth of money stock. This was quite easy at the time, given the will to do so. Since almost all the extra export earnings were accruing to the federal government, the CBN could easily have sterilized any fraction of that so long its partner in monetary management, i.e. the ministry of finance agreed to do so. But if the ministry was biased towards spending whatever the government earned, there was not much room for the CBN to manoeuvre. And whatever the federal government did spend in the country, automatically increased the stock of high-powered money and ultimately money stock.

Inflation is the obvious effect of such a great increase in the money stock. It would have been less, if government did not spend the whole of its revenue or even had an upper limit to go by in terms of its domestic expenditure. The extra billions could have been shifted away to buy foreign financial assets with them. This would have allowed naira to fall or provide some justification in a drop of its alignment with dollar and/or sterling, because of adverse effects on the balance of payments.

This is a hypothetical case, and things went differently. Naira did stay high for a long time, thus depriving many infant industries the chance to survive and many did disappear. In fact, agriculture suffered a lot: nearly N2 billion worth of food stuff was imported during 1978. Luxury textile imports were nearly N1 billion during the same year and the value of imported cars was then approaching half a billion mark.

To sum up, the CBN ought to have pointed out the inflationary effect of monetising the oil billions and if they did not do so they failed in their task as the central bank of the country. If they did, and the government of the day, which was the federal military government during this period, took no notice then they were the guilty party. Secondly, the CBN allowed the naira to stay too high for too long. This had adverse effects on the agricultural and industrial development of the country. Finally the interest rates on deposits of all kinds were administered at far too low levels for far too long, registering negative returns when inflationary expectations were accounted for. This must have adversely affected people's willingness to save, and therefore the availability of loanable funds in the economy.

K. The Depression

The depression in the Nigerian economy started from 1981/82 when the real GDP fell by over 8%. Since the growth of the economy in the earlier period was almost totally dependent on the oil sector, it is no surprise that such a lop-sided economy would be vulnerable to the vagaries of the international oil market. Let us look chronologically into the downturn.²⁰

Nigeria's production of oil fell dramatically from its earlier high level of around 2m barrels a day until January, 1981, to 0.64m b/d by August, 1981 - a drop of nearly two-thirds of the earlier production rate. Part of this production had to be left aside for its own internal use, leaving still less for export. The glut in the market was the reason for this downfall. Nigerian National Petroleum Corporation (NNPC) was offering \$4 discount to the \$40 OPEC price at the time, which Nigeria failed to bring down in the OPEC meeting in August because of opposition from high-cost producers like Libya and Algeria. But even at \$36 per barrel, it was still \$4 more expensive than the Saudi Arabian crude and the Americans (Nigeria's biggest customer) were turning more to them, causing a drop in its US shipments from 0.5m b/d to 0.3m b/d. This was also the result of some technical innovation in the customer countries. Nigerian light oil is relatively sulphur-free and this product differentiation was appreciated in \$4.50 a barrel differential in the OPEC pricing, between the Arab heavy and the Nigerian light. In the spot markets also this differential was set to around \$2.50. But, with the installation of "upgrading" facilities

²⁰

This descriptive account of the depression of the Nigerian economy is based on reports in the various issues of the following journals:

- (a) Africa Confidential, London.
- (b) Africa Now, London.
- (c) Africa Report, New York.
- (d) Africa Research Bulletin, Exeter, England
- (e) Africa, London
- (f) Economist, London.

at various refineries, which could reprocess any heavy crude to light end products, Nigeria light's natural advantage no longer could command higher price.

This 10% price cut was expected to increase production up to 1m b/d and at the above price, total oil revenue for the fiscal year 1981/82 was not enough to meet the expected import for the year. External reserves at the end of July were at N5.3 b. According to Prof. E.C. Edozien, economic adviser to the President, if the production could be raised to 1.4m b/d at the above price (\$36) the drop in the reserves would be N1b by the end of the year. The situation was thus fast becoming desperate and at one stage the reserves were enough to pay for three to five months import bill.

The civilian government at that time, headed by Shehu Shagari was rather slow to wake up to this crisis and introduced an austerity budget, designed to save a billion naira. Yet, for political reasons, the government was spending N2.3 b a year in keeping internal prices about a third below the international price. The major burden of the austerity budget was to be borne by delaying capital projects. All this would indicate that Nigeria would have to borrow from the international capital market to solve its cash-flow problems. That prospect was not bad at the time, with already substantial reserves and a low debt servicing ratio of 2.1%.

The situation became worse next year when Britain was accused of lowering "..... the price of North Sea crude oil specifically to undercut Nigerian crude and break OPEC in the process." The vice-president, Alex Ekwueme called an emergency meeting of the National Economic Council on 22nd March, 1982, and gave the 19 governors the preview of the desperate measures to be undertaken by the CBN, on foreign exchange. This amounted to virtual suspension of imports - no

fresh letters of credit and the commercial banks to furnish the CBN within a week, all the information on their commitments of foreign exchange. The vice-president also disapproved very strongly of some states trying to raise funds in the international markets.

The desperation of the government could be traced to their search for scapegoats by expelling two million aliens in January, 1983. At the same time the country was getting ready for another general election. The educated upper middle class's expectations have been formulated during the oil boom era when the 1979 election was held. At that time, oil price was \$40 per barrel and Nigeria was producing 2m b/d. Now (1983) they would be averaging less than half of that production level and also selling at a much reduced price of \$28. One ray of hope for the ruling NPN party was that for the vast majority of the voters, often poor, rural and illiterate, the set backs in the government revenue through recession in the oil industry, were not that important, because they were hardly touched by it during its prosperous phase. Only a minority group were to be affected and denied their good living if the recession was to deepen into a severe depression.

Even though Shehu Shagari was re-elected, the financial situation remained desperate for Nigeria. Around April/May, 1983, Nigeria's external debt was \$12 b, and it was already defaulting on payments on trade finance. The IMF facility was not to be considered for the politically unacceptable precondition of a devaluation of the naira. The medium-term prospect of raising the productive capacity of the oil sector was also being hampered, because of low profit margins mainly due to oil glut and the resulting dip in its price. NNPC itself was to cut down by a quarter its drilling plan for 1983. All the foreign companies like Mobil, Royal/Dutch Shell and Gulf Oil (Nigeria's second largest producer) found the fiscal situation of the time not conducive

for further investment. But Texaco and Agip were still exploring for oil.

In 1979, Nigeria produced 840.3m barrels while in 1983 it went down to 453.9m. The foreign exchange earnings from the oil sector in 1983 were nearly half of its 1980 level. This was the main reason behind the large accumulation of external debts, and the attempt to protect the living standards by trying to impress the international financial markets about the credit-worthiness of the country and cutting drastically on imports, could not possibly succeed. The casualty was the military take-over of Shagari administration by Maj. Gen. Mohmd. Buhari, on the last day of 1983.

Nigeria's macroeconomic problem had some reaction on the working of the international oil cartel of OPEC. When in October, 1984, Nigeria followed Norway and Britain in cutting its price by \$2 per barrel, that unsettled the OPEC co-operation on price and production. Sheikh Yamani, Saudi Arabia's oil minister flew into Lagos, when Prof. Tam David-West, Nigeria's oil minister did not turn up for the OPEC meeting in Geneva, to settle the price dispute. But, the rumour was that the price cut was undertaken against the professor's advice, when Buhari, himself an oil minister in the earlier military administration, was thought to be behind the Supreme Headquarters' decision for the price cut. But the professor remained loyal to his employer, coming out with comments like: (i) "Nigeria has never sold oil at a discount. All her oil is sold at the Official Selling Price." (ii) On Yamani's impending visit, "the sovereignty of a state is not negotiable, and neither is the interest of her citizens." David-West also complained about some OPEC members increasing their output when Nigeria obliged by following OPEC instructions to reduce the glut in the oil market and actually produced less.

By July, 1984, Nigeria's external debt stood around \$11 b, while her external reserves were only \$1.3 b. Various international agencies were agreeable to help and reschedule the debts only after Nigeria would take the IMF medicine. But to Nigeria, it was a bitter one, and they did not see any sense in it. The problem here was the external value of naira, which IMF thought was much too over-valued and they wanted it cut by 60%. This was almost universally unpopular in the country and the drastic reduction in import, employment and severe control of foreign exchange were presented as the austere programme which the international body ought to go by. The other problem was the enormous subsidy on domestic oil consumption and the IMF wanted it removed. Nigerians did not see any sense in it, because higher oil price would reduce domestic consumption and the extra oil available could not be sold abroad because of the glut in the international market. This would also add to the transport cost of food distribution from the rural to the urban centres. Both these arguments were in favour of the urban middle class who, though very vocal and therefore politically relevant, did not have to be subsidized at the cost of the rest of the community. Or, to put it differently, if the more successful and prosperous members of the community were made to pay the market (international) price for their petrol consumption, billions of naira used in artificially keeping that price down, would have higher social return.

Meanwhile, the austerity programme taken by the succeeding administrations was beginning to have its effects on the society. The closure of companies and the curtailment of the public sector were adding to the urban unemployment and causing problems of law and order in those areas, and especially in Lagos. Meanwhile there were tensions between the two groups of Muslims and they were caused, not by the

recession as such, but were due to the prosperous and oil rich modern state alleged to be changing the fundamental Muslim way of life in the north.

To avoid the problem of foreign-exchange, Nigeria took up an anti-money strategy and looked for double coincidence in wants in the international arena. They were first successful in this venture and managed to sign three barter deals with Brazil, France and Austria worth about \$2b in the first half of 1985. More were in the pipeline and if all were successful, the country could sell off 0.45m b/d on such deals. But Nigeria's two major exporters (UK, 19% of Nigeria's import in 1984, and the US, 12%) were not interested. This also annoyed Nigeria's cartel partners in the OPEC, but they did not make any problem for Nigeria, since the leader, Saudi Arabia also took up such a counter-trade strategy. Nigeria's OPEC quota at that time was 1.45m b/d while some estimates put the actual production to be around 1.75m b/d.

This barter strategy was also unpopular with Nigeria's own NNPC, since it left them with less room to manoeuvre in the spot market. Again, even within the deals, if the gap between the crude petroleum price and the price of the finished product (oil) were to widen, the deal could only survive if the spot market realities were considered. Thus, there seemed to be no less problems by abandoning monetary transactions and all it could offer Nigeria was a breathing space to reconsider the IMF alternative.

Meanwhile, there was another change in the political scene. On August 27, 1985 Major-General Ibrahim Babangida took over power in a bloodless coup. On December 12 of the same year he stopped further negotiations with the IMF, declaring "from now on the path of honour lies in discontinuing negotiations with the IMF". This was a popular

decision in the country and the general's argument for it was:

"It is not at all clear from the evidence that the additional sacrifice involved in obtaining the loan is less than the additional sacrifice entailed in not taking the loan. But what is clear is that whatever option we take will involve a lot of sacrifices by our people".

Though the imposition of the IMF programme was not politically feasible, the debate on it was very useful for Babangida to initiate an era of economic discipline, and self-denial. In his own words, again,

"The IMF debate has proved a unique occasion for the people of this country. Opinions have been expressed by a wide spectrum of the society, each person acting to the best of his or her knowledge with the purest of motives and all in the interests of Nigeria"

Let us now look at the 1986 budget. The emphasis of the budget was to harness home-grown efforts and to rely less on imports. The three objectives of the budget were (i) to restructure the economy in such a way as to reduce the dependence on the oil sector; (ii) to achieve, over the medium term, balance of payment and fiscal viability and (iii) to establish the base for a non-inflationary growth of the economy. To achieve such objectives the government would undertake certain policies, some of which are enlisted below:

- (i) allow naira to find its own value;
- (ii) reduction in petroleum subsidy of N900m, to be used for education and road repairs;
- (iii) fuel prices nearly doubled, except kerosene;
- (iv) nearly 20% reduction on current defence expenditure;
- (v) priority list for essential products in granting import licences;

- (vi) paying 30% of available foreign exchange for external debts;
- (vii) restrictions on exports removed;
- (viii) only government officers on Grade level 16 and above to get one car;
- (ix) banks to lend 15% of their loan to agriculture;
- (v) no fees in public primary schools;
- (xi) Health institutions to get N200m, Police to get N123m.

From the list above one could see that the IMF proposals for the economy were actually sought to be undertaken. But this needed adjustment to the hardship that was bound to follow and the 'national economic emergency', which was declared the October before, for fifteen months, turned out to be quite appropriate. The general was also very concerned about the actual working out of the various policies: ".... policies, no matter how soundly formulated become empty words, unless they are vigorously implemented". He emphasized "the critical nature of 1986 to our national economic survival and to approach policy implementation throughout the year in that spirit of emergency".

On the most crucial part of the above proposals, i.e. on the devaluation of naira, however, the government actually acted differently. They introduced the Second-Tier Foreign Exchange Market (SFEM), by segmenting the foreign exchange market into two parts. This would allow certain types of transactions in this market to be subsidized, while the others had to find their own levels in the market place. The preferred transactions were government payments to the international organisations and, to quote Eghosa Osagie,²¹ "..... the interests of private sector transactors influential enough to have had

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E. Osagie, "Operating SFEM in the Nigerian Setting", NJESS, Vol.28, No.1, March, 1986, pp.71-118.

their letters of credit confirmed before the takeoff of SFEM" (29th September, 1986). Nigerian Economic Society actually came out with a thorough scrutiny of this policy programme with the help of eight articles published in the March, 1986 issue of its journal (NJESS) and between them the authors looked into almost all possible facets of SFEM, both theoretical and applied. It is not the intention here to summarise all of them and I note a noncontroversial conclusion of one of those articles:

"..... SFEM can be considered successful only if it leads to increased domestic production. The possibility of this occurring would be enhanced if other policies contained in Nigeria's current programme of structural adjustment also actively work to increase domestic production of goods and services". (Osagie, *ibid.* p.116)

Let us now examine how the Structural Adjustment Programme has been working in the country. If we look at its performance towards the end of 1987, we would see that credit was tight, growth of money supply controlled and government spending curbed. The Nigerians were anxious not to fall in the Brazilian trap of wage and price inflation after a dose of devaluation. But this had its toll in human suffering. The president of the Nigerian Labour Congress, Ali Chiroma commented, "How are workers going to survive with rising prices and frozen wages?" On the other side of the industry, the executive director of the Manufacturers Association of Nigeria, Aladebo Fafowora argued, "There is a fine balance between inflation and killing off industry."

The industrial sector could no longer ride on the back of the high naira and now had to pay four times more for their imports of raw materials and spare parts. Volkswagen had to reduce their productive capacity substantially and laid off thousands of workers. To quote

Lyse Doucet:²²

"Austerity has thrown a harsh light on the weaknesses: virtually no backward integration in the automotive industry which has not advanced beyond the assembly stage; steel mills make steel rods but not steel sheets." (Doucet, *ibid.* p.53)

Later on:

"Industrialists are pleading for more time to adjust and for an improved tariff structure..... Some argue that 27-year old Nigeria should shut its doors and protect local industry like India did, in order to give indigenous industry a fighting chance".

On the credit side, food production improved and food prices stabilised during 1987, even though the big farmers were suffering from the higher costs of spare parts. Finance Minister Okongwn commented, "We're less frivolous and have become a more cost-conscious people". Yet the balance on the costs and benefits of SAP were still on the cost side. In fact, the former head of state, General Olusegun Obasanjo came out with a blistering critique of the economic policy. SAP he said, "..... drastically reduced the living standard of all classes of productive workers except speculators and commission agents". There was a brain drain away from the country and the government's liberal trade policy, Obsanjo argued, was not in the best interests of the country. Yet the government did not have much choice but to carry on with, as some commentator put it, SAP MARK TWO. A 6% rise in petrol price in April, 1988 set forth riots, starting from the university of Jos, which spread to the rest of the country leading to closure of many universities, death of at least 12 people and burning down of many government buildings. But the IMF was adamant, requiring further

increase in oil prices and reduction of budget deficit, and their approval was needed before Nigeria could reschedule its debts from the Western creditors and also to gain new loans from the World Bank and Japan. Finally, in 1989, the international body approved the January budget and offered Nigeria a loan of \$740m. The budget required people to pay 43% more for petrol, when they needed it for private use. The second-tier foreign exchange market was abolished and naira was due to find its own market level. Compared to the beginning of 1986, naira fell by 80% by the end of 1988, adding to the cost of living for the rich, the middle class and the poor. The latest policy of General Babangida was to privatise a major part of the economy - in 1988, 64 private banks were ushered in.

All those recessionary features of the economy were to be reflected in the national income data and the behaviour of the banking sector. For a change, this time the monetary sector, or more particularly the central bank would be reacting to the exogenous shocks of the economy, as best as it could, rather than being a party to bringing about the massive changes in the money stock, as was the case of the earlier period. But the CBN did have a role to play and let us follow the economic data, to fathom how they did it.

GDP during the period 1981/82 to 1987/88 fell by 23 percent whereas the price level (GDP deflator) is estimated to have increased by 61 percent. This may be due to an increase in the supply of narrow money (M_1), during the same interval, by as much as 53 percent and of the broad money (M_2), by 90 percent. Interest rates on deposits (3 months) went up from 5.75% in 1981, first quarter to 14.92%, last quarter, 1987. The rates on first-class advances for those two periods were 8.75% and 17.96%, respectively.

Let us now look into some relevant items of the balance sheet of the CBN during the period. If we take an early date in this interval, say December 1981, we can observe the declining trend of the foreign assets as a proportion of total assets. It fell to 25 percent, from 58 percent in one single year; and then it went down to 9.8% in December 1982, to 5.6% in December 1983 and was at 9.7% on March 1987. To compensate for that, government securities had to rise : it went up to 62.3% in December 1981 from 30.6%, a year earlier. The subsequent year-end figures were always above 70% until December 1985. In March 1987, it went down to 60%. Another related point to note, is that treasury certificates which were discontinued during the oil boom period, were reintroduced when the recession set in in government revenue from the oil sector. The recession also revived the treasury bill issues, after its volume was declared to remain unchanged in the 1975-76 budget speech. Thus, we can see, that one favourable by-product of the economic difficulties in general and of the fiscal problems in particular, was that certain basic monetary instruments, which were allowed to languish and almost linger into oblivion on the wave of success on exports, were now revived and given a new lease of life by the monetary authorities in the country.

For the commercial banks, the liquidity ratio during this period still remained quite high, the lowest figure being recorded at 29.2 percent during November, 1981 while the highest was 87.5 percent in April, 1983. It was mainly in the 30's almost all through 1982 and gradually went upwards to the 50's and 60's during 1983, 1984 and 1985, coming down somewhat in 1986 and the early part of 1987. Thus, the growth in the economy during the oil boom period or its downturn subsequently did not have much effect on the nature of the liquidity ratio of the commercial banks. Maybe, it is not appropriate to expect

it any other way, because the alternatives are rather limited to them. With relative lack of development of the capital market, and the very nature of commercial banking biasing them towards the short end of the credit market, such observations cannot be avoided, whatever phase the so-called "real" sector of the economy may be undergoing.

This concludes my descriptive account of the financial and monetary aspects of the Nigerian economy, during the span of this century. Before I present a survey of the recent research works on the related problems in chapter four, it may be appropriate to provide a quantitative assessment of certain features of the post-CBN development of the economy in terms of some basic macroeconomic magnitudes like the saving-ratio, growth rates of income and per capita income, of money and per capita money and some measures of the financial intermediation. Since such a quantitative analysis of the development process has not yet been attempted, I take that up in the next chapter, before returning to the other main themes of the thesis in chapters five, six and seven.

CHAPTER THREE - INFLATION, FINANCIAL INTERMEDIATION AND GROWTH

A. Introduction

In this chapter an account of the mainly monetary impacts on the development process during the post central bank era of the Nigerian economy is undertaken. As we already observed in the earlier chapter, this period can be sub-divided into three distinct parts with separate structural features from one another and I may have to account for that in the empirical analysis of the relations. Furthermore, the civil-war period poses problems of its own, when all the relevant economic data could not be compiled for the eastern provinces. The state of the war-economy itself would also make this three-year span rather distinct from any other. Thus, a quantitative study of the monetary features of the growth of the economy during such a heterogeneous period would need some heroic assumptions for its statistical treatment and they will be spelt out below. On the economics of the analysis, one may look into the relevant macroeconomic magnitudes concerning growth and, more particularly, the inflationary financing of growth. It has been suggested¹:

"..... the case for inflationary policies, leading to rising prices, which some people might call the Keynesian approach to development, is not clear cut theoretically, and the empirical evidence is equivocal." (Thirlwall, 1974, p xii).

1. A P Thirlwall, Inflation, Saving and Growth in Developing Economies, Macmillan, 1974.

This hypothesis, in its various facets, is taken up for empirical testing in this chapter. Since the hypothesis of demand-pull inflation generating development can be put forward in different formats, I undertake them separately in the following sections. First, I look into the basic relation of growth and investment in terms of per capita and ordinary growth rate of gross national product and saving and investment ratio. Since the high growth rate of the oil-boom period is mainly initiated by export, it may be interesting to note how the basic relations involving growth rate and saving (or investment) ratio are to be recorded for Nigeria.

In the next section the broad issue of the role of money in the development process is investigated for one historical period. Since the impacts of the growth rate of money can be split up into the growth rates of real income and of the general price level, for a stable and 'unitary' income-elasticity of the demand for money, controlling money stock for stable or slowly rising prices may not necessarily be the optimal policy for a developing economy. When sufficient savings are not forthcoming for the investment need of the country, the authorities may allow money stock to grow faster to finance the development projects. If that brings forth inflation, it may not be socially sub-optimal. Inflation, again, may influence the saving-income ratio. Thus, it is important to know:

- (i) what rate of inflation could be regarded as socially optimal for the saving-ratio and for the growth-rate and
- (ii) what could be regarded as the optimal growth rate of the money stock. All these questions are investigated in sections C and D below.

Money, broadly defined to include savings and time deposits with the commercial banks, along with the demand deposits would, by and large, indicate the financial resources of a developing economy like Nigeria. The relative contributions of other financial intermediaries in the country, are quite small and this may inhibit the growth process itself, if policies are not designed to make allowance for such financial backwardness. It is worthwhile to know, therefore, how the process of financial intermediation may be helping the investment generation process in the economy and also, at what stage of financial maturity the economy has reached, so that the monetary policies like the fixing of interest rates can be achieved at the socially optimal points. I take up such issues in section E before summarising the results of this chapter in the concluding section.

B. Growth and Investment

One usually expects a positive relationship between the growth rate and saving-income or investment-income ratios².

2. Due to the lack of data on saving overtime, gross investment values from the national income accounts are here used for both total saving and for total investment.

The hypothesis is that higher investment will lead to higher accumulation of capital, and with stable capital-output ratio, real income would increase, as a result. Let me first put this hypothesis for testing, for the Nigerian data during the period, 1961 to 1987. The correlation coefficient between investment/income ratio and the growth rate, however, turns out to be only +.0302. The corresponding figure for the rate of growth of per-capita income is only +.007. This would indicate the lack of any statistical relationship involving these variables in our sample, which is an exception from the rule. But, surprisingly, a negative relationship is observed. Let us see how.

As already indicated, our sample period encompasses a three-year span of civil war and two structural changes (oil boom: 1970-'80; depression: 1981-'87). To tackle such a heterogeneous sample period, one may use three dummy variables. One of them (D_1) would refer to the civil war years, when data from the eastern states could not be included in the national statistics. Thus, variable D_1 would have ones for the three fiscal years 1967 to 1969, and zeroes elsewhere. The oil boom dummy (D_2) would contain ones for the years 1970 to 1980 and zeroes elsewhere, while the depression dummy (D_3) would have ones for the years 1981 to 1987 and zeroes elsewhere. Since such usages may affect the results, the regression equations are presented below, first with the civil-war dummies only, and then with all three of them.

$$\frac{\Delta Y}{Y} = 1.661 + 7.863 \left(\frac{I}{Y} \right) + 3.359 D_1 \quad \dots (3.1)$$

(0.23) (0.19) (0.45)

$$R^2 = .009; D.W. = 1.31; S.E.E. = 12.03$$

(t-values)

$$\frac{\Delta Y}{Y} = 17.903 - 95.156 \left(\frac{I}{Y} \right) + 2.886 D_1 + 10.163 D_2$$

(2.04) (1.82) (0.38) (1.53)

$$- 10.839 D_3 \quad \dots (3.2)$$

(1.78)

$$R^2 = .283; D.W. = 1.60; S.E.E. = 10.69$$

$$\frac{\Delta Y_n}{Y_n} = -0.669 + 2.933 \left(\frac{I}{Y} \right) + 2.864 D_1 \quad \dots (3.3)$$

(0.09) (0.08) (0.40)

$$R^2 = .007; D.W. = 1.37; S.E.E. = 11.60$$

$$\frac{\Delta Y_n}{Y_n} = 15.384 - 95.419 \left(\frac{I}{Y} \right) + 1.865 D_1 + 9.08 D_2$$

(1.83) (1.90) (0.26) (1.42)

$$- 11.246 D_3 \quad \dots (3.4)$$

(1.93)

$$R^2 = .288; D.W. = 1.67; S.E.E. = 10.26$$

As we can see from the above four regression equations, (3.1) to (3.4), the R^2 values remain very low indeed, if the two structural dummies, D_2 and D_3 are omitted. This indicates the weakness of the relationships before one even tries to interpret some of the coefficients. When I go on to do that, the nearly significant negative coefficients for $\frac{I}{Y}$ in equations (3.2) and (3.4) are contrary to a-priori expectation from our hypothesis. This negative result could be explained, at least for a major part of the period, if we consider the importance of export in the growth of national income. During the oil-boom (1970-'80) and the depression

"(1981-'87) periods, the growth of national income and its decline, respectively, is likely to have followed the dramatic increase in the export of petroleum products and also its relative fall, through the operation of the foreign-trade multiplier during those years. Maybe, since such a strong association dominated two-thirds of our sample period, it is not being possible to come up with the positive relationship, as expected from the hypothesis. Let us test these amendments, in terms of the following regression equations:

$$\frac{\Delta Y}{Y} = \frac{11.827}{(1.12)} - \frac{26.113}{(0.82)} \frac{(I + X)}{Y} + \frac{2.889}{(0.36)} D_1 + \frac{7.271}{(0.96)} D_2 - \frac{7.2}{(1.11)} D_3 \quad \dots(3.5)$$

$$R^2 = .2 ; D.W. = 1.60 ; S.E.E. = 11.3$$

$$\frac{\Delta Y_N}{Y_N} = \frac{9.961}{(0.98)} - \frac{28.428}{(0.93)} \frac{(I + X)}{Y} + \frac{1.928}{(0.25)} D_1 + \frac{6.534}{(0.89)} D_2 - \frac{7.487}{(1.2)} D_3 \quad \dots(3.6)$$

$$R^2 = .202; D.W. = 1.67; S.E.E. = 10.86$$

$$\frac{\Delta Y}{Y} = \frac{17.271}{(1.6)} - \frac{94.832}{(1.78)} \frac{I}{Y} + \frac{3.829}{(0.11)} \frac{X}{Y} + \frac{2.809}{(0.36)} D_1 + \frac{9.819}{(1.3)} D_2 - \frac{11.113}{(1.65)} D_3 \quad \dots(3.7)$$

$$R^2 = .284; D.W. = 1.59; S.E.E. = 10.94$$

$$\frac{\Delta Y_N}{Y_N} = \frac{15.263}{(1.47)} - \frac{95.357}{(1.86)} \frac{I}{Y} + \frac{0.732}{(.02)} \frac{X}{Y} + \frac{1.85}{(0.25)} D_1 + \frac{9.014}{(1.24)} D_2 - \frac{11.299}{(1.75)} D_3 \quad \dots(3.8)$$

$$R^2 = .288; D.W. = 1.66; S.E.E. = 10.5$$

As we can see from the regression equations, (3.5) to (3.8) above, the inclusion of the export-income ratio separately in the last two cases or in conjunction with the investment in the first two, did not improve the explanation and the evidence still remains inconsistent with the a-priori expectation from theory. The correlation coefficient between growth rate and the export-income ratio is only + .017, and with export plus investment as a ratio of income, it is only + .0304. So, it is not very surprising, that one may end up with such anomalous results in the above regression equations. Again, the data on the investment-income ratio indicates an average of 17% with a standard deviation of 6%, which is not unusual for a developing country. For the growth rate, the similar figures are 3.37% and 11.4%. For the per-capita income, however, the average growth rate has only been 0.15% with a S.D. of 10.97%! The volatile nature of this income growth is suggested from its highest rate of 27.6% during 1969-70 and the lowest rate of -20.2% in 1982-83. The 1987 per capita income of N349, at 1980 prices, was over 15% less than its 1961 value. These figures demonstrate the wide fluctuations of the relevant magnitudes and may explain why it was not possible to establish a direct relationship between the growth rates and the investment or the saving ratio.

C.. Money in the Development Process

It has been well documented by now, that the use of money in place of barter would save resources for each participant in a transaction, and therefore, enormously for the whole economy. The government, as the monopolist issuers of the legal tender could divert resources to itself, with the increase in the monetisation of an economy. Nigeria has been no exception and we saw in the last chapter how the spread of money from the foreign trade sector to the rest of the economy evolved, though it took a long time to come by. In the context of development, the central authorities can augment investment, if they could divert domestic income away from private consumption to public investment. To do that the government must have a surplus from its tax income and borrowings over its expenditure and loan repayments. If such a surplus is not forthcoming, because of inadequate tax base and/or inefficient collection system and also due to the infancy of the credit markets, the state can divert resources to itself by being the sole supplier of the currency in circulation. Since there is a close relation between this monetary base and the money stock consisting of commercial bank deposits³, it is possible to work out how the government of the day can finance part of its investment expenditure through the creation of high-powered or 'state' money. And this operation need not necessarily be inflationary. Let me see how.

³ A model for the determination of money stock in the context of the post-civil-war Nigerian experience has been proposed and tested in chapter seven, below.

Starting from the equation of exchange, $MV = PY$, where M = money supply; V = the income velocity of money; P = Price level and Y = real income, one can rewrite the relation in terms of the rates of change of the variables, as follows:

$$m = k + p + y \quad \dots(3.9)$$

$$\text{where } m = \frac{1}{M} \frac{dM}{dt}; \quad k = \frac{V}{dt} \left(\frac{1}{V} \right);$$

$$p = \frac{1}{P} \frac{dP}{dt} \quad \text{and} \quad y = \frac{1}{Y} \frac{dY}{dt}$$

Equation (3.9) can be manipulated and rewritten in the following form⁴, assuming $p = 0$:

$$\frac{dM_G}{I} = \frac{K(k + y - a)}{A \cdot Cr \cdot y} \quad \dots(3.10)$$

where, dM_G/I is the change in the stock of government money as a fraction of investment (I);

A = credit multiplier;

$a = \frac{1}{A} \frac{dA}{dt}$ = rate of change of the credit multiplier;

K = inverse of the income velocity of circulation of money

Cr = the required capital-output ratio

Using appropriate values for some of the parameters above for Nigeria in the middle 1960's, and assuming a required

⁴ Here I follow the model proposed by R S Bhambri, "Demand for Money and the Investible Surplus", Nigerian Journal of Economic and Social Studies, March 1968, vol 10, no 1. It is also presented in Thirwall, (1974) op cit, pp 132-134, from where equation 3.10 above has been taken.

growth-rate of 5%; $C_T = 3$; $A = 1.6$; $K = 1/v = 1$; $k = 0.04$; $a = 0.03$, Bhambri concluded that the newly created government money would finance 2.5% of total investment without inflation. After over twenty years, if I attempt the same exercise for the late 1980's, and particularly 1987, I need to change the values of certain parameters, like A and K. Velocity of circulation of narrow money was around 10 during 1964 to 1966, whereas, it was 4.36 for 1987, giving us a K-value of 0.23. March 1987 figure for A would be around 1.9. Using these values, and the same numbers for the other parameters, I conclude that nearly 5% of the total investment could have been financed by the newly-created high-powered money, without inflation. And with the actual inflation of 10 per cent in 1987, actual growth rate of 1.2%, a fall in the velocity of circulation of narrow money from 4.61 in 1986 to 4.36 in 1987 and a rise in the credit multiplier by 0.1 to 1.9 and assuming capital-output ratio of 3, the corresponding actual figure turns out to be 7.4%. Or, in other words, the increase in the average value of the high-powered money by about N726 million in 1987 compared to 1986, could be estimated to have helped the federal government to finance over 7 per cent of gross investment, or N457 million of the total investment of N6180 million in the country.

It may be appropriate at this stage to look into the nature of the velocity of circulation of money, or its obverse, the stability of the demand for money. How much a given rate of change of money stock would affect the price level and the level of output, would depend, to a large extent, on the nature of the demand for money. If the income elasticity of the demand for money is high, an increase in the money stock would

lead to a low increase in the effective demand, than is the case when the elasticity is low. Again, the suitability of this theoretical device itself may be called into question if the demand for money function does not indicate a stable value for the velocity or the income elasticity. To look into such questions, I present below some OLS estimates of the demand for money function, admitting that such a technique is unsuited in this context, since both income and money are endogenous variables in an essentially simultaneous system of demand for and supply of money. Such a model is presented in chapter seven, where I estimate and discuss the relevant parameters.

$$\log \left(\frac{M_1}{P \cdot N} \right) = -0.312 + 0.159 \log \left(\frac{Y}{N} \right) - 0.004 (d-p^*)$$

(0.34) (1.14) (1.22)

$$+ 0.837 \log \left(\frac{M_1}{P \cdot N} \right)_{-1} + 0.042 D_1 \quad \dots (3.11)$$

(9.75) (0.42)

$R^2 = 0.875; \quad h = -1.12; \quad S.E.E. = 0.14$

$$\log \left(\frac{M_2}{P \cdot N} \right) = -0.203 + 0.114 \log \left(\frac{Y}{N} \right) - 0.003 (d-p^*)$$

(0.23) (0.84) (0.77)

$$+ 0.895 \log \left(\frac{M_2}{P \cdot N} \right)_{-1} + 0.028 D_1 \quad \dots (3.12)$$

(13.12) (0.29)

$R^2 = 0.916; \quad h = -0.89; \quad S.E.E. = 0.14$

The short-run income-elasticity of demand for real money (both the variables are in per-capita terms) turns out to be 0.159 for narrow money and 0.114 for broad money. The corresponding long-run values from the above lag structure, are 0.98 and 1.09, respectively. I could conclude, therefore, that

based on the above estimates, the long-term income elasticity of the demand for real balance for our sample period, come quite close to unity. But the above estimates for the coefficients of the important income variable are insignificant in both the cases. When I add the other two structural dummies to each of the regression equations, the relevant t-values worsen, without much improvement in the overall fit of the equations. It may be mentioned here that both the h-values indicate, that the use of the lagged endogenous variable as an argument in the two functions above, the acceptance of the null hypothesis that there is no first order autocorrelation at the 5% level of significance. The coefficient for the real interest rate variable (ie $d - \dot{p}^*$, where d = nominal interest rate on 3-month deposits with the commercial banks and \dot{p}^* is the expected inflation rate, proxied here by their actual values) also remains statistically insignificant in both the cases. If I still attempt to explain the negative sign for this coefficient, in the narrow money case (equation 3.11) it is as expected, $(d - \dot{p}^*)$ being a likely measure of the opportunity cost for holding it. In the broad money case, however, where I have savings and time deposits as well, there is an "own-rate positive response in the portfolio asset demand sense acting against the opportunity cost element for the narrow part of it. In equation (3.12), the net result turns out to be negative (though, insignificantly so), indicating the overwhelming influence of the opportunity cost element against the own-rate response. Finally, the only significant variable

in these two tests, is the lagged dependent variable. The insignificance of the income coefficient casts doubt on the measurement of this parameter in these OLS estimates, and we have to wait until chapter seven for a more appropriate estimate for it.

Let me now look at the general question of how monetisation can affect the growth rate of a developing country. One can look at the influence of money on the productive activities of a country in four stages:

- (i) money as a medium of exchange gradually replacing barter;
- (ii) introduction of a banking system to intermediate between savers and investors;
- (iii) the emergence of the central bank to control money and credit suitable for economic growth; and
- (iv) the development of a capital market for furthering the financial intermediation between the savers and the investors.

The economic logic behind these various stages regarded as necessary for growth has been outlined by N Kaldor⁵ and summarised as follows:

⁵ N Kaldor, "The Irrelevance of Equilibrium Economics", Economic Journal, December 1972.

"Because development is a cumulative phenomenon sustained by increasing returns, a monetary and banking system is vital to enable the expansion of investment so as to generate the savings required to finance additional investment out of the additions to production, which production itself makes possible through necessary returns. In other words, credit creation is necessary to finance increasing returns".

(Thirlwall 1974, p 111).

As we already saw in the last chapter, Nigeria can be regarded as having reached the third stage for providing the financial infrastructure for development. But rather than waiting for a money and credit market to develop fully, the authorities may undertake inflationary policies to generate growth. This they can do by regulating the rate of growth of money stock in such a way as to reach the maximum growth rate. Financing of public investment when private saving is lagging behind, by printing money may be the case in point. But, the gestation period of such projects may be so long as to induce effective demand well ahead of rise in production, thus resulting in inflation. Again, the multiplier process of demand induced, Keynesian-type expansion of income may not be operative in the developing countries because of the lack of available capacity in various industries to respond to the increase in demand. Thus, even if we assume that the monetary authorities in Nigeria can control the stock of money in the country, regulating it to finance investment in excess of private domestic saving may lead to rise in output and also in price level. If the inflation rate is too high, however,

and the deposit interest rates at the banks are artificially kept too low, resulting in negative real returns, it may add to the reduction in private saving and thus requiring the government to print more money to finance investment in excess of the available saving. In fact, in 18 of the 27 years during 1961 to 1987, the real return on 3-month deposits with the commercial banks, was negative, the lowest being in 1975 of -30.43%. This obvious inadequacy of the interest rate policy has now been rectified and the last three years of our sample period registered positive real returns.

Thus financing economic development through money creation has a limit, and the rate of growth of money stock may be related in a quadratic form with the rate of growth of income. If such is the case, it is possible to decipher the rate of growth of money at which the growth rate of income is the highest. But such a point, if it exists, need not indicate the optimum level for either variable. If the society chooses the rate of growth for money stock which maximises the growth rate of income, it may have to endure an inflation rate, which is far too high. The optimum point would be attained when the social marginal rate of substitution between the inflation rate and the growth rate is equal to the slope of the opportunity locus between those two variables. If the relation between the real income growth rate (dependent variable) and the money stock growth rate is quadratic, so would be the relation between the inflation rate and the income growth rate, assuming a monotonically increasing relation between the inflation rate and the money stock growth rate. In such a scenario so long

inflation is regarded as a 'bad' and growth as a 'good', the maximum achievable growth rate, can never be the socially optimal growth rate, with convex preference (social) function between income growth and inflation rates. With this reminder, let me now look into the opportunity locus between the growth rates of income and money provided by the data during 1961 to 1987. They are based on the following regression equations involving the relevant variables.

$$\begin{aligned} \frac{\Delta Y}{Y} = & 0.910 + 0.459 \left(\frac{\Delta M_1}{M_1} \right) - 0.004 \left(\frac{\Delta M_1}{M_1} \right)^2 \\ & + \frac{2.524}{(.34)} D_1 - \frac{2.45}{(0.40)} D_2 - \frac{8.32}{(1.41)} D_3 \end{aligned} \quad \dots (3.13)$$

$$R^2 = 0.328; \quad D.W. = 1.38; \quad S.E.E. = 10.6.$$

$$\begin{aligned} \frac{\Delta Y}{Y} = & -\frac{1.483}{(0.31)} + \frac{0.626}{(2.43)} \left(\frac{\Delta M_2}{M_2} \right) - \frac{0.006}{(1.66)} \left(\frac{\Delta M_2}{M_2} \right)^2 \\ & + \frac{3.786}{(0.52)} D_1 - \frac{2.836}{(0.47)} D_2 - \frac{8.731}{(1.54)} D_3 \end{aligned} \quad \dots (3.14)$$

$$R^2 = 0.377; \quad D.W. = 1.41; \quad S.E.E. = 10.2.$$

$$\begin{aligned} \frac{\Delta Y_N}{Y_N} = & -\frac{0.011}{(0.003)} + \frac{0.387}{(1.72)} \left(\frac{\Delta M_{N1}}{M_{N1}} \right) - \frac{0.003}{(0.99)} \left(\frac{\Delta M_{N1}}{M_{N1}} \right)^2 \\ & + \frac{1.338}{(0.18)} D_1 - \frac{3.157}{(0.52)} D_2 - \frac{8.741}{(1.51)} D_3 \end{aligned} \quad \dots (3.15)$$

$$R^2 = 0.299; \quad D.W. = 1.41; \quad S.E.E. = 10.41.$$

$$\begin{aligned} \frac{\Delta Y_N}{Y_N} = & -\frac{1.96}{(0.45)} + \frac{0.526}{(2.13)} \left(\frac{\Delta M_{N2}}{M_{N2}} \right) - \frac{0.005}{(1.31)} \left(\frac{\Delta M_{N2}}{M_{N2}} \right)^2 \\ & + \frac{2.648}{(0.368)} D_1 - \frac{3.412}{(0.58)} D_2 - \frac{8.8}{(1.57)} D_3 \end{aligned} \quad \dots (3.16)$$

$$R^2 = 0.343; \quad D.W. = 1.37; \quad S.E.E. = 10.09.$$

Equations (3.13) to (3.16) indicate the quadratic relation between the growth rates of real income and of money. The linear relations involving these variables performed much worse in terms of the statistical criteria of R^2 and D.W. measures. The quadratic form is in line with similar relations reported for some Latin American countries⁶. Four different forms of the equation are made out of two definitions of the growth rate of income (ie growths of real income and of per capita income) and of narrow and broad money. They, however, indicate rather high values for the growth rates of money⁷ for the maximum growth rate for income. In equation (3.13), it is 57 per cent for narrow money and 52% for broad money in equation (3.14). These are the rates at which the growth rates will "peak", after which the negative impact of high inflation rate will more than offset the positive effect of increased effective demand on output. When I conduct the same experiment with the per capita growth rates of income and money, the corresponding growth maximising rates for narrow and broad money turns out to be 65% and 53%, respectively. Next, I use these monetary growth

⁶ H C Wallich, "Money and Growth: A Country Cross-Section Analysis", Journal of Money Credit and Banking, May 1969.

⁷ From equation (3.14), for example, $\frac{d\left(\frac{\Delta Y}{Y}\right)}{d\left(\frac{\Delta M_2}{M_2}\right)} = .626$

$- .012 \left(\frac{\Delta M_2}{M_2}\right) = 0, \therefore$ Growth maximising monetary expansion rate, $\left(\frac{\Delta M_2}{M_2}\right)^* = 52.16\%$.

rates to calculate the "peak" income growth rate attainable, assuming normal time (ie zero values for all the dummy variables). It turns out to be 15% corresponding to both narrow and broad money while the per capita growth rate peaks at around 12%, again for both the definitions of money. This is approximately consistent with the population compound growth rate of around 3% during our sample period.

It should be noted here, finally, that in all the four equations above, (3.13) to (3.16), there is almost always a significant positive influence of the monetary expansion rate on the growth rate of real income while the non-linearity is only hinted at. The insignificance of such coefficients would undermine the rather large growth-maximising values of the rate of growth of money stock. Nevertheless, the non-linearity is consistently hinted at in all the four equations and their implications are presented as suggestions for the qualitative nature of the relations, rather than the exact measures of the growth maximising values. Therefore, the reported magnitudes, calculated on the basis of such coefficients, are to be interpreted as indicative, and not definitive measures of the underlying "true" values.

Now, a 52% growth of broad money would bring about an inflation rate of nearly 20 per cent, if implemented now, in terms of the consumer price index⁸. Thus choosing a growth rate of the money stock of one or the other definition, to

⁸ The regression equation on which the calculation is based, is reported in the next section.

maximise the growth rate of real income, need not necessarily be the optimum solution for the society. But, it would be useful to know the other underlying opportunity locii, involving the growth rates of money, of income and of the price level to judge the optimum rate of growth for the money stock for the country. I now turn to such an evaluation in the next section.

D. Inflation, Growth and the Saving Ratio

Let me first look into some evidence from the annual time-series data, how the saving-income ratio has been responding to income and, its growth rate and also to inflation rates. Here again, I have to use the investment-income ratio as a proxy for the saving-income ratio, conceding that their ex ante values may be different, but their expost values must be the same. I also use the same structural dummy variables, as already indicated in the above sections. It may be mentioned here that the various criteria for the statistical testing of the relations reported in this chapter are not robust enough to suggest the strong evidence favouring one or the other hypothesis. But, neither are they so weak as to disregard the strong hint for certain relationships, admitting the O.L.S. estimates of the various equations which would form different parts of an essentially simultaneous system of the macroeconomy of Nigeria may lead to some apparent inadequacies. Some simultaneous estimates of a macro model are reported in the research survey part of chapter four below.

With all these reminders, let me now look into the following two regression equations, with saving-ratio, as the dependent variable.

$$\frac{S}{Y} = - \frac{0.068}{(1.26)} - \frac{0.002}{(3.00)} \left(\frac{\Delta Y}{Y} \right) - \frac{0.001}{(1.18)} \left(\frac{\Delta P}{P} \right) + \frac{0.001}{(4.20)} \left(\frac{Y}{N} \right) \\ + 0.033 D_1 - 0.014 D_2 - 0.03 D_3 \quad \dots\dots (3.17) \\ (1.46) \quad (0.46) \quad (1.68)$$

$$R^2 = 0.787; D.W. = 1.48; S.E.E. = 0.03.$$

$$\frac{S}{Y} = - \frac{0.07}{(1.29)} - \frac{0.002}{(3.03)} \left(\frac{\Delta Y_N}{Y_N} \right) - \frac{0.001}{(1.21)} \left(\frac{\Delta P}{P} \right) \\ + 0.001 \left(\frac{Y}{N} \right) + 0.031 D_1 - 0.014 D_2 - 0.032 D_3 \quad \dots\dots (3.18) \\ (4.17) \quad (1.38) \quad (0.47) \quad (1.75)$$

$$R^2 = 0.789; D.W. = 1.51; S.E.E. = 0.03.$$

In equations (3.17), the saving-ratio is hypothesised to depend on the growth rate $\left(\frac{\Delta Y}{Y} \right)$, inflation rate $\left(\frac{\Delta P}{P} \right)$ - the GDP deflator used here) and per capita real income (Y/N) , and also on the three structural dummy variables, D_1 , D_2 and D_3 . In equation (3.18) the only difference lies in the use of the rate of growth of per capita real income, in place of the real income. On the basis of the life-cycle hypothesis of saving, I would expect a positive influence on the saving-ratio from the growth rate of real income (both actual and per capita). The significantly negative influence here in both the equations is thus contrary to our hypothesis and needs to be explained in terms of the Nigerian experience. This negative relation between the growth rates and the saving and/or

investment-ratio, was also observed in equations (3.2) and (3.4) above. Since I am now looking into a different direction of causality, the explanation here can only be provided in terms of a national myopia in people's consumption and saving behaviour. This may also be due to the lack of sufficient number of saving institutions like bank branches, spread all over the country, and also to the typical negative real return on savings in the form of savings and time deposits, when such institutions were already available.

The effect of inflation on the saving-ratio could come through growth, when the demand-pull inflation would raise growth rate, and therefore, the saving-ratio. But the latter relation being found to be negative for the reasons mentioned, inflation may exert a negative influence on the saving-ratio. In both the equations above, (3.17) and (3.18), I get insignificantly negative coefficients, which were similar to a testing of the same equation for some African countries (Thirlwall, 1974, op. cit., p 211). Finally, the effect of the per capita income on the saving-ratio has been significantly positive, as expected.

We now move on to the question of the relationship between the investment-ratio and the inflation rate. Since I have been using, without choice, the data on investment for calculating the saving-ratio, it may be more appropriate to set the relevant hypothesis in terms of the invest-ratio itself. [^] Theoretically also, the relation between these two rates is

A note

more direct than the one between saving-ratio and inflation, where one may have to assume inflation influencing the growth rate, which, in its turn, influences the saving-ratio. Inflation is likely to augment investment, for a given level of income, since it may improve expectations of profit due to wage-price lag. But at a high rate of inflation, saving is likely to be adversely affected due to the low real consumption prospect such a saving may bring forth, if nominal interest rates on various types of deposits do not adjust to stop the fall in real return. We already saw such was the typical case in Nigeria during our sample period. A fall in saving, therefore, at a high enough inflation rate, for given income, would lead to a fall in saving - and investment-ratio. We can, therefore, observe a quadratic relation between the investment-ratio and the inflation rate, and it would be interesting to estimate the inflation rate at which the ratio is maximised for the data in question. Such a relation is presented in the following regression equation.

$$\frac{I}{Y} = 0.139 + 0.003 \left(\frac{\Delta P}{P} \right) - 0.0001 \left(\frac{\Delta P}{P} \right)^2$$

$$\begin{matrix} (7.88) & (1.52) & (1.73) \\ + 0.022 D_1 & + 0.062 D_2 & - 0.038 D_3 \end{matrix} \dots\dots\dots (3.19)$$

$$\begin{matrix} (0.72) & (2.46) & (1.53) \end{matrix}$$

$$R^2 = 0.593; D.W. = 1.16; S.E.E. = 0.04$$

Since the D.W. statistic does not indicate evidence for autocorrelation, I may, perhaps, make use of the relevant

coefficients, significant only at 75 to 90 per cent levels.

The inflation rate, maximising the investment-ratio during our sample period turns out to be 15%, and the corresponding expected value of the investment-income ratio for a normal period (ie assuming $D_1 = D_2 = D_3 = 0$), would be just over 16 per cent. Since, such a relation could suggest the inflationary finance for growth, it would be appropriate to look into the possible relations between

(i) inflation and growth and

(ii) growth of money stock and the inflation rate.

There could be some lag between the independent and the dependent variables in the above two relations, but I intend to decipher the one-year impacts in them, and the results came out, as follows

$$\begin{aligned} \frac{\Delta Y}{Y} = & \frac{0.496}{(0.1)} + \frac{1.301}{(1.82)} \left(\frac{\Delta P}{P} \right) - \frac{0.051}{(2.32)} \left(\frac{\Delta P}{P} \right)^2 \\ & + \frac{5.056}{(0.68)} D_1 + \frac{2.24}{(0.36)} D_2 - \frac{9.27}{(1.41)} D_3 \dots\dots (3.20) \end{aligned}$$

$$R^2 = 0.362; D.W. = 1.28; S.E.E. = 10.32$$

$$\begin{aligned} \frac{\Delta Y_N}{Y_N} = & - \frac{1.569}{(0.34)} + \frac{1.152}{(1.68)} \left(\frac{\Delta P}{P} \right) - \frac{0.05}{(2.28)} \\ & \left(\frac{\Delta P}{P} \right)^2 + \frac{3.725}{(0.52)} D_1 + \frac{2.05}{(0.34)} D_2 - \frac{8.85}{(1.41)} D_3 \dots\dots (3.21) \end{aligned}$$

$$R^2 = 0.367; D.W. = 1.33; S.E.E. = 9.9.$$

$$\frac{\Delta P}{P} = 0.969 + 0.279 \left(\frac{\Delta M_1}{M_1} \right) - 5.173 D_1$$

$$\quad \quad \quad (0.22) \quad (2.39) \quad \quad \quad (0.68)$$

$$+ 9.167 D_2 + 6.196 D_3 \quad \dots\dots\dots (3.22)$$

$$\quad \quad \quad (1.47) \quad (1.03)$$

$$R^2 = 0.472; D.W. = 1.92; S.E.E. = 10.8.$$

$$\frac{\Delta P}{P} = 0.449 + 0.265 \left(\frac{\Delta M_2}{M_2} \right) - 4.693 D_1$$

$$\quad \quad \quad (0.09) \quad (1.94) \quad \quad \quad (0.59)$$

$$+ 9.756 D_2 + 5.919 D_3 \quad \dots\dots\dots (3.23)$$

$$\quad \quad \quad (1.48) \quad (0.95)$$

$$R^2 = 0.432; D.W. = 1.94; S.E.E. = 11.2.$$

$$\frac{\Delta P}{P} = 1.958 + 0.261 \left(\frac{\Delta M_{N1}}{M_{N1}} \right) - 5.045 D_1$$

$$\quad \quad \quad (0.43) \quad (2.12) \quad \quad \quad (0.65)$$

$$+ 9.594 D_2 + 6.193 D_3 \quad \dots\dots\dots (3.24)$$

$$\quad \quad \quad (1.50) \quad (1.01)$$

$$R^2 = 0.447; D.W. = 1.92; S.E.E. = 11.05.$$

$$\frac{\Delta P}{P} = 1.088 + 0.275 \left(\frac{\Delta M_{N2}}{M_{N2}} \right) - 4.438 D_1 +$$

$$\quad \quad \quad (0.23) \quad (1.93) \quad \quad \quad (0.56)$$

$$+ 10.026 D_2 + 6.112 D_3 \quad \dots\dots\dots (3.25)$$

$$\quad \quad \quad (1.54) \quad (0.98)$$

$$R^2 = 0.431; D.W. = 1.96; S.E.E. = 11.21.$$

In equations (3.20) and (3.21) above, there is a strong hint of the inflation-rate (measured as the percentage changes of the consumers' price index), positively influencing the growth-rate. At the same time, there is a 'significant' limit to this process, as hypothesised above. In both the cases, the

growth maximising inflation rate turns out to be 12 to 13 per cent. The expected growth-rate of real income in such a case, for a normal year, would be 9 per cent (equation 3.20) and for the growth rate of per-capita income, 5 per cent (equation 3.21). In equations 3.22 to 3.25, I notice the contemporaneous influence of the rate of growth of the money stock, both actual and per capita and also, both narrow and broad, on the inflation rate. The results are all statistically much more robust than any other set of relations we have looked into so far. The relevant coefficient also varies consistently between .26 to .28, when I use the price index from the GDP-deflator to define the inflation rate in this instance, suggesting a one per cent rise in the growth rate of the money stock would increase the inflation rate by 0.27%, in the same year.

It should be noted, in this context, that the direction of causality between money and prices or between their rates of changes need not be unidirectional. The causal link between money and prices could operate on the opposite direction, ie, inflation causing monetary expansion. S. Ajayi⁹ investigated this particular problem on money and prices, based on quarterly data (1961 first quarter to 1977, second quarter) and concluded:

".. the empirical evidence supports the view that money plays an important role in the determination of prices and there is unidirectional causality between money and prices

9. S.Ajayi, "On the Directional Causality Between Money and Prices", The Nigerian Journal of Economics and Social Studies, November 1983, Vol 25, No 3, pp 319-325.

with the causation going from money to prices for the periods observed". (S. Ajayi, op.cit., 1983, p 324).

This piece of evidence would justify the specification of the above equations, 3.22 to 3.25, even though they are for the rates of change of price level and of money.

It would appear, by now, after looking at the different estimated equations in sections B, C, and D that there may be a simultaneous, non-linear and possibly a dynamic relationship involving the various growth rates and the ratios, analysed above. The single-equation OLS estimates can, at best be a first approximation of the impact effects involving the relevant exogenous and the endogenous variables in the "current" year. If such approximations are to be regarded as a fair representation of the underlying model, at least qualitatively, a segment of it can be depicted in the following diagram.

Points A to H in Figure 3.1 indicate how the opportunity locii between

- (i) $\frac{\Delta Y}{Y}$ and $\frac{\Delta M}{M}$ in quadrant I;
- (ii) $\frac{\Delta Y}{Y}$ and $\frac{\Delta P}{P}$ in quadrant II and
- (iii) $\frac{\Delta M}{M}$ and $\frac{\Delta P}{P}$ in quadrant IV may look, based on

the OLS estimates of the various relations though not all of them, as we saw above, are statistically significant at the 95% level. As we can see, our first-shot OLS estimate of this basically simultaneous, non-linear disequilibrium model may be regarded as inaccurate, if the lag structure in each relation is the same, since points A and H are wide apart and also because points E and F do not coincide. But they could serve to illustrate how the 'true' model would look, in each period. In such a case, given the social trade-off between inflation and growth, one could find the 'bliss' point and then work one's steps backward to ascertain the required rate of change of money stock to achieve it. This proposition is presented in figure 3.2 below.

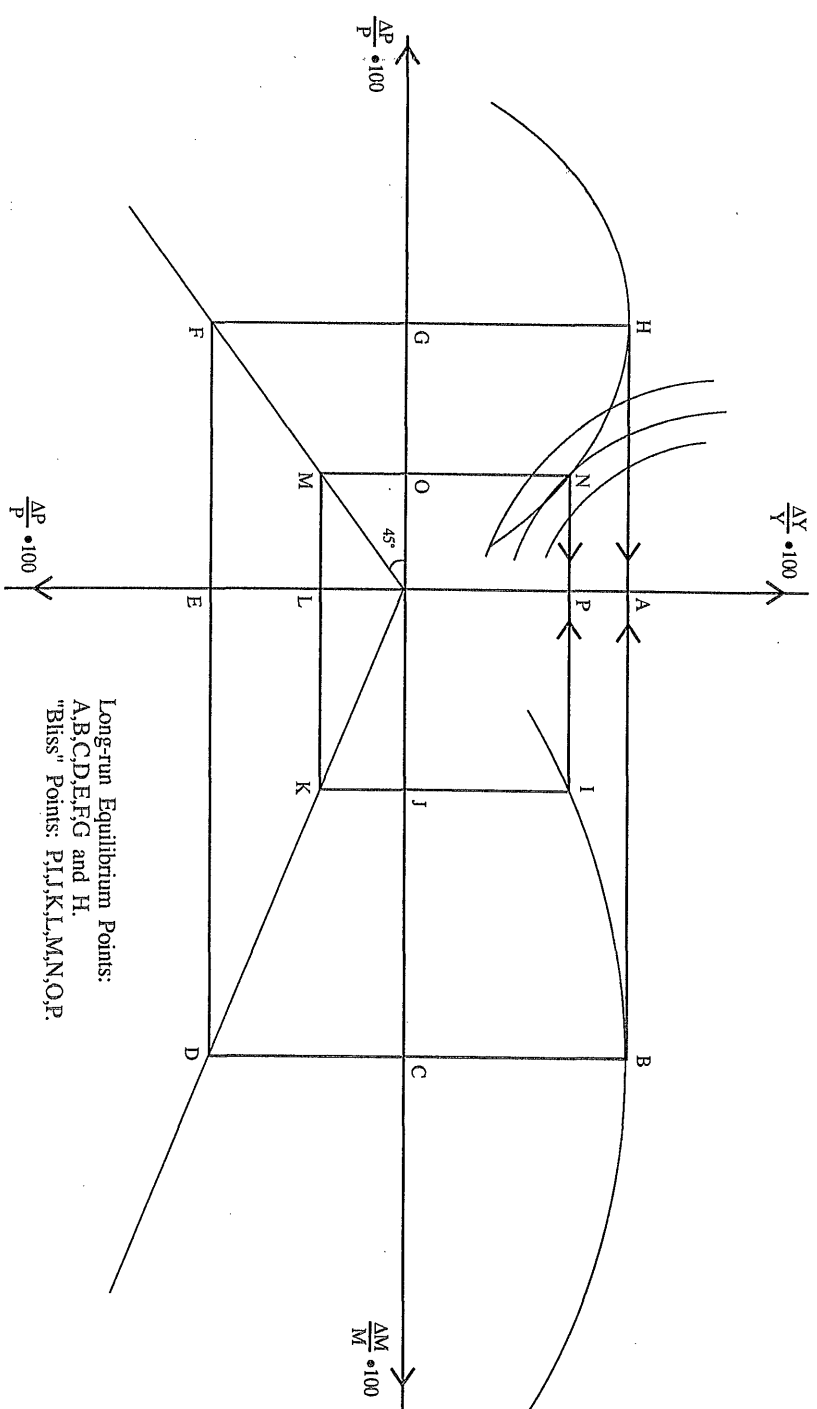


Fig 3.2 Long-run Equilibrium and "Bliss" Points

E. Financial Repression and Economic Growth

Let me now put forward the case against inflationary finance of growth as depicted in the works of R. McKinnon and E. Shaw¹⁰. In countries, where the markets for loans are not yet developed and a typical investor has to save on his own before he can invest, money stock may not be regarded as a substitute asset for physical capital, as is assumed in the neoclassical growth models. In such a scenario, money actually becomes a complement to physical assets. Because, higher return on physical assets would lead to an increased demand for investment in them, for the given level of income, ceteris paribus. But investment, if it is typically self-financed, has to come from one's own savings. Now, savings can only be made in money; thus an increase in the desired investment-income ratio leads to a higher demand for money making it a complementary asset to the physical capital. In other situations, where money and credit markets are not so underdeveloped, increase in the ex ante investment could be financed from borrowing, leading to a drop in the demand for money, since the budget constraint on the asset and liability portfolio, must always balance thus making room for the extra borrowing.

The hypothesis proposed above, can be presented in the following demand for money function.

10. This portfolio approach to finance growth in the context of developing countries with inadequate credit and money markets is presented in great details in chapter five and I only sketch out the hypothesis in this section and provide an indirect test of the hypothesis.

$$\left(\frac{M}{P}\right)_d = f\left(\frac{I}{Y}, Y, d - \dot{P}^*\right) \quad \dots\dots (3.22)$$

where $\frac{M}{P}$ = real money stock,

$\frac{I}{Y}$ = Investment-income ratio,

Y = real income,

d = nominal interest rate on deposits,

\dot{P}^* = expected rate of inflation,

P = price level.

The complementarity hypothesis suggests, for the above equation, $f_1 > 0$; $f_2 > 0$; $f_3 > 0$. The last two conditions are the usual ones for income and own-rate (real) response for demand for real balance, respectively. The first one, however, is the unusual one indicating complementarity hypothesis. The hypothesis can be tested in various formats (to be discussed in chapter five, below). The one I follow here was first used by M. Fry¹¹, in testing the complementarity hypothesis for ten Asian countries. When I use it for the Nigerian case during our sample period I have to make allowance for the three structural dummies I have been using so far in the regression equations reported above. The estimated equations for the narrow and broad money came out, as follows:

11. M. Fry, "Money and Capital or Financial Deepening in Economic Development", Journal of Money, Credit and Banking, 1978, vol 10(4), pp 464-75.

$$\begin{aligned}
M_1 = & 0.298 + 0.122 \left(\frac{I}{Y} \right) + 0.180 y \\
& (0.14) \quad (0.11) \quad (0.58) \\
& - 0.004 (d-P^*) + 0.626 \frac{M_1}{-1} + 0.071 D_1 \\
& (1.14) \quad (2.83) \quad (0.63) \\
& + 0.135 D_2 + 0.229 D_3 \quad \dots (3.26) \\
& (0.91) \quad (1.08)
\end{aligned}$$

$$R^2 = 0.887; h = (\text{footnote 12}); S.E.E. = 0.14$$

$$\begin{aligned}
M_2 = & 0.375 - 0.272 \left(\frac{I}{Y} \right) + 0.148 y - 0.003 (d-P^*) \\
& (0.17) \quad (0.24) \quad (0.48) \quad (0.82) \\
& + 0.703 \frac{M_2}{-1} + 0.077 D_1 + 0.171 D_2 \\
& (3.04) \quad (0.73) \quad (0.96) \\
& + 0.238 D_3 \quad \dots (3.27) \\
& (0.88)
\end{aligned}$$

$$R_2 = 0.925; h = (\text{footnote 12}); S.E.E. = 0.14.$$

12. To test the evidence for the presence of first-order autocorrelation in the regression equations, 3.26 and 3.27, I first calculate r , which is approximately equal to $1 - \frac{d}{2}$, d being the Durbin-Watson statistic. r is then related to h by the formula $h = r \sqrt{\frac{n}{1 - n \text{ var } b_1}}$ var b_1 , being the sample variance of the coefficient of the lagged endogenous variable and n is the number of observations. h is $N(0, 1)$. This method was successfully used in testing the presence of first-order autocorrelation in equations 3.11 and 3.12 in section C above. But the method cannot be used here in equations 3.26 and 3.27, where in both the cases, $n \cdot \text{var } b_1 > 1$, indicating imaginary values for h . In such cases, J. Durbin suggested [J. Durbin, "Testing for Serial Correlation in Least Square Regression when Some of Regressors are lagged Dependent Variables", *Econometrica*, vol 38, 1970, pp 410-21] to estimate

$$e_t = \beta_0 + \beta_1 e_{t-1} + \beta_2 X_{1t} + \beta_3 X_{2t} + \dots + \beta_{n+1} \cdot X_{nt}$$

If the estimate of β_1 is significantly different from zero, we are to reject the null hypothesis of no autocorrelation, in favour of the presence of first-order autocorrelation. When this method is undertaken for equations 3.26 and 3.27, both the regression equations indicated "insignificant" estimates for the coefficient of e_{t-1} , at 5% level. Therefore, there is no evidence of first-order autocorrelation in equations 3.26 and 3.27 above.

M_1 and M_2 in the two above equations, and their one-year lagged values there, represent log of per capita real money balances, narrow and broad respectively. y -indicates the log of real per capita income while $\left(\frac{I}{Y}\right)$ and $(d-P^*)$ are defined similarly

as in earlier equations. The estimated coefficients in both the equations, however, turn out to be statistically insignificant, except in the cases of the lagged values of the dependent variables. Given these limitations, if we are to look at the signs of the $\left(\frac{I}{Y}\right)$ coefficients in the equations, narrow money turns out to be a complementary asset to physical capital, whereas broad money as a substitute. This hint of a result here is confirmed, when I submit the same hypothesis to a more direct test in chapter six, below.

Let me now look into certain implications of the complementarity hypothesis, in the context of the Nigerian economy of the recent years. Investment as a proportion of income is more likely to increase if more savings are forthcoming in the economy. Now, other things being equal, more savings will be possible, if there are enough financial institutions to gather and encourage savings in commercial bank branches, for example. In the Nigerian context, the relative insignificance of other financial intermediaries would lead us to look only at the commercial bank deposits, for this purpose. For example, in December 1975, the combined savings in (i) National Provident Fund, (ii) Federal Savings Bank, (iii) Nigerian Building Society, (iv) Merchant Bank Time

deposits, (v) Premium Bonds, Saving Certificates and Saving Stamps, came up to N 242 million, which was less than 8 per cent of the total deposits with the commercial banks, of N 3136 million, at the time. Thus, if I am to regard the deposits with the commercial banks as a measure of the extent of financial intermediation in the country, ie they are the typical agent through which most of the savings in the country are mopped-up, I may not be very far from the truth.

The hypothesis I am proposing here, is that, higher the extent of financial intermediation in the country, greater would be the investment-income ratio. For a measure of the spread of financial intermediation, a time series on the total number of commercial bank and other financial institute branches all over the country would be appropriate. In its absence, the total deposits with the commercial banks may be a useful proxy. As we just saw, since such deposits are more than 90 per cent of total deposits or savings with all the (D_i^s) financial institutions during most of our sample period, this could be regarded as a legitimate measure of the growth of financial intermediation in Nigeria.

The regression equation estimated to test the above hypothesis is that of investment-income ratio on the per capita real deposits with the commercial banks, along with the usual structural dummies, D_1 , D_2 and D_3 . The results came out as follows:

$$\frac{I}{Y} = 0.132 + 0.0009 \left(\frac{D_1}{P.N} \right) + 0.003 D_1$$

(5.04) (0.69) (0.08)

$$+ 0.05 D_2 - 0.068 D_3$$

(1.25) (1.02)

$$R^2 = 0.544; D.W. = 1.11; S.E.E. = 0.04 \quad \dots\dots (3.28)$$

$$\frac{I}{Y} = 0.104 + 0.0013 \left(\frac{D_2}{P.N} \right) - 0.003 D_1$$

(4.54) (2.50) (0.1)

$$+ 0.006 D_2 - 0.13 D_3$$

(0.19) (2.75)

$$R^2 = 0.637; D.W. = 1.55; S.E.E. = 0.04 \quad \dots\dots (3.29)$$

Both the equations (3.28) and (3.29) suggest a positive relation between financial intermediation and the investment-income ratio, while for the broader definition of (D_2^*) commercial bank deposits (including demand, savings and time deposits), the results are much more robust. The mean elasticity in this case, is 0.556, implying on the average, a 1% increase in the per capita real total deposits with the commercial banks would lead to over half a per cent increase in the investment-income ratio. Thus, a policy measure to encourage deposits with the banks would be conducive to the growth of investment, for a given level of income.

F. Conclusion

Let me now summarise the broad results in this concluding section of the chapter. The most unusual result in section B was the nearly significant negative relation between the growth rates of income and also of per capita income and the investment-income ratio. This can only be explained by the domination of the foreign trade sector of the economy both during the upswing of the oil-boom period and the downturn of the recent depression. Since both these periods were over two-thirds of our sample period, I failed to identify the usual positive relationship between the relevant variables. Since, from the point of macroeconomic theory, the impact of export and of investment on the national income is similar and since the first factor dominated most of the period under consideration, I may be getting such an anomalous result, which can best be ignored for any policy implication. But the test of this hypothesis did not improve the evidence in favour of the hypothesis and the negative relation persisted, though insignificantly, when allowance was made for the predominance of the foreign sector. The high degree of fluctuation of the growth rate, the dependent variable, could be the source of the problem as indicated earlier. Since the investment plus export as a proportion of income contributed insignificantly to the growth rate in our sample period, the possible negative influence of the investment-income ratio on the growth rates may be ignored in the policy discussion.

In the next section, I first make use of a formula, to calculate how much of the aggregate investment could be financed, by printing money without any inflationary impact. The same formula could be manipulated to suggest that N 457 m of the total investment of N 6180 m in 1987 could have been financed out of the estimated money creation by the government of N 726 m for an actual inflation rate of 10 per cent in that year. In the same section, I estimate the impact of the rate of growth of money stock on the growth rate of income. The maximising values, which are not so robust on their statistical criteria, turns out to be 57% and 52% for the narrow and broad money leading to the growth rate of income of 15%. Since these growth rates of money refer to maximising rather than the optimising growth rates of income, their values need not necessarily be regarded high, in spite of the relative "insignificance" of the curve-inducing coefficients of the regression equations. The same experiment conducted with the variables redefined in per capita terms, lead to consistent results, as with the original variables. Finally, in this section I also estimated the demand for money function (both narrow and broad), since it relates to both sets of measurements mentioned above. The long-run elasticity of the demand for per capita real balance (both narrow and broad) with respect to real per capita income, turns out to be unity, though based on statistically insignificant values for the income variable. It may be mentioned here that the

demand/supply process of money stock is essentially a simultaneous system and it is estimated as such in chapter seven below, where I get significant response for the income variable.

In section D, I found per-capita income as the only source of significantly positive influence on the saving-ratio, whereas the rate of growth of income turned out to have a significantly negative impact. Since, I have to use investment data as the proxy for savings, this result was not surprising after the negative relation between these two variables on the opposite direction of causality, reported in equations (3.2) and (3.4) above. This time the explanation could be the typical negative real return on the typical medium for savings, ie, the savings and time deposits with the commercial banks. On the investment-income ratio, the supposed non-linear relation between inflation rate and this variable, did not materialise significantly, but there is a strong hint for such a relationship. If we are to go by this strong hint, the maximum investment inducing rate of inflation, for a given value of income would be 15% and for a normal period that could bring forth an investment rate of 16% of income. When I test the other non-linear relation between the growth rate and the inflation rate, the non-linearity was significant, implying a growth maximising rate of 12 to 13 per cent. The maximum growth rates in such cases, would be for a normal year, 9 per cent, but only 5 per cent for the per capita income. The

contemporaneous influence of the rate of growth of money stock on the rate of growth of price level was significantly positive, indicating a 0.27% increase on the inflation rate in the same year of the increase in the money stock by one per cent. Finally, three different opportunity locii between

- (i) the income growth rate and the money stock growth rate (non-linear);
- (ii) money stock growth rate and the inflation rate (linear) and
- (iii) the income growth rate and inflation rate (non-linear), were presented together in a diagram (figure 3.1).

Based on parameter-estimates, some of which were not significant at the 95% level, both the non-linear relations would have "peaked" at some consistent values of the relevant variables, only if the lag structure of the underlying simultaneous disequilibrium system was similar. As the values in figure 3.1 suggest, it was not so, at least for the current year.

Finally, in section E, I tested an alternative hypothesis to inflationary finance of growth. The hypothesis of regarding money as a complementary asset to physical capital in economies which suffer from financial repression, is taken up in much greater detail in chapter five and tested directly in chapter six below. Here, I provide an indirect test, but the result remained inconclusive, "significantly". An important

issue in this context is the influence of financial intermediation on the rate of investment for a given level of income. The supposition is that such influence is direct, but to test it in the present context, one needs a measure for the degree of financial intermediation, year by year. It may be reasonable to use per capita real deposits with the commercial banks as such a measure and the broader definition of deposits confirmed a significantly positive influence on the investment-income ratio. In 1987, the average holding of total deposits was N 115.32 per person, at 1980 prices. To increase the investment-income ratio by 1%, this average holding had to increase by N 7.69 at 1980 prices or by N 21.09, at current (1987) prices.

Chapter 4. Monetary Studies on the Nigerian Economy

A. Introduction

In this chapter I undertake a selective and biased survey of the monetary studies of the macroeconomy of Nigeria. It is not the purpose here to be exhaustive in my listing and analysis of many published and unpublished works which may not be very relevant to the specific theme being developed here. It may be appropriate, therefore, to concentrate on the studies on (i) the demand for money and (ii) the supply of money first and then also to look into some investigations on the broad macro model of the economy involving, among other relations, these two equations as well. Since the present investigation would test the 'complementarity hypothesis' in terms of an aggregative production function in Chapter 6, it may be of interest to look at some evidence on the nature of the production function at a disaggregated, macro level for some manufacturing industries in Nigeria.

B. The Demand for Money

There have been a few empirical studies on the demand for money in Nigeria. The first among these works was done by S. Tomori¹. This was followed by a series of comments on Tomori's work by S. I. Ajayi², O. Teriba³, O. Ojo⁴ and J. S. Odama⁵, all of which came up in March, 1974 issue of the Nigerian Journal of Economic and Social Studies and had since been dubbed the TATOO - debate⁶.

1. S. Tomori, "The Demand for Money in the Nigerian Economy", NJESS, 14 (November 1972). pp 337-346.
"A. Rejoinder", NJESS 16 (March 1974) pp 179-189.
2. S.I. Ajayi, "Comments and Extension", The Nigerian Journal of Economic And Social Studies (NJESS), 16 (March 1974) pp 165-74.
3. O. Teriba, "Some Methodological Issues and Further Evidence", NJESS, 16 (March 1974) pp 153-164.
4. O. Ojo, "The Demand for Money in the Nigerian Economy: Some Comments", NJESS, 16 (March 1974). pp 149-152.
5. J.S. Odama, "A Comment", NJESS, 16 (March 1974) pp 175-178.
6. S.I. Ajayi and O.Ojo, Money and Banking George Allen & Unwin, 1981, p.107.

on the demand for money in Nigeria. O.Ojo⁷, O.Teriba⁸ and S. I. Ajayi⁹ also published their own thoughts on the same theme and among the expatriates D. Ghosh and U. Kazi¹⁰ worked on a new approach to the same problem. The survey here reports on some of these works as they tackled various facets of the demand for money in Nigeria.

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- 7 . O. Ojo, "The Demand for Money: Evidence from an Underdeveloped Money Market." NJESS, 16 (July 1974) pp 235-242.
 - 8 . O. Teriba, "The Demand for Money in Nigeria", The Economic Bulletin of Ghana, Vol. 3, No.4, (1973). pp 14-22.
 - 9 . S.I. Ajayi ' Some empirical evidence on the demand for money in Nigeria', American Economist 1977 (Spring).
 10. D. Ghosh and U. Kazi, 'Homogeneity, Expectation and Adjustment of Demand for Money in Nigeria', Ahmadu Bello University, Dept. of Economics Discussion Papers, December 1978. The authors used for the estimation of the relevant parameters, a non-linear least square programme called BMD X 85 at the CDC 70 computer in Ahmadu Bello University, Zaria, Nigeria, to get their results which are presented and discussed below.

S. Tomori (op.cit., 1972) attempted to examine the demand for money in Nigeria in the period 1960 to 1970 and 1960 to 1966. We quote Tomori, in the summary of his findings:

" two definitions of money were used, and it was found that the narrower definition M (currency plus demand deposits) performed better than the broader definition M* (currency plus demand deposits plus time and savings deposits) when related to 1960-70 data The insignificance of interest rates is not surprising in view of the relative constancy in interest rate. One plausible reason why M performed better than M* is the level of monetization or stage of capital market in Nigeria The study also reveals that interest rates have been pegged within a given range over the years. It seems as if this was deliberate policy designed to facilitate the required investment for economic development. Given a stable demand for money which seems to have been established in this study, it follows that to enable the rate of interest to remain pegged, money supply must have been used as an instrumental variable to achieve this pegging objective itself"

Tomori's work had been criticised on both economic and statistical grounds. O.Ojo's (op.cit., March, 1974) comment on the insignificance of the interest rate was that:

" it is precisely the insignificance of the interest rate that led me to the idea that in an underdeveloped money market, characterized by the absence of adequate financial assets, adjustment to a position of equilibrium would probably take place, not by way of purchase of money substitutes in the form of financial assets, but rather by way of purchase, of physical assets".

Prof. O. Teriba (op.cit., 1974) made a thorough scrutiny of Tomori's works and made some tests of his own. He applied the partial adjustment approach to equilibrium, instead of assuming that the passage from one equilibrium to another is completed in one year. He also treated Currency and Demand Deposits separately and used a number of interest rates, both short-term and long-term. Some of his results were as follows:

- (1) Time deposit of all the assets included, is the closest substitute for money. Treasury bills are also close substitutes for money, though not as close as time deposit.
- (2) The war-years period had a negative effect upon the demand for money in Nigeria, though the coefficient was not significant. The negative effect might be due to the inflationary pressure of the period which made real assets more attractive than cash balances.

- (3) The estimate for partial adjustment ranges between 0.08 to 0.3, indicating that there was much lag in the adjustment of actual to the desired cash balances. But the adjustment period is fairly fast for Demand Deposits alone. The estimated value for partial adjustment approximated 0.6. Teriba explained this by indicating that the shift from demand deposits to time deposits can take place without any transaction costs.
- (4) For Demand Deposits again, the interest elasticities are very low and insignificant, whereas the short-run income elasticity was never below 0.8 while the long-run income elasticity was generally about 1.4.

S. Ajayi (op.cit., 1974) noted, in his empirical work that, income alone explains about 81% of the demand for money when the narrow definition is used as opposed to 85% -86% when the wide definition of money is used. Ajayi also calculated the speed of adjustment to equilibrium and the interest and income elasticities, some of which confirmed O. Teriba's results.

J. S. Odama (op.cit., 1974) commented on Tomori's examination of the role of money and the Central Bank in the Nigerian economy, as ".....devoid of any policy use.....", because, ".....the only instrument in the models presented (discount rate) turns out to be statistically insignificant. O. Ojo (op.cit., July, 1974) in a

later work on demand for money in Nigeria came out with the conclusion:

".....in an underdeveloped money market adjustment to a position of portfolio equilibrium would probably take place, strictly, by way of purchase (or sale) of physical assets, rather than by way of purchase of alternative (to money) financial assets....."

This summary of the works on the demand for money in Nigeria would indicate that certain results, like the inelasticity of interest rate in the demand for money, have been a common feature of all the studies. But other than that, some of the major questions on the demand for money were still unanswered. One such question was the homogeneity of demand for nominal money balance which was assumed to be of degree one with the price level in all the studies without any evidence supporting that assertion. Another problem with those studies concerned with identification. It is well known¹¹ that the co-efficient for the lagged value of the money stock cannot be identified as a parameter either for expectation of income or for partial adjustment of money stock to the equilibrium unless one of them is assumed to be equal to unity.

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11. E. L. Feige, "Expectations and Adjustments in the Monetary Sector", American Economic Review, 57 (papers and proceedings, May 1967), pp 462-73.

There is no a-priori reason in theory to assume either elasticity to be equal to one, though the previous authors¹² have done so, may be due to the lack of available technique for non-linear estimation rather than their belief in such extreme assumptions. What Ghosh and Kazi (op.cit., 1978) did was not to take for granted the proportionality of nominal demand for money and the price level and they went on to test this assumed proportionality. They also combined the processes of adaptive expectations and of partial adjustment and estimated the corresponding elasticities simultaneously, without having to assume a particular value for either of them.

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12. O. Teriba (op.cit., 1973) implicitly assumed the value of λ to be equal to unity, and this could allow him to interpret the complement of the coefficient of $m, t-1$ as "..... the speed of adjustment between the actual and the desired cash balance". (op.cit., p 156). S. I. Ajayi (op.cit., 1974) estimated this speed of adjustment on a similar assumption about the elasticity of income expectation (i.e. λ) On the other hand O. Ojo (op.cit., July, 1974) implicitly assumed θ to be equal to unity and he went on to find out the parameter for the adaptive expectation for the rate of inflation, which he used in his demand for money function. The parameters λ and θ referred to here are defined in the reported work of Ghosh and Kazi (op.cit., 1978).

Since no such technique was used before to decipher these two important parameters, it may be appropriate here to go through their work in as much detail as possible.

Because of the underdeveloped state of the money and financial markets in a developing country like Nigeria, it was assumed that savings deposits or time deposits as typical alternatives to holding money, depending on which definition of money to use. The official definition of money (i.e. the CBN definition) in the country included only currency in circulation outside the banking system and the demand deposits. If that was M1, one could regard savings deposits to be the money substitute in that case. If savings deposits were included in the definition of money, calling it M2, time deposits may then be regarded as the money substitute. It is an empirical matter to find out which definition of the money stock is the appropriate one¹³ and also to ascertain which particular asset is the money substitute. Previous works on this issue in the Nigerian context have hinted at the choice of the particular asset(s).

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13. David Laidler proposed that the definition of money should depend on the stability of the demand for money function. In other words, the definition which gives a stable demand for money function, should be the appropriate one.

D.E.W. Laidler, "The Definition of Money: Theoretical and Empirical problems", Journal of Money Credit and Banking, (August 1969) pp 508-25.

One difference between the present approach and the earlier ones is that while almost all the earlier works would regard physical capital as the only substitute for money, this one could regard a particular type of bank deposits as outside the definition of money and, therefore a possible substitute. Alternatively, when all the bank deposits (i.e. demand, savings and time) are included in the definition of money, the physical capital can then be regarded as the substitute asset. Again, a so called perverse sign (i.e. positive) for the interest-rate coefficient in the demand for money function (for example, Ajayi, op.cit., 1974, 1977) can be interpreted by the "complementarity" hypothesis which is elaborated in great detail in the next chapter.

Let the desired real balances $(M/p)^*$ be a function of expected real income, y^e and of interest rate, r . The demand for money equation (all the values are in logarithm) would then be:

$$(M/p)^* = \alpha + \beta y^e + \gamma . r (4.1)$$

The adaptive expectations hypothesis about y^e , with λ as the elasticity of the expected income with respect to actual income would indicate the following relation:

$$y^e = \lambda y + (1 - \lambda) y^e (4.2)$$

Let θ be the proportion of adjustment of the gap between the desired value of real balances this period and the value of actual balances last period. The adjustment equation with an error term u , can be written as:

$$m = \theta m^* + (1 - \theta) m_{-1} + u \dots \dots \dots (4.3)$$

where, $m = M/p$.

The first three equations can be combined through Koyck transformation to get the reduced form equation below:

$$m = \alpha\theta\lambda + \beta\theta\lambda .y + \gamma\theta .r - \gamma\theta (1 - \lambda) . r_{-1} \\ + (2 - \theta - \lambda) m_{-1} - (1 - \theta) (1 - \lambda) m_{-2} + v \dots \dots \dots (4.4)$$

where v is a random error.

Ghosh and Kazi (op.cit., 1978) could not apply ordinary least squares estimation technique to identify the five parameters in the model, i.e., $\alpha, \beta, \gamma, \lambda$ and θ , from the six coefficients that would be estimated. For this reason they had to estimate equation (4.4) in such a way that the six coefficients would have the relations corresponding to the different combinations of the parameters as described in that equation.

It can be shown¹⁴ that assuming either θ or λ or both as equal to unity would ease this problem of identification and one may be able to correspond the parameters of the theoretical model to the co-efficients of the regression equation. In the testing of their different specifications of the demand for money in Nigeria, Ghosh and Kazi made these assumptions by assigning unit values to either θ or to λ and both to θ and λ , as had been the case so far in the earlier works. But they also tested equation (4.4) in the way it was with the linear and non-linear constraints on the coefficients, so that one may not have to assert a particular value for θ or λ , for which there was no a priori theoretical argument, neither was there any suggestion of that from the particular nature of the Nigerian economy. To be more specific, the estimation of equation (4.4) was not undertaken by putting the theoretical limits of zero to unity on θ and λ , and they were done unconstrained¹⁵.

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14. D.E.W. Laidler and M. Parkin, "The Demand for Money in the United Kingdom 1956-67: Preliminary Estimates", The Manchester School, (September 1970). pp 187-208.
 15. N.R. Draper and H. Smith, Applied Regression Analysis, Wiley & Sons, New York, 1966.

Let us now look at the question of homogeneity. If for the time being both θ and λ are equal to unity, equation (4.4) above would reduce to

$$(M/p)d = \alpha y^{\beta} \cdot r^{\gamma} \quad \dots \dots \dots (4.5)$$

without the error terms and rewriting the variables in their original form.

However, this specification of the demand for money assumed that the demand for nominal balance varied proportionally with the price level implying¹⁶ :

".....money is held for the services it provides its owners, and these services arise from its being a source of purchasing power. (Therefore),..... the demand function for money is one that determines the demand for money measured in units of constant purchasing power" (Laidler, op.cit., 1969, p.60).

But this assertion needs to be tested, specially in the context of a developing country where, information about price level and certainty about future may not be of the same type as in a developed economy. There could be two ways of testing this homogeneity. First, was the estimation of the equation for the demand for nominal balances, as follows:

$$Md = \alpha \cdot y^{\beta} \cdot r^{\gamma} \cdot p^{\delta} \quad \dots \dots \dots (4.6)$$

16. D.E.W. Laidler, "The Demand for Money: Theories and Evidence.
Pennsylvania: International Text book company, (1969).

In this case, the expected value of δ is unity. If that is the case, then the estimation of the demand for real balance was justified. Another way of testing the same phenomenon was to estimate the following demand for money function:

$$(M/p)^d = \alpha \cdot y^\beta \cdot r^\gamma \cdot p^{\delta_1} \dots \dots \dots (4.7)$$

In this case, the expected value of δ_1 was zero. They tried both the approaches on some assumed values of θ and λ . Let me now indicate their different ways of testing the demand for money function, the results of which are tabulated at the end. For the econometric testing of the various demand for money functions discussed above, Ghosh and Kazi (op.cit.) used two definitions of money:

(i) M1 : Currency in the hand of the public plus demand deposits with the commercial banks;

(ii) M2 : M1 plus savings deposits with the commercial banks.

Next, for y , they used the gross domestic product at constant (1962/63) factor cost. The availability of the GDP figures only on the annual basis, somewhat restricted the estimation of the demand for money function for a detailed analysis of its various parameters.

The lack of sufficient variation in the Nigerian interest rates was another problem in testing the demand for money function.

Interest rate is the measure of the opportunity cost of holding idle cash balances and they used the rate paid on time deposits (about the same as the one on savings deposits) suggested by the earlier work of O. Teriba (op.cit., 1973, 1974) to be the closest substitute for money. It may be mentioned here that the banking habits of the population and the legal restraint on the frequency of the withdrawal suggest that the inclusion of time deposits in the definition of money may not be appropriate. But again, this is an empirical matter which has to be settled on the actual testing of the demand for money function on various definitions of money.

The measure for price level used was the implicit GDP deflator (at factor cost), that being the only general price index available. It should be noted that the income (y) and the price index (p) are the yearly values whereas money stock (M) and interest rate (r) were the third quarterly values of the corresponding years. They also used a dummy variable in some years, on the presumption that the war years might have caused a change in the usual cash handling behaviour of the population. Let me now present the different forms of the demand for money function which had been tested under various assumptions. When we assume $\theta = 1$ and $\lambda = 1$, we have, under various definitions of money (m):

$$md = \alpha_0 + \beta y + \gamma r + v \dots \dots \dots (4.8)$$

If we assume $\lambda = 1$, the reduced form equation, from equation (4.1) to (4.3) would be:

$$md = b_0 + b_1 y + b_2 r + b_3 m_{-1} + v \dots \dots \dots (4.9)$$

where $b = \alpha\theta$

$b_1 = \beta\theta$

$b_2 = \gamma\theta$

$b_3 = (1-\theta)$, and

v = random term.

If we assume $\theta = 1$, the reduced form equation, from equations (4.1) to (4.3) would be:

$$md = a_0 + a_1 y + a_2 r + a_3 r^{-1} + a_4 m^{-1} + v \dots \dots \dots (4.10)$$

where $a_0 = \alpha\lambda$

$a_1 = \beta\lambda$

$a_2 = \gamma$

$a_3 = -\gamma(1-\lambda)$

$a_4 = (1-\lambda)$, and

v = random term

It can be seen from equation (4.10) that the parameter γ could be calculated in two ways, from the coefficient \hat{a}_2 and \hat{a}_3 . Finally, before the results are reported, it is to be noted that when they tested for homogeneity as indicated in equation (4.7) they did not use r as an argument in the demand for money (only in the non-linear case) and the λ -parameter would have the same a priori expected value as that of δ .

In Table 4.1 I reproduce their demand for money function in per capita, real terms, for both $m1$ and $m2$. For $m2$, the β -parameters from three different estimates were rather close to unity and also well-determined. The γ -parameter, however showed the same degree of insignificance as was noticed in the earlier works. But

TABLE 4.1

Nigerian Demand for Money functions in per capita, real terms on the basis of annual data, 1958-1974

Equations	Intercept	y	x	x_{-1}	m_{-1}	\bar{R}^2	D-W	F	β	γ	λ	θ
m_2 (8)	-1.142 (0.400)	1.178 (0.169)	-0.129 (0.232)			.94	0.9461	51.78	1.178	-0.129	1"	1"
(9)	-0.581 (0.479)	0.640 (0.221)	-0.117 (0.251)		0.451 (0.235)	.87		33.50	1.166	-0.213	1"	0.549
(10)	-0.390 (0.591)	0.557 (0.363)	-0.464 (0.287)	-0.169 (0.287)	0.464 (0.243)	.87		23.72	1.040	-0.464 *	0.536	1"
m_1 (8)	0.158 (0.891)	0.577 (0.774)	-0.676 (0.105)			.80	1.1344	31.12	0.577	-0.676	1"	1"
(9)	-0.760 (0.133)	0.412 (0.102)	-0.347 (0.182)		0.432 (0.191)	.83		24.14	0.725	-0.611	1"	0.568
(10)	-0.48 (0.152)	0.394 (0.120)	-0.509 (0.421)	0.159 (0.371)	0.439 (0.199)	.82		16.81	0.702	-0.509 [†]	0.561	1"

1) + Based on the coefficient of x.

2) * Upper value based on the coefficient of x
lower value based on the coefficient of x_{-1} .

3) Numbers in the parentheses represent standard errors.

the sign was consistently negative, suggesting that the interest rate on time deposits to be the opportunity cost of holding money, though the lack of sufficient variation in this variable made the estimate of the γ -parameter, statistically insignificant. The estimation of θ and λ was rather inadequate here, having to assume one or the other to be equal to unity. The corresponding estimates for m_1 in Table 4.1, displayed the similar features as for m_2 , though there were some important differences. The β -estimates for m_1 were consistently smaller than they were for m_2 .

This is to be expected, since the broader definition of money would allow more room for variation of the holding of real balances in response to changes in real income, as compared to the case for the narrower definition of money. The other important difference between the two sets of estimates in Table 4.1, lay in the statistical significance of the γ -parameter estimates and also in their magnitudes. The m_1 set of values for parameter were greater in their absolute values and they were generally significant compared to the other set. There were two reasons for that. The narrower definition of money excluded savings deposits, interest paid on this asset being the likely measure of the opportunity cost of holding money in the form of currency and demand deposits. As already mentioned, this was the rate of interest used in the estimation of our model. The reason behind the low value of the estimate of the elasticity of m_2 with respect to interest rate lay in the fact that the rate to be paid on time deposits (presumably, a close substitute for m_2) had been

more or less the same as the one on savings deposits. So long as these rates were the same, the γ - parameter would be biased downwards, since the own-rate response of savings deposits (included in m_2) would be positive.

On the estimates of θ and λ in Table 4.1, we note that though these estimates were admittedly "improper" for reasons discussed above, their values for m_1 and m_2 vary only by 2 per cent and all four of them were statistically well-determined.

Tables 4.2 and 4.3 give results for the estimation of different demand for money functions, all for the broader definition of money in real terms. The narrower definition of money indicated wide variation in the estimates of the parameters, when different functions (i.e., equation 4.8, 4.9 and 4.10 have been estimated. That is the reason why the results of Tables 4.2 and 4.3 were reported only on the basis of m_2 alone.

Evidence from Tables 4.2 and 4.3 suggested homogeneity of degree one between the nominal demand for money and the price level. In Table 4.2, this homogeneity would indicate the p -coefficients to be equal to zero and in Table 4.3 it would indicate the same coefficients to be equal to unity. The testing confirmed such values, indicating the homogeneity behind the usual practice of estimating the demand for money functions in real terms. These coefficients were statistically significant, however, for only in the cases of equations (6) and (6)' in Table 3, and elsewhere, they were not.

Another common feature of Tables 4.2 and 4.3 lay in the

TABLE 4.2
Nigerian Demand for Money functions in real terms on the basis of annual data, 1958-1974

Equa- tions	Intercept	γ	α	α_{-1}	m_{-1}	P	Dummy	R^2	D-W	F	β	γ	λ	θ
(8)	-0.789 (0.436)	1.014 (0.100)	-0.277 (0.229)					.93	0.87	103.46	1.01	-0.28	1"	1"
(8)	-0.102 (0.044)	1.068 (0.102)	-0.214 (0.225)				0.044 (0.024)	.95	1.32	65.07	1.07	-0.21	1"	1"
(7)	-0.784 (0.446)	0.868 (0.251)	-0.275 (0.234)			0.246 (0.388)		.93	1.00	65.93	0.87	-0.28	1"	1"
(9)	-0.467 (0.479)	0.673 (0.244)	-0.272 (0.231)		0.336 (0.220)			.93		60.30	1.01	-0.41	1"	.664
(9)	-0.096 (0.075)	1.024 (0.473)	-0.219 (0.241)		0.039 (0.408)		0.040 (0.046)	.95		44.41	1.07	-0.23	1"	.961
(9)	-0.413 (0.525)	0.714 (0.283)	-0.280 (0.243)		0.402 (0.303)	-0.180 (0.538)		.92		41.60	1.19	-0.47	1"	.598
(10)	-0.139 (0.576)	0.602 (0.253)	-0.131 (0.269)	-0.307 (0.300)	0.339 (0.220)			.93		45.68	0.91	-0.46 [†]	0.661	1"
(10)	-0.066 (0.080)	0.977 (0.472)	-0.065 (0.279)	-0.325 (0.302)	0.019 (0.405)		0.043 (0.046)	.95		36.32	1.00	-0.33 [‡]	0.981	1"
(10)	-0.838 (0.608)	0.476 (0.361)	-0.040 (0.331)	-0.467 (0.441)	0.198 (0.358)	0.386 (0.756)		.92		33.90	0.59	-0.58 [‡]	0.802	1"

1) + based on the coefficient of α_{-1}

2) Number in the parentheses represent standard errors.

Nigerian Demand for Money functions in nominal terms, on the basis of annual data, 1958-1974

TABLE 4.3

Equations	Intercept	γ	x	x_{-1}	m_{-1}	P	Dummy	\bar{R}^2	D-W	F	β	γ	λ	θ
(6)	-2.781 (0.444)	0.869 (0.250)	-0.277 (0.233)			1.244 (0.387)		.97	1.008	160.82	0.869	-0.277	1"	1"
(6)	-0.304 (0.044)	1.175 (0.292)	-0.198 (0.221)			0.822 (0.434)	0.822 (0.028)	.98	1.253	141.19	1.175	-0.198	1"	1"
(9)	-1.969 (0.784)	0.784 (0.272)	-0.251 (0.243)		0.340 (0.273)	0.551 (0.715)		.97		102.75	1.188	-0.380	1"	0.660
(9)	-0.279 (0.110)	1.178 (0.110)	-0.218 (0.244)		0.109 (0.348)	0.561 (0.710)	0.047 (0.044)	.98		83.48	1.322	-0.245	1"	0.891
(10)	-2.030 (0.786)	0.485 (0.404)	0.003 (0.351)	-0.533 (0.532)	0.658 (0.386)	1.517 (1.120)		.97		82.44	1.418	-	0.342	1"
(10)	-0.278 (0.111)	0.873 (0.574)	0.009 (0.353)	-0.483 (0.537)	-0.120 (0.434)	1.434 (1.209)	0.043 (0.045)	.98		68.21	0.873	-	-	1"

1) Numbers in the parentheses represent standard errors.

coefficient for the civil-war-years dummy variable. There was no particular a priori expectation about the sign of this coefficient and whatever results one might come up with, needed to be rationalized ex post. O. Teriba (op.cit., 1974) used the same technique to measure any possible effect of the disruption of war efforts on the usual money demand behaviour of the people. In all cases, his coefficients were negative though statistically insignificant and he rationalized that as merely a suggestion for the ".....impact of inflation at that period which made real assets more attractive". As opposed to this the results here were always positive (on different types of demand for money functions, to Teriba's and also on the basis of longer time periods) and (almost) significantly so in the cases of equation (8)' in Table 4.2 and of equation (6)' in Table 4.3. Added to this, the observed inflation rate during the war period was not very high (the price level on the basis of the implicit deflator of the GDP at factor cost went up to 110.04 from 107.01 during this period). Ghosh and Kazi (op.cit., 1978), suggested tentatively that the uncertainty of the war years might have shifted the demand for money function upwards, in response to the increased preference for purchasing power.

Finally for Tables 4.2 and 4.3, it may be noted that the inclusion of p and the Dummy variable in the demand for real balance functions made the estimates of θ and λ inefficient, so that the calculation of the other parameters on the basis of these estimates, might not be very reliable. Even then, the β - parameters were generally around unity and γ - parameters were

negative.

Let us now look at the non-linear estimates of the different parameters. In Table 4.4, the results are presented for the estimation of equation 4.4, all the variables being in logarithm, whereas, in Table 4.5 they are not. The parameters were estimated without the inequality constraints of $0 \leq \theta \leq 1$ and $0 \leq \lambda \leq 1$, dictated by economic theory.

The β - value for m_2 in Table 4.4 was 0.98, which was close to the estimates of this parameter from the earlier tables. Of the other parameter estimates, the γ - value was negative and well-determined, whereas θ had crossed the upper limit. The m_1 - estimate there showed a very low value for the elasticity of real balances with respect to permanent income, but the λ and θ values fell within their theoretical limits, without any constraint.

m_2 - equation in Table 4.4 with the price level as an argument, in place of the interest rate, showed a high value for β and θ , both of them being well-determined. The value and the standard error of γ in this equation would support the assumption of homogeneity, discussed above. λ - value here crossed the lower limit, though it was not well determined. Finally, the last equation in table 4.4. indicated an efficient measure for λ which was significantly higher than the theoretical upper limit for it, whereas θ was less than unity, though not significantly so. The homogeneity assumption was also supported in this equation, though the β - parameter had an unusually small value for its standard errors.

TABLE 4.4
Non-linear Least Squares (unconstrained) Estimates * (1) of the Nigerian Demand for Money
Functions in per capita, real terms on the basis of annual data, 1958-1974

Equations	α	β	γ	λ	θ	S.E.
m_2	-0.5717 (1.8633)	0.9819 (0.1345)	-0.1118 (0.0645)	0.5688 (1.0661)	1.2000 (0.7046)	0.0089
m_1 (4)	0.5014 (0.7831)	0.5014 (0.3366)	-0.0325 (1.3644)	0.8000 (0.1710)	0.3454 (0.2551)	0.0033
m_2	-0.1075 (0.0225)	1.3809 (0.1055)	-0.0139 (0.0404)	-0.0317 (0.0599)	0.8277 (0.0766)	0.0011
m_1 (4)	-0.8457 (0.4601)	1.0878 (0.9450)	0.2574 (0.7721)	2.0073 (0.2463)	0.5000 0.3758	0.0015

1) * γ - parameter refers to interest rate for the first two equations and the price level for the last two equations.

2) Numbers in parentheses are the standard errors and the last column (S.E.) indicates the standard errors of the equations.

TABLE 4.5
Non-linear Least Squares (unconstrained) Estimates *(2) of the Nigerian Demand for Money
Functions in per capita, real terms on the basis of annual data, 1958-1974

Equations	α	β	γ	λ	θ	S.E.
m_2	0.2109 (0.0635)	0.1173 (0.0423)	-0.4970 (0.4840)	0.6448 (0.2852)	1.4205 (0.5826)	0.2890
(4) --	0.1397 (0.0495)	$e_y = 1.069$ 0.8790 (0.0413)	$e_x = 0.219$ -0.0226 (0.4520)	1.8825 (0.5172)	0.6556 (0.3941)	0.3778
m_1	0.3195 (0.1261)	$e_y = 0.8016$ 0.1521 (0.0621)	$e_x = -0.010$ -0.8318 (0.7203)	0.6476 (0.2090)	1.2444 (0.5151)	0.8701
(4) --	0.1621 (0.0559)	$e_y = 1.1407$ 0.0935 (0.0452)	n.c. 0.0136 (0.4567)	2.0034 (0.3940)	0.6692 (0.3303)	0.5554
		$e_y = 0.7012$	n.c.			

1) * Parameters of this model (with the interest rate) have been estimated on the basis of the original data (i.e., without logarithmic transformation).

2) Numbers in the parentheses are the standard errors and the last column (S.E.) indicates standard errors of the equations.

3) n.c. = not computed.

Table 4.5 reports the results for two convergences when two sets of starting points were used. One notable feature for the θ and λ estimates was that when one was comparatively low the other was rather too high. This feature had been noted in some estimate of the U.K. demand for money function, though within the stipulated limits for the parameters (Laidler and Parkin, op.cit., 1970). The calculation for the β and γ values in this group had been obtained at the mean values of the respective variables and for β they were well-determined and not far out of their expected magnitudes. The lack of enough variation in the r - values induced them to try this approach of Table 4.5, specially when the log transformations could render such variations even less. The first equation in this group gave a likely value for the γ - parameter, but its standard error was too high. Again, the disturbing feature of θ and λ values sometimes crossing the upper limit for them occurred here.

All the different results of the estimation of the demand for money functions, reported in Tables 4.1 to 4.5, would not be so helpful unless one tries to provide them as evidence in favour of the particular values for the four important parameters, namely β, γ, θ and λ .

I now go on to present them in the concluding part with some other results.

The value for β - i.e. the elasticity of demand for real balances with respect to permanent income - comes out to be unity or just over it, as it is to be expected. All the significant values of β

for m_2 from the different tables fall within 0.9 to 1.2, excepting one at Table 4.4, when it goes up to 1.4.

The sign of γ - the elasticity of demand for real balances with respect to interest rate - is likely to be negative, though in all cases this parameter estimate comes out to be insignificant.

This supports the results of the earlier works, though the consistency with which the negative sign appears in the different models should not be totally ignored due to the statistical insignificance of the underlying coefficients.

The same kind of doubt persists in the estimates of θ and λ even though many of their estimated values have low standard errors. Estimation of equation 4.4 with the inequality constraints would help to get a more likely set of values for these two parameters, than they had.

An interpretation of the θ - parameter by E. Feige (op.cit., 1967) could enable one to predict qualitatively the value of θ in Nigeria. If, in Nigeria, innovation in financial intermediation takes the form of lowering the gap between the lending and the borrowing rates, the value would tend to increase i.e. there would be "..... more rapid adjustment of actual cash balances to desired positions". (Feige, op.cit. p. 467). But if this innovation takes the form of providing close substitutes for money, like corporate and government bonds, the effect would be a low value of θ indicating slow pace of the adjustment mentioned above.

On the definition of money in Nigeria, they supported the case of a broad definition consisting of currency in the hands of the

public plus demand and savings deposits with the commercial banks. This definition provides one with more stable estimates of the different parameters than is the case of any other definition. Since the main purpose of defining money in a certain way is to find out a stable relationship between money stock and the level of (permanent) income, the definition that provides such stability could be preferred to others. But unfortunately for more recent years, deposits data are not split up into three types, thus prohibiting an investigator further confirmation on this 'right' definition of money for Nigeria.

Finally, the demand for nominal money in Nigeria may seem to be proportional to the general price index which was in line with the same demand in most other countries. The β - parameter is also in line with its estimates in other economies. The γ - parameter is comparable with its value in other countries, though its measure here had been hampered by the lack of sufficient variation in the interest rates. Therefore, the nature of the demand for money in Nigeria during the period under study fell within the broad scheme of such functions for most other countries and it may be worthwhile to investigate it further in the lines suggested above, for the sake of a sound quantitative basis of future monetary policy.

This rather detailed presentation of my earlier joint work when it was written in first person plural rather than the third as above, can only be justified on the basis of its technical completeness compared to the earlier publications on the subject. At that time, the authors' conclusions were:

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- (i) Elasticity of the demand for real balance with respect to permanent income (i.e. value for β) to be within a range of 1.0 - 1.2.
 - (ii) The elasticity of demand for real balance with respect to interest rates is not significantly different from zero.
 - (iii) The values for partial adjustment (θ) and of adaptive expectation (λ) could be around 0.6 and 0.8 respectively.
 - (iv) The "best" definition for money in Nigeria during this historical period is currency in circulation plus demand and savings deposits with the clearing banks.

I report here two further¹⁷ works on the related theme. On the first one, Oladeji Ojo adopted a different approach to tackle the problem of the correct definition of money in the Nigerian context. He started with a C.E.S. utility function and a budget constraint involving M (i.e. money defined as currency in circulation and demand deposits) and S.D. (i.e. Savings Deposits). Maximizing utility subject to the budget constraint, allowed Ojo to write the assets demand function in ratio form and the logarithmic transforms enabled him to identify the elasticity of substitution between money and this near-money asset (S.D.). The motivation for setting up his problem in this particular fashion was justified as follows:

17. Oladeji Ojo, "On the Empirical Definition of Money

Stock", NJESS, vol. 20. No.2., July, 1978 pp 195-206.

Tayo Fakiyesi, "Demand for Money in Nigeria: Analysis of the Distributed Lag Structure", NJESS, vol. 22. No.1., March, 1980. pp 23-39.

"..... if money were properly defined to include these assets, then their influence could be taken into account when formulating monetary policy. The question then becomes one of defining money 'properly'". (Ojo, *ibid.*, p196)

Ojo used this approach of considering near-money not only to S.D. but he used T.D. (Time Deposits) and S.T. (Time and Savings Deposits) as possible substitutes for money. His results for the O.L.S. estimates of the relevant parameters, after correcting for autocorrelation (partially) revealed the right signs, significantly. On these criteria, Ojo concluded S.T. to be the closest substitute for money, because its elasticity of substitution with money came out as greater (60.7) than those for S.D. (44.73) and T.D. (2.4). Ojo went on to say:

"This paper has confirmed that there is a high degree of substitution between money (narrowly defined) and savings deposits on the one hand and money and the sum of savings and time deposits on the other. Using the wider definition of money would improve the quality of research in monetary theory and in the formulation of monetary policy" (Ojo, *ibid.*, p 205).

There are certain problems with this approach of defining money. The established view in the literature would follow a portfolio theory of J. Tobin ¹⁸ for the personal sector where the whole vector of assets may be solved simultaneously, given the expected returns and the variance-convenience of returns on them. By restricting the individual to an initial choice of certain monetary assets, however sophisticated or convenient the utility function may be, the investigator already assumes away the answer, except the logical requirement for estimating the parameters. On estimation itself, very low values of the R^2 and the persisting auto-correlation even after a round of refinement, would leave the 'significance' of the relevant parameters, somewhat doubtful.

18 . J. Tobin, "Liquidity Preference as Behaviour towards Risk", Review of Economic Studies, February, 1958. pp. 55-86.

Therefore, both on theoretical and empirical grounds, Oladeji Ojo's case for the correct definition of money does not seem to be established here, even though one may reach similar conclusions through different routes.

The other work by Tayo Fakiyesi (op.cit.) used Shirley Almon's¹⁹ technique to estimate the elasticities of nominal balance with respect to permanent income (β_1) and to permanent (consumer) price (β_2) index. For this purpose Fakiyesi used both the narrow (M1) and broad definitions of money (M2), where $M2 = M1 + \text{time and savings deposits}$. The degree of the polynomial for the lag-structure was restricted to two and three because "..... the fourth and fifth degree polynomial were all experimented with, but they produced no improvement on the results" (Fakiyesi, *ibid.*, p.27).

19. Shirley Almon, "The Distributed Lag Between Capital Appropriations and Expenditures", *Econometrica*, vol. 33, January, 1965, pp 178-196

When the polynomial of degree two was used, the values for β_1 and β_2 were 1.1408 and 1.538 for M1, and 1.25 and 1.381 for M2. "While the elasticities are significantly different from zero, the price elasticities are not significantly different from unity (,t)hus rejecting the possibility of money illusion on the part of the money holders" (Fakiyesi, *ibid.*, p. 28). On the lag structure in this case (i.e. for polynomial of degree two), the weights for both the income and price variables registered higher values for more recent periods than the distant ones (for both M1 and M2), while "..... the weights of the price variable lay above the income variable for both definitions of money. (indicating) the lag in income is shorter than the lag in the price variable" (*ibid.*, p. 28).

For the third degree polynomial β_1 and β_2 for M1 were 1.116 and 2.036 respectively and for M2 they were 0.696 and 1.823, respectively. "As can be seen from the results, one of the greatest handicaps of this technique is that its results are always greatly influenced by the degree of polynomial chosen" (*ibid.*, p. 28). Again, in this case the structure of weights for the M1 -equation for the income variable was similar to before, but for the price variable here and also for both the income and price variables in the M2 -equation, these structures of weights were of the inverted 'U' type.

Tayo Fakiyesi concluded the paper as follows:

"..... although the results did not completely offer the opportunity to discriminate unambiguously between the two definitions of money, they were surely indicative of the necessity to take cognizance of the differences in the definition in formulating monetary policy. The results are also conclusive in showing us that permanent income and permanent prices belong to the demand for money equation". (ibid., p. 37).

One might comment favourably on the sophistication of the statistical technique used in the above work compared to all the published works on this topic and would not argue the conclusions made on the relevance of the particular definition of the money stock in the context of monetary policy. But there still remains the restrictive assumption on the full or complete adjustment to the desired levels of money stock(s), which this distributed-lag model could not cope with and an autoregressive model had to be incorporated to indentify partial adjustment from adaptive or any other type of expectation on one or more of the explanatory variables. The wide variation in the estimates of the elasticities when the degree of the relevant polynomial is changed from two to three could also be due to the nature of data used. The income figures for 48 out of the 64 observations had to be interpolated. Also the nature of the collected data on the consumer price index changed during this time period, earlier ones encompassing less of people and goods and services than the later. But these types of difficulties are common to all

investigators of the quantitative nature of the developing economies and given those handicaps, Fakiyesi's work exhibited a thorough scrutiny of certain aspects of the demand for money in Nigeria.

C. The Supply of Money

Unlike the demand for money, the literature on the supply of money in Nigeria has been dominated by S. I. Ajayi²⁰ though some other authors²¹ also made their contributions on this interesting facet of the Nigerian monetary economics.

20. S.I. Ajayi, "A Critique of the Money Multiplier Approach to Money Supply Determination". Nigerian Journal of Economic and Social Studies, 1972, vol. 14, No. 2.

-----, "The Monetary Base in Nigeria", Journal of Modern African Studies 1973, vol. 1, No. 1.

-----, "A Portfolio Approach to Money Supply Determination in Nigeria", NJESS, March 1973, vol. 15, No. 1.

-----, "Critique of Money Multiplier Approach to Money Supply Determination: a Reply", NJESS, 1974, vol. 16, No. 2.

-----, "Money in a Developing Economy. A Portfolio Approach to Money Supply Determination in Nigeria" Ibadan University Press, 1978.

-----, "The money multiplier and monetary control" in "Money, Finance and Nigerian Economic Development : Essays in

Honour of Obasanmi Olakanpo", (editors) O. Teriba and V.P. Diejomaoh, Ibadan University Press, 1978.

-----, "An econometric case study of the relative importance of monetary and fiscal policy in Nigeria", Bangladesh Economic Review, vol. 2, No. 2. April, 1974.

S.I. Ajayi, and O. Teriba " The Inflationary process in Nigeria, 1960-1972 : Evidence from quarterly data", in Proceedings of Conference on Inflation, Nigerian Institute of Social and Economic Research, 1974. Ajayi, et.al. "Monetary Policy in Nigeria (Theory and Evidence)", University of Ife Press, 1980.

21. E.O. Akinnifesi and T. Phillips, "The Determinants and Control of the Money Stock in Nigeria", Economic and Financial Review, Central Bank of Nigeria, vol. 16, No. 1, 1978.

O. Teriba, "The 1967-69 Banking Amendments in Nigeria: an Appraisal of Financial Adaption in an Underdeveloped War Economy", NJESS, vol. 2, No. 1, March, 1970.

-----, "Instruments of Monetary Control: The Nigerian Experience' in "Money, Finance and Nigerian Economic Development", (Editors) O. Teriba and V.P. Diejomaoh, Ibadan University Press, 1978.

D. Ghosh, "Money Stock, Monetary Base and the Process of Money Supply in Nigeria", University of Leicester, Department of Economics. Discussion Paper No. 22, July, 1981.

-----, "The Theory of Money Supply and the Nigerian Experience", The Nigerian Journal of Public Affairs, vol. VIII, 1978-79, pp 94-114.

Like the earlier section, however, I would be selective and choose Ajayi's book on the portfolio approach (op.cit., 1978) to survey his thoughts on this problem. Ajayi preferred the portfolio theory to the money multiplier concept, because, "..... the money supply at any given point in time is the result of the portfolio adjustments of the non-bank public, the banking sector and the Central Bank". (op.cit., p1) He then went on "..... to construct an analytical model explaining the portfolio behaviour of the three sectors, i.e. the non-bank public, the Central Bank and the banking sector; thereby specifying the banking and the non-bank public demand for assets, " (ibid. p1)

Ajayi formulated his asset demand functions for both the non-bank public and the banking sectors in terms of partial adjustment to equilibrium or desired values of the different asset variables. The desired value of money was hypothesized to follow Baumol-Tobin²² type transactions demand for cash where the independent variables happened to be the rate on treasury bills and income.

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22. W.J. Baumol, "The Transaction Demand for Cash: An Inventory Theoretic Approach", Quarterly Journal of Economics, November, 1952, pp 545-556.

J. Tobin, "Interest Elasticity of the Transactions Demand for Cash", Review of Economics and Statistics, August 1956, pp 241-247.

When considering the demand for currency, which varied between half to two-thirds of narrow money (i.e. currency outside banks plus demand deposits), Ajayi recognised the inadequacy of treasury bill rate as the opportunity cost of holding cash:

"The use of treasury bill rate as a measure of opportunity cost may be questionable in the case of currency, because treasury bills are issued in large denominations. In fact the average person does not have access to them.... A more relevant variable is the rate of return on savings deposits" (Ajayi, *ibid.*, 1978, p59).

On the demand for other financial assets Ajayi considered demand, savings and time deposits as alternatives to holding currency and went on to describe the special feature of each in the particular Nigerian context of his time-period, i.e. 1960, third quarter to 1969, second quarter.

There had been two practical problems which Ajayi had to cope with: (i) the civil war and (ii) income figures being available only in yearly frequencies. The first problem he tackled by using a dummy variable and the second by interpolation. Ajayi also made allowance for seasonal variations in his dependent variables by using appropriate seasonal dummies and applied ordinary least squares estimates to measure his parameters.

Ajayi noted various "non-economic factors" in the demand for a particular type of asset. The age distribution of the population and the scepticism of the older generation towards monetary innovations like banks had to be reckoned with. Urbanization was another factor which could have had opposing influences on the

demand for cash. The seasonality of cash holding was also important due to the agrarian nature of the economy: purchases of cocoa in the Western States and groundnuts in the Northern would account for the peak cash holding during December and early January. Again the amount of deposits might be dependent on the extension or otherwise of branch networks by the leading banks. Advertisements to attract deposits through radio, cinema (not so much T.V. during Ajayi's period of interest), ".....erection and/or acquisition of architecturally captivating branch" (Ajayi, *ibid.*, 1978, p 68) or by " mobile banking units set up in the local markets of Nigeria's principal cities....." could account for some of the variations in deposits of the three kinds, rather than the interest rate(s) and measured or permanent income.

With such reminders let us now look into the results of the asset demands for the non-bank public sector. As expected the coefficient for treasury bill rate as a measure of the opportunity cost for holding cash, came out with the wrong sign though statistically insignificant. The positive coefficient on the civil war dummy indicated an increase in the demand for currency holding amidst the gathering uncertainty around, but it came out to be statistically insignificant. The seasonal dummies indicated "significantly" low currency holding for the first three quarters and a peak for the fourth.

For demand deposits also the non-bank public sector registered statistically "insignificant" coefficient for the treasury bill rate. So Ajayi re-estimated the equation without it and came up

with qualitatively very similar results on all counts, for the currency holdings. On time deposit, the 'own-rate' response was significantly positive, as one would expect from a portfolio approach. The income coefficient registered significantly positive coefficient for the first time. On saving deposit, Ajayi went through some elaborate explanation why there could not be any 'own-rate' response here and did not find any, though he did not report the result. The reason behind this apparently negative result lay in the nature of the non-price competition for saving deposits among the commercial banks: the expatriates cashing in on their long-standing reputation of experience and resourcefulness while the indigenous ones appealing to the patriotic sentiments of the Nigerians. The estimated regression equation registered an insignificantly positive coefficient for the treasury bill rate, as expected and also a significantly positive coefficient for the income variable. The civil-war dummy for saving deposits equation recorded a significantly negative coefficient and Ajayi rationalized that as follows:

"This could be due to the fact that many small savers, uncertain of what might happen, withdrew their savings as they moved from one region to the next, holding some in currency or possibly reducing indebtedness to the commercial banks". (Ajayi, *ibid.*, 1978, p 69).

Finally, for the non-bank public sector, Ajayi worked out the long-term response of the various types of assets due to a change in income. For example, an increase in the annual flow of income by one naira would increase currency holding by seven kobo,

savings deposits by 5 k, time deposits by 17 k and demand deposits by 7 k. The speed of adjustment to the desired (equilibrium) value was highest for saving deposits (completed in one quarter) and slowest for time deposits (completed in nearly seven quarters). The corresponding figures for currency holding was just below two quarters and for demand deposits, just above three quarters.

Ajayi then went on to investigate the demand for various types of assets by the commercial banks. He divided all such assets into two groups: (i) liquid assets and (ii) loans and advances. He then disaggregated liquid assets into (a) treasury bills (TBB) and (b) cash reserves (RESB) which was the sum of vault cash and deposits with the CBN. He used the same stock-adjustment format as before and tried both types of the dummy variables. One special feature of his results was the absence of any statistically significant positive response of the demand for treasury bills due to variations in the treasury bill rate. This apparently anomalous result, Ajayi explained in terms of the special nature of the War economy: "The overriding considerations were the financial requirements of the government Even when the rate on bills fell during the second quarter of 1968, banks still found it profitable to absorb a large quantity of short-term government debts into their portfolios". (Ajayi, 1978, *ibid.*). The estimate for the RESB (cash reserves) component of the liquid asset registered a significantly positive relation with total deposits with the banks, as expected. On the estimation of the equation for loans and advances, Ajayi selected

independent variables from both the demand and the supply sides. On the supply side, the relevant variable was the excess liquidity ratio (EXLQ) while on the demand side he used export, import and export next period because it has to be financed this period. There was a new dummy variable to account for the restriction on the commercial bank credit on top of the usual ones for the civil war and seasonal variations.

The civil war recorded a negative impact on loans, because of the war-time constraints to conserve foreign exchange while the commercial bank credit rationing scheme (14% expansion limit) was not needed, according to this evidence. The excess liquidity variable performed as expected, and even better when the war years were excluded from the regression. On the speed of adjustment towards the desired values, the loan equation registered the slowest move, taking over three years to complete half the course.

Ajayi finally estimated a reaction function for the Central Bank of Nigeria. This he did in terms of the treasury bill rate which could be an intermediate target for monetary policy to regulate capital flows in and out of the country. To determine the behaviour of the Nigerian treasury bill rate, Ajayi used the U.K. TB rate as an independent variable because ".....the United Kingdom is by far Nigeria's greatest single trade partner, and also because most of the expatriate banks have their head offices in Britain" (Ajayi, 1978, *ibid.*, p79). The rate would also depend on the foreign exchange reserves, negatively, because "the greater the level of exchange reserves the less the pressure on

the central bank to inhibit capital outflow (Ajayi, *ibid.*, p79). Ajayi also included the net exports and the war-time and export-import-seasonal dummies in the estimation of his reaction function.

The results showed a positive relation with the U.K. TB rate, as expected but the foreign exchange reserves registered 'insignificant' positive relation. The civil-war dummy came out with a negative sign (insignificant), implying, tentatively, "..... an attempt by the Central Bank to keep the rate low to facilitate government financing of the war" (Ajayi, 1978, *ibid.*, p80). Ajayi then went on to propose a model combining the three sectors, i.e. non-bank public, banks and the CBN to illustrate the basic financial flows in the system. Even though he admitted that the interest-rate response of various assets holding are weak, the structure of his model relied heavily on the open market operations. On monetary base, Ajayi noted that its main determinant was, during the period of his study, the balance of payments - a situation "..... not radically different from the old Currency Board".

Ajayi's works on money supply in Nigeria could provide other researchers (like the present one) with very many hints on how to model the subsequent facets of the problem and that I will take up a little later. Let me here leave a few broad comments on the above. The first reaction to Ajayi's models would have to be the lack of simultaneity in his sectoral equations. A flow-of-fund mechanism seems to operate between the three broad sectors and for each sector, there is a typical balance sheet problem. This

type of problem has been successfully hypothesized and tested in the context of the U.K.²³, for example.

If the extra constraint, that for each sector the balance sheet must balance, is imposed, the data could be manipulated better and the relevant hypothesis has a better chance to 'succeed'. This is not to say that negative results are not as important as others and I would totally accept Ajayi's philosophy on empirical works (Ajayi, 1978, *ibid.* p 64). But the point can still be made that whatever a priori information may be available, whether theoretical or historical, should be made use of without biasing the method of testing one way or the other.

On the problem of the Central Bank's reaction function, the same methodology may be tried. Almost each asset in the financial flows in any economy could be a liability to some sector and asset to another. The total deposits of the commercial banks, for example, can be regarded as being supplied by them whereas there is a demand for it coming from the non-bank personal sector.

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23. J.M. Parkin, "Discount House Portfolio and Debt Selection Behaviour", Review of Economic Studies, October, 1970.
J.M. Parkin, M.R. Gray and R. J. Barrett,
"The Portfolio Behaviour of Commercial Banks", in
Econometric Models of the U.K., edited by Hilton and Heathfield, Macmillan (1970).
D. Ghosh and J.M. Parkin, "A Theoretical and Empirical Analysis of the Portfolio, Debt and Interest Rate Behaviour of Building Societies", The Manchester School, Sept. 1972.

In this scheme of general equilibrium or disequilibrium, the central bank tries to manipulate some results by working on a few instruments it has at its disposal, to reach its goal(s). Again the simultaneity of the whole process is of vital importance and that may be hypothesized and sought to be tested.²⁴

It is quite interesting to note that the Nigerian economy had changed totally in terms of financial flows, both domestic and international, since the early 1970's. The oil boom period brought with it a different kind of challenge in the mid 1970's whereas the collapse of the oil price in more recent periods had to be endured with the help of the existing financial institutions and instruments. An understanding of the Nigerian money supply process in the context of such a shifting scenario is an interesting project and the identification of some previous monetary behaviour and relations in the economy which have already been worked out, would be of immense help in such an endeavour.

24. G. Clayton, J.C. Dodds, J.L. Ford and D. Ghosh, "An Econometric Model of the U.K. Financial Sector: Some Preliminary Findings", in "Issues in Monetary Economics", edited by H.G. Johnson and A. R. Nobay, Oxford University Press, 1974.

Ajayi's works of the pre-oil boom era have to be assessed in this context. For example, we now know that the interest-elasticity of demand for money is almost negligible and the banks also do not respond much in their reserve or portfolio management to interest rate changes. In any case, the magnitude of the bond market, both private and government is small and the oil boom era postponed, for a long time, the government's need to raise money from the public. The overriding importance of balance of payments in determining the monetary base had to be appreciated and at the same time when the surplus was turning into deficits, the position of government bonds restored the basis for the monetary base. Thus the relation between the federal government finances and the Central Bank of Nigeria's balance sheet is the crucial factor in understanding the money supply mechanism in Nigeria of the 1970's and 1980's. With this premise or prejudice in mind, a model is to be proposed for the relevant period in the Nigerian monetary history in Chapter 7.

D. Some Production Functions

The relevance of production functions in this survey of some monetary studies on the Nigerian economy is to be justified in the two subsequent chapters where the hypothesis of real balances being a complementary rather than a substitute asset for physical capital will be proposed and tested in the context of an aggregate production function. It may be worthwhile, therefore, to look into some evidence on the nature of the disaggregated production functions for some manufacturing industries in Nigeria.

One such attempt, covering the whole of the country was made by E. Osagie and M.O. Odaro²⁵.

They made use of the returns from the individual firms to the 1970 industrial survey for the Federal Office of Statistics. They used the Cobb-Douglas production function because of, among other reasons, "changing rate of substitution between inputs", but that leaves the elasticity of substitution to be always equal to one.

Osagie and Odaro defined their factors of production as:

- "1. Labour, classified as Nigerian (LN) and expatriate (LF)
2. Capital, classified as
 - non residential buildings, (KB)
 - transport equipment, (KT) and
 - machinery and equipment (KM)"

(ibid., p 153).

They also combined two types of labour: $LA = LF + LN$, and three types of capital: $KA = KB + KT + KM$, to estimate the same relations in more aggregated form. The main problem they encountered was in the paucity of observations; for example, one equation for the Sugar Confectionary industry was estimated for six parameters from ten observations only. I report some of their results in the following Table 4.6.

25. E. Osagie and M.O. Odaro, "Production Functions in Selected Nigerian Manufacturing Industries", NJESS, vol. 17, No. 1, March 1975, pp 151-157.

Table 4.6:
Estimated Production Functions in Some Nigerian Manufacturing Industries, 1970

Industry	Constant	LA	KA	Number of Observations	S.E. R	R ²
1. Sugar Confectionary	-2.38	1.26 (2.94)	0.14 (0.39)	10	0.88	.84
2. Soft Drinks, Beer and Stout	-2.99	0.99 (3.02)	0.42 (0.91)	12	0.92	.83
3. Textiles	-0.93	0.95 (3.32)	0.27 (1.07)	20	0.77	.93
4. Fabricated Metal Products	-0.61	0.82 (4.43)	0.40 (1.39)	15	0.53	.76
5. Cosmetics	3.03	1.07 (7.34)	-0.84 (0.46)	14	0.67	.91
6. Plastics	1.81	-0.19 (0.36)	1.33 (3.28)	10	0.88	.85
7. Other Chemical Products	1.50	0.89 (1.31)	0.16 (0.33)	10	1.07	.51
8. All Industries Above	0.03	0.88 (8.68)	0.29 (3.06)	91	0.86	.84

Note: Figures in parentheses are the t values

Table 4.7:
Elasticity of Substitution in Six Nigerian Manufacturing Industries

	1965	1966	1967	1968	1969
Bakery Products	1.029 (0.240)	0.691 (0.337)	0.960 (0.261)	0.592 (0.288)	0.858 (0.284)
Textile Industry	1.026 (0.174)	0.815 (0.739)	0.739 (0.318)	1.007 (0.229)	0.704 (0.183)
Sawmills	1.283 (0.137)	1.288 (0.150)	0.763 (0.267)	0.476 (0.341)	0.905 (0.277)
Printing & Publishing	1.026 (0.169)	0.875 (0.189)	0.770 (0.195)	1.015 (0.210)	1.024 (0.237)
Chemical Products	1.359 (0.223)	0.522 (0.465)	0.967 (0.213)	0.929 (0.293)	1.300 (0.242)
Metal Products	0.263 (0.152)	0.292 (0.226)	0.590 (0.181)	0.468 (0.172)	0.254 (0.197)

Note: Figures in parentheses are the standard errors.

When the estimates were further disaggregated as explained above, Osagie and Odaro (ibid., p 154) found

" Except in fabricated metal products and other chemical products which are relatively capital-intensive industries in the Nigerian context, Nigerian labour exhibits higher productivities than foreign labour, a feature unambiguously demonstrated when all industries are aggregated".

For our purpose here, we note that only the aggregated "All industries above" in Table 4.5 came up with both the elasticities "significantly" different from zero. It also indicated increasing returns to scale, but as already noted, the restrictive form of the production function would throw no light on the complementarity issue.

A different type of production function, namely, the C.E.S. was used by J.O. Iyaniwura²⁶.

He estimated the elasticity of substitution between labour and capital for each of the five years from 1965 to 1969. His results are reproduced in the following Table 4.7.

As already noted by D.G. Mayes^{27,28}.

"Many of the computed elasticities are widely different from unity, but the equations are frequently poorly determined so it is difficult to generalise. However, it is clear that the assumption of unit elasticities does not apply in all cases" (Mayes, op.cit., p 102).

26. J. O. Iyaniwura, "Production functions in Nigerian

manufacturing industry", Ph.D. thesis, University of Exeter, 1974.

27. K.J. Arrow, H.B. Chenery, B.S. Minhas and R.M. Solow, "Capital-labour substitution and economic efficiency", Review of Economics and Statistics, vol. 43, 1961, pp 225-250.
28. D.G. Mayes, "Application of Econometrics", Prentice Hall International, 1981.

To carry on with the above points, only two of the six industries reported in Table 4.7 - namely, Bakery Products and Printing and Publishing - were exhibiting elasticities of substitution as significantly different from zero for all the five years reported. Thus, not only we could be sure that the manufacturing industries exhibited unit elasticities of substitution, as assumed in the earlier work reported above, but some of the industries could be experiencing a relation of complementarity between labour and capital during the time under study. In chapters 5 and 6 below, I would take up the problems of bringing in labour, capital and real balance (real money) together in a production function for the whole economy and investigate the hypothesis of complementarity between real money and physical capital.

But this section on production functions can not be complete without reporting two works by U. A. Kazi and J. S. Odama.²⁹ These two authors from the northern University (A.B.U.) at Zaria applied the latest state of the art to ask some interesting questions involving industrial production functions and were able to answer a few. They made good use of the surveys on nineteen industries in the Nigerian manufacturing sector, conducted by the Federal Office of Statistics in Lagos for the period 1962 to 1975.

29 . U. A. Kazi and J. S. Odama, "Factor Shares, Technological progress and Relative Efficiency in Selected Industries

in Nigeria, 1962 - 1975", NJESS, vol. 23. No. 3,
November, 1981 pp 411-446.

J. S. Odama and U. A. Kazi, "Rate of Capital-Labour
Substitution in Time Series Production Functions in the
Nigerian Manufacturing Industry, 1962-75", NJESS, vol.24,
No.1, March 1982. pp 37-60.

Since such an exhaustive and thorough study of the production function relation at a disaggregated micro level had not been attempted before on the Nigerian data, it would be difficult to compare their findings with the earlier works, some of which have already been discussed above.

"We have concerned ourselves with the determinants of productivity growth such as technical change, an ease of factor substitution, and the differential growth rate of industries. For the plausibility of our findings, therefore, the evidence we obtained can only be compared with similar results of studies from other developing countries" (Odama and Kazi, *ibid.*, p 54).

Even though the sector under consideration contributed less than ten percent of the G.D.P. of the country at that time, the insights into these 19 industries could help devise long-term policy strategy on growth and employment in the industrial sector as a whole. Some of their conclusions can be enumerated below, which were based on the time-series estimation of the C.E.S. production function, first on the O.L.S. method. But they also made allowance for the contemporaneously correlated error terms across the nineteen industries and pooled them together to use the generalised least square method of estimation. The justification for doing so was as follows:

"A closer look into the production relations of all establishments vis-a-vis economy would show us that the

disturbances which enter into the deterministic relations are subject to the common random shocks generated within or outside the system. The most obvious ones, , are the oil boom, indigenisation of all foreign concerns, monetary policy, nationalisation of banks, government tax and tariff policy, and the oligopolistic aspects of industrial development owing to the importation of foreign technology" (Odama and Kazi, *ibid.*, p 42)

Some of their conclusions were as follows:

"The determination of the adjustment period between actual output to desired level is found to be somewhat larger than it is in some advanced countries.

..... Most of the industries indicated that relative shares are independant of time trend and wages.

Technological progress appears to be neutral in the determination of labour income.

The identification of technological progress showed that its momentum was somewhat slower before 1971, but it increased rapidly after the oil boom. It made a 40 percent contribution to productivity during this period. On average, the trend of technological advance contributed 2.46 percent per year. "(Kazi and Odama, *ibid.*, p. 429).

Yet, the conclusion we are interested in, as a justification for proposing an aggregate or macro production function, lies in the nature or degree of substitution between capital and labour and

how far the Cobb-Douglas type (which restricts this elasticity to unity) may be useful in that respect.

Let us look at their findings on this issue:

"Our estimates fluctuate between 0.36 to 1.81. (W)e may see that the distribution of the elasticities is bi-modal and its peaks occur roughly around unity. Evidence from the statistical testing indicates that 37, 47 and 16 percent of industries exhibit technologies similar to LP (Leontieff Production function), CD and CES respectively. Comparable cross section studies of Peruvian industries by Ann White³⁰ suggests the distribution of 24, 33 and 42 percent, whereas, J.M. Katz's³¹ findings for time series yields roughly 10, 50 and 40 percent". Based on these pieces of evidence, therefore, if one has to choose between these three mutually exclusive types of production function for Nigeria, CD seems to be the winner and we will do so in Chapter 6, below.

30. A. D. White, "Alternative Estimates of Capital Labour Substitution in Developing Economies: Comments on Professor Clague", Econometrics, Vol. 33, November, 1971, pp 1053-54.

31. J. M. Katz, Production Functions, Foreign Investment and Growth: A study based on the Argentina Manufacturing Sector. 1969, North Holland Publishing Co. Amsterdam.

E. Macro-economic Models

There have been a few macro-economic models on the Nigerian economy, for example, one by J.S. Odama³² was constructed to review the working of the model for planning purposes in terms of some policy variables. But my interest here is on the monetary sector and how it may interact with the rest of the economy. To elaborate that point I go on to present a model where the demand for and the supply of real balances feature prominently along with the other equations.

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32. J.S. Odama, "Adaptive Control Rules for Economic Planning: An application to the Nigerian Economy", Ph.D. thesis, University of Missouri, 1973.

O. Ojo, "A Medium-term Planning Model of the Nigerian Economy" NJESS vol. 15, 1973. pp 125-151.

This was worked out by D. Ghosh and U. Kazi³³. They followed L. R. Klein's³⁴ broad outlines for model building to suit the economic environment of developing countries:

"With careful attention paid to local institutional peculiarities, to differences in behavioural characteristics, and to differences in economic structure, we can probably piece together useful models of developing countries Some parts of the keynesian type aggregative structure are universal, while others are not applicable outside the industrial economies for which they have been established".

I can now present their model as follows:

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33. D. Ghosh and U. Kazi, "A Macroeconomic Model for Nigeria, 1958-1974", Empirical Economics, vol.3, issue 3, 1978, pp 135-154.
 34. L.R. Klein, "What kind of Macro-econometric model for developing economies", Indian Economic Journal, 1965, vol. 13, pp 559-570.

$$\begin{aligned}
C_t &= \alpha_0 + \alpha_1 Y_t + \alpha_2 C_{t-1} + \alpha_3 I_t + \alpha_4 D_1 + V_{1t} & (1) \\
I_t &= \beta_0 + \beta_1 Y_{t-1} + \beta_2 \bar{R}_{2t} + \beta_3 D_2 + V_{2t} & (2) \\
Z_{d,t} &= \gamma_0 + \gamma_1 Y_t + \gamma_2 \bar{R}_{1t} + \gamma_3 Z_{d,t-1} + V_{3t} & (3) \\
Z_{s,t} &= \lambda_0 + \lambda_1 X_t + \lambda_2 M_t + \lambda_3 \bar{R}_{2t} + V_{4t} & (4) \\
M_t &= \sigma_0 + \sigma_1 Y_t + \sigma_2 D_1 + V_{5t} & (5) \\
A_t &= \epsilon_0 + \epsilon_1 A_{Et} + \epsilon_2 N_t + \epsilon_3 D_1 + V_{6t} & (6) \\
Q_t &= \phi_0 + \phi_1 Q_{Et} + \phi_2 D_2 + V_{7t} & (7) \\
P_t &= \mu_0 + \mu_1 M_{s,t-1} + V_{8t} & (8) \\
X_t &= \psi_0 + \psi_1 P_t + \psi_2 P_{pt} + \psi_3 D_1 + V_{9t} & (9) \\
Y_t + T_t &= C_t + I_t + G_t + X_t - M_t & (10) \\
Y_t &= A_t + Q_t + O_t & (11)
\end{aligned}$$

The endogenous variables of the system without the time subscripts, were as follows:

- C = Private real consumer expenditure,
- Y = Gross Domestic Product at constant factor cost,
- I = Net real investment, private and public,
- Zd = Demand for real balances,
- Zs = Supply of real balances,
- M = Real imports,
- A = Agricultural etc. product at constant factor cost,
- Q = Product of the Mining etc. sector at constant factor cost,
- O = Product of all other sectors (i.e. other than Agriculture and Mining) at constant factor cost.

X = Real Exports,
P = General Price Index, measured by the GDP (at factor cost) deflator.

The exogenous variables of the system, without the time subscripts, were as follows:

l = Real Liquid assets,
D1 = War years dummy,
D2 = Structural dummy,
 $\bar{R}1$ = Commercial Bank 3 - months Time deposit Rate,
 $\bar{R}2$ = Interest Rate on 'First class Advances',
AE = Agricultural, etc., export,
N = Population,
QE = Mining etc. export,
T = Indirect Taxes less Subsidies,
G = Government Expenditure (other than public capital formation)
Pp = Petroleum price,
Ms = Nominal supply of money. Vit's are the appropriate error terms for the stochastic relations.

They then went on to examine the consistency of their model and the relevance of each behavioural equation in terms of its Nigerian background. For example,

"..... (the) neglect of the supply side of the economy (was) forced on us by the lack of time series data for our sample period. We need to know the capital stock, average earnings and

total employment to be able to quantify the relations in the supply side of the Nigerian economy. In the absence of these detailed informations, we build our model with the emphasis on the demand side of the economy (op.cit., p 141)

Ghosh and Kazi tackled the problem of equilibrium income at an administered interest (which could be reasonably assumed to have been below the equilibrium rate), by asserting that the disequilibrating forces at the level of income corresponding to the intersection of the usual IS and LM curves, have to be opposite in direction but equal in magnitude. They then went on to estimate (2SLS) the model, the results of which are reproduced below in Table 4.8.

I choose only the demand and supply of real money equations here for comments from their works:

"The demand for money function comes out with all the right signs, though only in the case of income, it is statistically significant. The short run (mean) income elasticity of the demand for real balances turns out to be .85 whereas the corresponding long-run value, based on the insignificant coefficient for $Z_{d,t-1}$, is 1.01. The (mean) interest elasticity of the demand for real balances, based on the statistically insignificant coefficient for \bar{R}_1 , turns out to be - 0.24. The insignificance of the interest rate coefficient in the demand for money function had been the common theme of all the works on the demand for money in Nigeria, referred to above.

The supply of real balances equation has all the right statistical properties, though its economic interpretation is

TABLE 4.8

The Nigerian Macroeconomic Model 1958-74

Estimated Structural Equations						R ²	D-W
C _t	=	1041.009 - (229.617)	0.177C _{t-1} - (0.185)	1.419I _t + (0.804)	0.880Y _t [^] (0.215)	0.933	1.52
I _t	=	400.118 + (430.734)	0.262Y _{t-1} - (0.046)	93.016R _{2t} [¯] + (54.422)	36.518D ₂ (96.823)	0.959	1.48
Z _{dt}	=	102.794 + (124.458)	0.158Z _{dt-1} - (0.283)	31.043R _{1t} [¯] + (29.449)	0.112Y _t [^] (0.037)	0.944	1.44
Z _{st}	=	448.622 - (357.619)	54.151R _{2t} [¯] + (43.005)	0.305M _t [^] + (0.307)	0.192X _t [^] (0.170)	0.922	2.29
M _t	=	63.032 + (41.489)	38.978D ₁ + (27.912)	0.175Y _t [^] (0.012)		0.951	2.50
A _t	=	-196.299 + (367.730)	31.495N _t + (6.163)	1.292A _{Et} + (0.799)	52.506D ₂ (136.506)	0.827	1.41
Q _t	=	39.950 + (20.384)	0.799Q _{Et} + (0.100)	73.795D ₂ (85.764)		0.973	1.62
P _t	=	68.240 + (1.864)	0.097M _{st-1} (0.004)			0.981	2.40
X _t	=	-800.818 + (252.717)	54.097P _t [^] + (134.293)	12.789P _{pt} - (2.495)	42.652D ₁ (59.374)	0.940	2.00

Numbers in parentheses are the standard errors

rather obscure. Ideally speaking, if net balances from foreign trade has some positive effect on the high-powered money, and therefore, on money supply, the coefficient for M and X should be equal in magnitude and opposite in sign. But import in Nigeria may be dependent on government expenditure, which ".....helps to explain substantial fluctuations in imports on the grounds that at all government levels, items such as vehicles, machinery and equipment, chemicals, are required to execute development programme" (Odama, op.cit., 1973 p.47). When government expenditure has such a major effect on imports, and when, at the same time, it may affect the supply of money, the foreign trade balance effect of our endogenous real money supply may not turn out as negative for imports". (Ghosh and Kazi, ibid., p43)

A comment may be made about the use of their two dummy variables: D1 for the civil war and D2 for the structural change of the economy for the last three years of their sample period when the oil boom was gathering momentum. They undertook the usual practice of using ones for the affected years and zeroes elsewhere. But this led onto severe multicollinearity which then prompted them to leave out one or the other, or both in particular equations. The data for the three civil-war years, 1967/68 to 1969/70 excluded the "three eastern states" and there was no a-priori expectation about the sign of its coefficient, whereas for D2 it was positive. As the results of Table 4.8 revealed neither of the two dummy variables came out to be significantly different from zero, whenever it was used, but for D2 the sign was always as expected.

Ghosh and Kazi then examined the stability of thier model, which it was, and presented the results of some of their dynamic and equilibrium multipliers. For example, most of the endogenous variables like consumption, income, investment, import and export were coming quite close to their long-run equilibrium values after a change in an exogenous policy variable like government expenditure in three years and most of these adjustments were being completed after only one year. Again an increase in the price of petroleum would improve the balance of payments immediately from the first year but after three years import would cross over export gains and it would become adverse, after that.

In this chapter, as indicated at the outset, I have presented a very selective and biased survey of some of the works on the macroeconomy of Nigeria. The purpose is to set up a meaningful hypothesis on the basic monetary structure of the economy during the period of interest. This is undertaken in the three succeeding chapters. The lessons of this chapter would help me in this endeavour in selecting the right questions to ask, or the problems to solve and also using the earlier findings or the existing knowledge to try to answer them. The primary question seems to be:

Is real money a complement to physical capital in Nigeria? The way one answers that question would go a long way in selecting the right monetary policy instruments and also their socially optimal values. Another important question would be: how money stock is being determined in Nigeria? An identification of the

primary forces behind money supply and an evaluation of their magnitudes to answer that question is of vital importance and I now gradually move on to undertake these tasks.

Chapter 5 Microeconomic Basis of Complementarity of Money

A. Introduction

R.I. McKinnon suggested¹ a relation of complementarity between money and physical capital in poor countries where 'the fragmented economic environment' makes the typical small firm-household rely mainly on self-finance and where the indivisibilities of investment and the high propensity to consume, make money the complement asset of physical capital. The economic environment of developing countries where financial institutions are not as well-developed as in rich countries, may very well describe the situation faced by many small firms in the first world, where such firms are yet to establish themselves to the level where the benefits of mature financial intermediation may be bestowed on them. But this supposed similarity cannot, of course, be used to the aggregate relation of macroeconomic behaviour or of monetary policy on such issues, neither are such problems the target of my investigation in this chapter. What I intend to explore here is the microeconomic basis of the broad complementarity suggested by McKinnon's thesis. The illustrations of the economic agents used there, however, need not necessarily be restricted to the third world.

B. The Complementarity Hypothesis

Let us outline here McKinnon's hypothesis of cash balance being a complement of physical capital. He starts with J. Hirshleifer's² theory of investment, where the problems of consumption, saving, borrowing or lending, and of financial and real investment are

¹ R.I. McKinnon, Money and Capital in Economic Development, The Brookings Institution, 1973

² J. Hirshleifer, Investment, Interest and Capital, Prentice-Hall, 1970.

simultaneously solved in a two-period choice problem, starting with the given levels of initial endowments in the form of income-flows.

Let me reproduce McKinnon's diagram here and spell out the points in his hypothesis in figure 5.1 below.

The firm-household starts at a point T_1 of initial endowment with the given flows of income oY_2 in period 2 and of oY_1 in period 1 which contains "consumable capital carried over from the past (oC_1) and current income (C_1Y_1)" (McKinnon, op.cit. p20). T_1T_1' indicates the production-opportunity curve under traditional technique, whereas $T_1T_2T_2'$ represents the production-opportunity curve under the new technique. The differences between the two techniques are highlighted by:

- (i) the enormous economy of scale is available under the new technique; and
- (ii) T_1T_2 has to be invested first in the new technique before return is available from the investment.

If the individual firm-household is restricted to self-finance, he would be investing, producing and consuming at point B, where the internal rate of return is equal to the marginal rate of substitution between consumptions in period 1 and in period 2, giving them a utility level indicated by the indifference curve I_1 . But, if they have access to the fully developed and perfectly competitive money market, they could invest as much as Y_1D_1 in period one, to generate enough income to repay it all in period two and still enjoy a consumption level indicated by the indifference curve I_2 at point C.

This is made possible by borrowing OD_1 in period one to be able to invest Y_1D_1 to generate an income of DD_1 in period 2. The firm-household can borrow on the basis of his prospective income, to be able to consume OC_1' in period one. Out of the second-period income of DD_1 , DD' is paid back with interest, for borrowing OD_1 (i.e. LD') and LC_2'

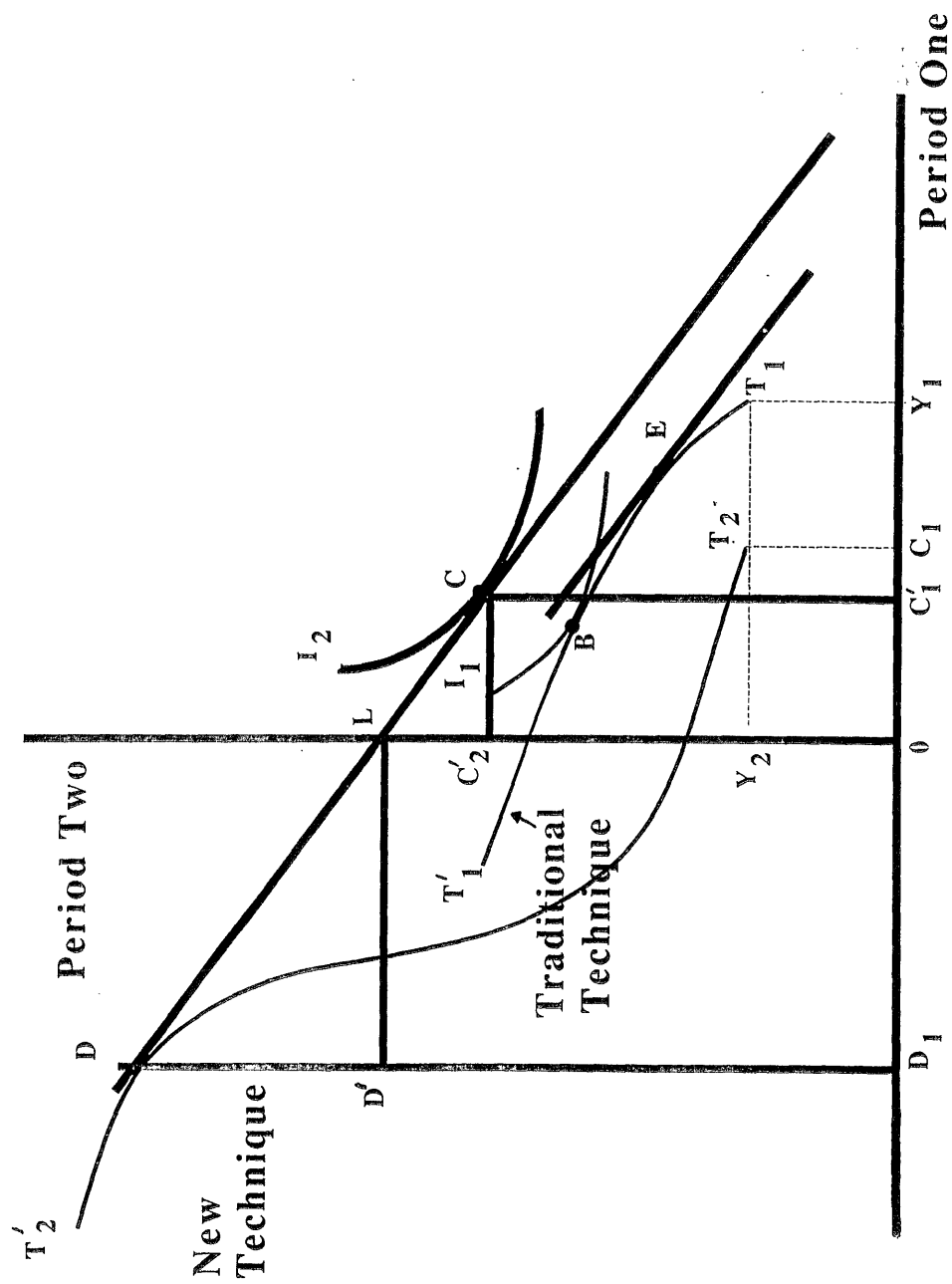


Fig. 5.1 Investment choice between two techniques

is paid back for borrowing CC_2' to finance the period one consumption (i.e. CC_2'). This leaves OC_2' to be consumed in period 2. We may note, the second-period given income-flow of OY_2 in McKinnon's diagram can now be used as the initial endowment for period three. But, more importantly, it serves no analytical purpose in the development of his above argument and could have been avoided altogether to enable him to look at his firm-household with the initial endowment of OY_1 alone.

The substantial point, however, is contained in the following last few lines from his chapter 2:

"In an idyllic "fully developed" economy, such intertemporal transactions would take place freely so that neither consumption limitations nor sparse endowment would inhibit high-returning investments where "lumpiness" or indivisibilities are important. In short, poverty would be no barrier to the efficient deployment of the country's limited capital". (McKinnon, op.cit. p21).

Let us now be specific and look into the investment problems of a saver-investor who has no access to the financial market as a borrower. We assume that the economy or the surroundings facing our entrepreneur are not as primitive as to need the use of his own output as capital. We further assume that the real return on money is such (i.e. $d - \dot{p}^*$ where d is the deposit interest rate on one's savings in the form of time or savings deposit with a bank, \dot{p}^* is the expected rate of inflation) relative to the cost of storing one's own outputs as inventories for saving, accumulations purpose, that the entire saving is optimally done when kept in the form of interest-yielding deposits. This entrepreneur now faces the acute problem of indivisibility of investment opportunity whereby his savings have to be accumulated for a period of time before it becomes large enough to be expended on ".... fixed assets, such as machinery, or even seed-fertilizer-pesticide packages of working capital...." (McKinnon, op.cit. p.57). This makes

the lag for investment expenditure larger than it is for consumption after some income is earned. These restrictions would then indicate:

" if the desired rate of capital accumulation (and hence private saving) increases at any given level of income, the average ratio of real cash balances to income will also increase" (McKinnon, op.cit. p.57) McKinnon makes it clear in a footnote (p.67) that this increase in the demand for money is not what Keynes³ had in mind for a temporary, or what we call a disequilibrium increase due to an increase in ex ante investment. "This ex ante effect is certainly present in our model", McKinnon argues (p.67 op.cit.) "but there is an additional permanent effect of an increase in the I/Y ratio when plans are realised." Thus, McKinnon's relationship is one of equilibrium, or optimal behaviour rather than an adjustment towards it.

These strings of argument lead McKinnon to present the following money-demand equation :

$$\left(\frac{M}{P}\right)_d = L \left(Y, \frac{I}{Y}, d-p^* \right) \quad \dots \quad (5.1)$$

where, $L_1 > 0$, $L_2 > 0$ and $L_3 > 0$.

Since in this environment, $\frac{\partial L}{\partial \frac{I}{Y}} > 0$,

cash balances turn out as a complement asset to physical capital and not as substitute, as one would expect from the portfolio theory. In other words, the relative absence of borrowing opportunity to invest in physical capital and the discrete nature of available investment opportunities, forces one to save continuously for a period before one has enough funds to spend on 'real' investment.

The same relation can also be presented as follows:

$$\left(\frac{M}{P}\right)_d = L \left(Y, \bar{r}, d-p^* \right) \quad \dots \quad (5.2)$$

³

J.M. Keynes, "The Ex Ante Theory of the Rate of Interest", Economic Journal, 1937

where the new argument \bar{r} measures the average return on physical capital, and here also we would expect $L_2 > 0$ in contrast to all neo-classical models when we expect the portfolio relation of substitutability, i.e. $L_2 < 0$. In McKinnon's words:

"..... if money is viewed as a conduit through which accumulation takes place - rather than as a competing asset - the demand for money rises *pari passu* with the productivity of physical capital." (op.cit. p60).

McKinnon's policy prescription based on his analysis, outlined above, would be to conduct monetary policy (i.e. control money supply or recommend deposit rate of interest) in such a way that "..... a higher real return on holding money relaxes the saving-investment bottleneck by enlarging M/P . On the other hand, once $d-P^*$ rises toward the best marginal and intramarginal returns to be earned on self-financed investments, the competing-asset effect becomes dominant and REDUCES the aggregate flow of investment". (op.cit. p61). This would explain the nature of the next equation:

$$\left(\frac{I}{Y}\right) = F(\bar{r}, d-P^*) \quad \dots \quad (5.3)$$

where the partial derivatives of the investment function, F , are :

$F_1 > 0$ and $F_2 \gtrless 0$. The possibility of $F_2 < 0$ sets in the "competing-asset" aspect of money holding and the optimality of monetary policy in such circumstances is to hit that rate of the real return of cash-holding, i.e. $(d-P^*)^M$ where, saving, investment and $\left(\frac{M}{P}\right)_d$ are all at their optimal levels.

Equation (5.3) above can be described by his diagram in figure 5.2 where the relationship extends to possible negative returns on money holding. The macroeconomic policy perspective becomes apparent when we see the gradual elimination of monetary and financial repression, in terms of another diagram:

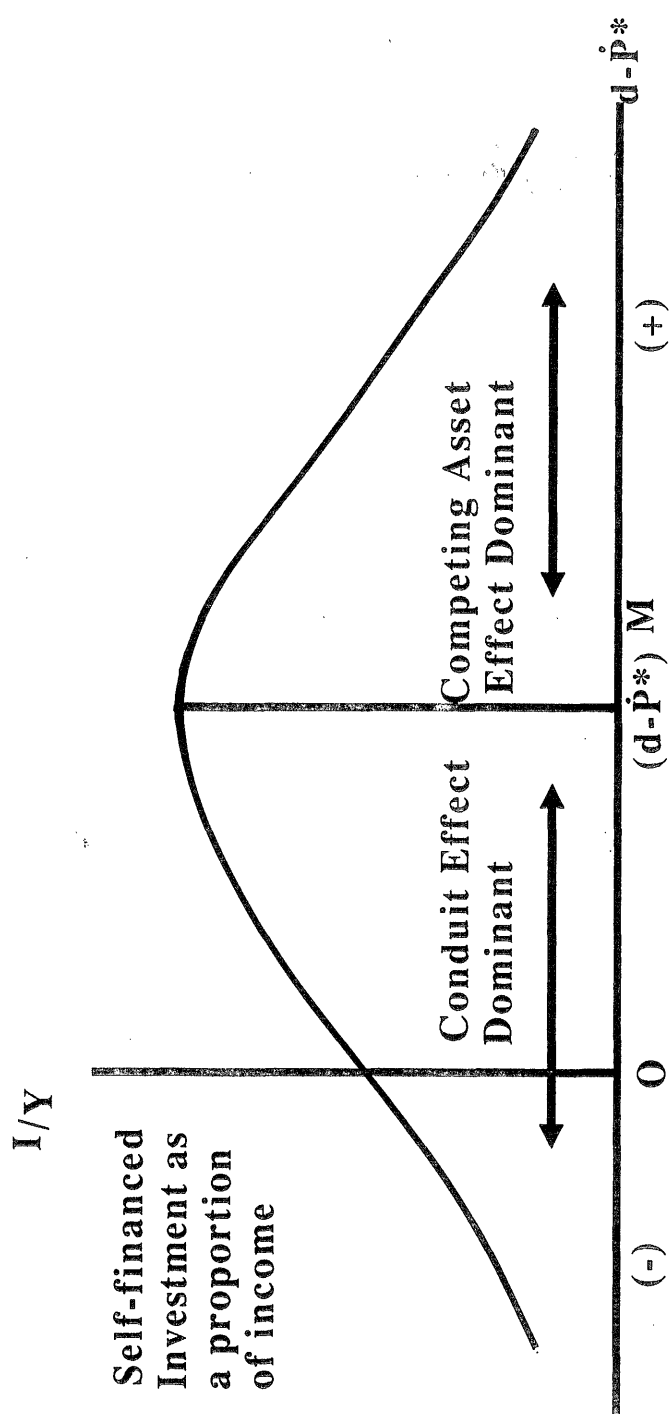


Fig. 5.2 Real Return on Money and Self-financed Investment

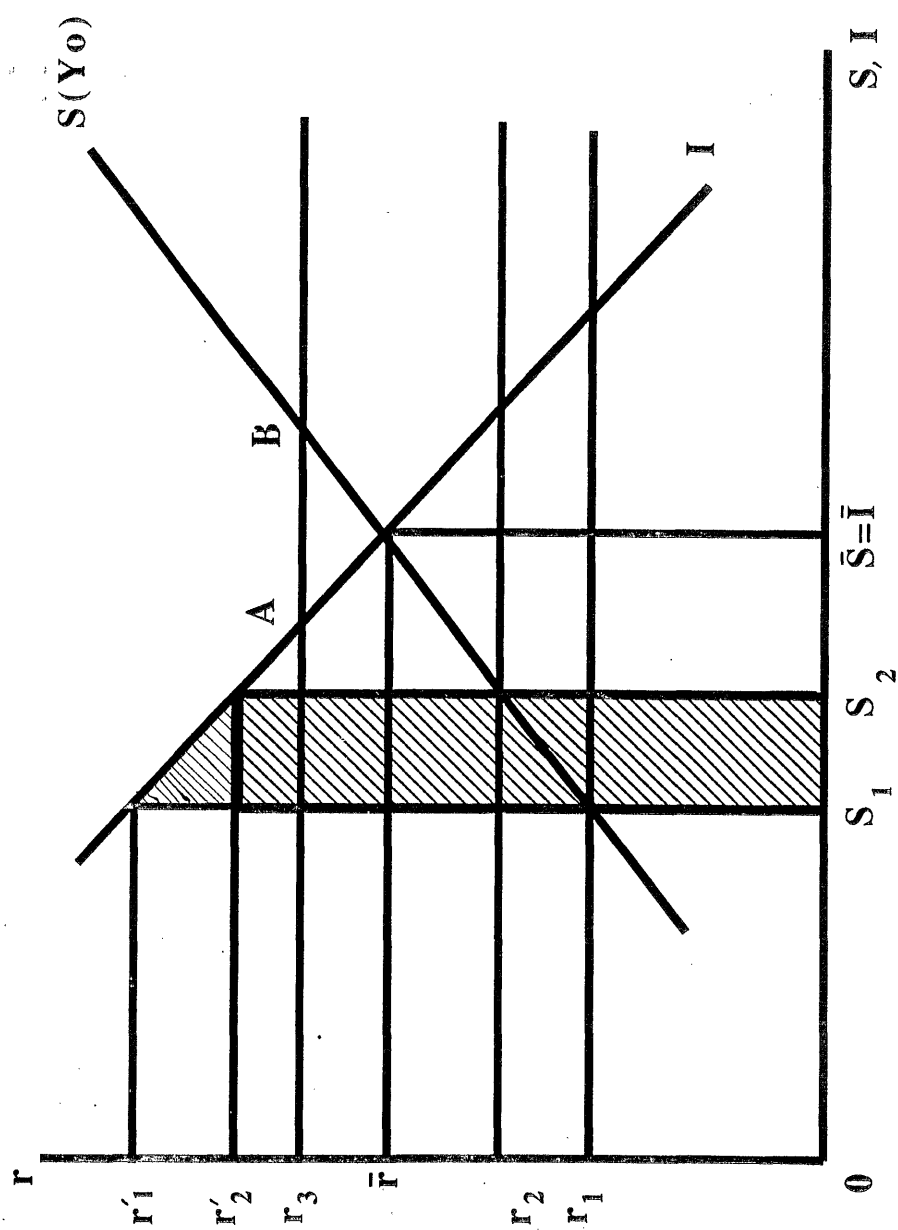


Fig. 5.3 Financial Repression and Economic Growth

The McKinnon and Shaw⁴ hypothesis describes the financial repression in less developed countries as a situation indicated by r_1 above, when saving is only at OS_1 (and therefore, investment), because of the low return on saving. If r_1 is pushed up towards r_2 both saving and investment will increase to S_2 , and the investment projects with lower internal rate of return (the shaded area) will now be undertaken.

This is made possible because more loanable funds are now available through extra saving (i.e. S_1S_2) and therefore there is now more room for profitable investment. In the initial situation when the "administered" nominal interest rate was at a low enough level to generate the real interest rate at r_1 , the profit from the marginal project would be r_1r_1' less the differential between the loan and deposit rates of interest. Partial emancipation from financial repression is next introduced by the real interest rate being at r_2 . The expost investment is now equal to expost saving at S_2 , when the marginal efficiency of capital of the marginal project would bring forth a profit of r_2r_2' less the difference between the loan and deposit interest rates. It can then be said that this move would bring in more investment projects with lower yields (i.e. internal rate of return) than it was possible before. The optimal policy would push the rate of interest further up to \bar{r} , for the maximum attainable rate of investment, and this will correspond to the real deposit interest rate $(d-P^*)^M$ in figure 5.2. One can extend this analysis to maintain that if the authorities overdo this elimination of financial repression by raising the (deposit) interest rate still further (say consistent with r_3), investment in physical capital may drop and the competing financial asset (i.e. interest-yielding bank deposits) effect would start to operate (i.e. AB financial asset in fig. 5.3 corresponding to

⁴ E. Shaw, Financial Deepening in Economic Development, Oxford University Press, 1973.

the interest rates above $(d-\dot{P}^*)^M$ in fig. 5.2)

For these aggregate or macroeconomic relations which lead to the above monetary policies in LDCs, there has to be some microeconomic basis, which McKinnon has outlined, but never worked out in details. McKinnon suggested the use of two-period Fisherian⁵ approach which has been developed by J. Hirschleifer (op.cit.) and that is what we pursue here to check to what extent the micro behaviour would support the above macroeconomic generalizations.

C. The Intertemporal Choice

Let us first look at the micro-choice problem for a firm-household without any of the restrictions mentioned in the earlier section. The only restriction we need here is that the entrepreneur is a lender in the present period when he faces a perfect capital market.

In figure 5.4 we assume the firm-household with a given initial endowment of only Y_t , facing PP' the production opportunity curve and a competitive market opportunity curve MM' indicating the rate of interest at which it can lend and/or borrow. Here we make him a lender so that the optimal point D is above B rather than below it. The optimal production-investment point is at B where the firm's internal rate of return is equal to its market interest rate. The optimal consumption-saving point is at D, where the firm's rate of time preference is equal to the market rate of interest. At this optimal the firm is consuming \overline{OC}_t in period 1, 'saving' $\overline{C}_t Y_t$. Of this 'saving', he is investing $\overline{Y}_t Y_t$ in real capital at the beginning of the present period (i.e. period 1) and $\overline{C}_t \overline{Y}_t$ on financial capital. The returns on the physical capital, next period (2) are $O\overline{Y}_{t+1}$ and on financial capital $\overline{C}_{t+1} \overline{Y}_{t+1}$, allowing him a second-period consumption of $O\overline{C}_{t+1}$.

If we now call here financial investment as money, for example,

⁵ I. Fisher, The Theory of Interest, Macmillan, 1930

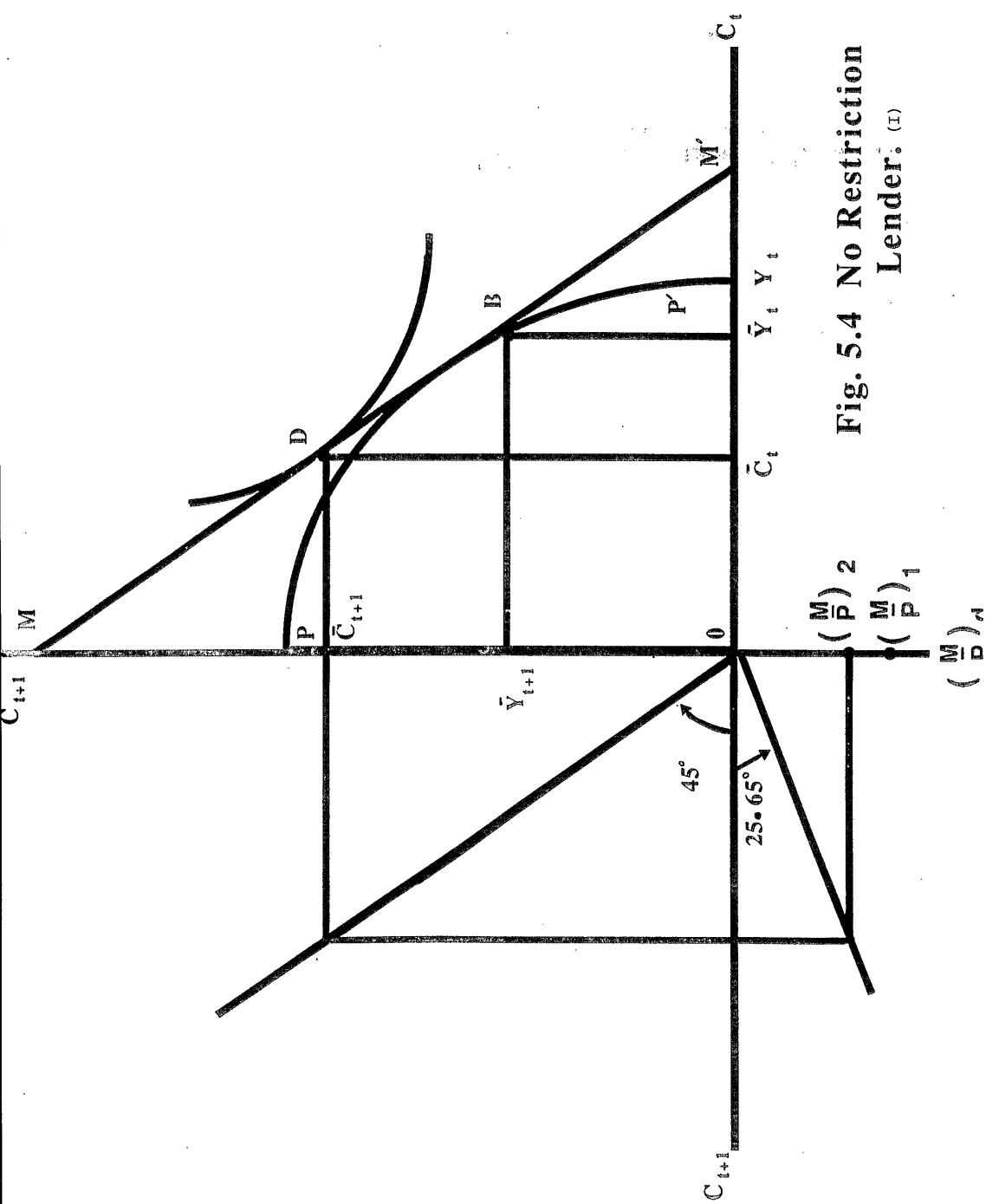


Fig. 5.4 No Restriction
Lender: (I)

an interest-earning saving or time deposit with a clearing bank, we can indicate the demand for money in the two periods. For this we further assume that expenditure is evenly spread out through a period for consumption, whereas for investment here, it is spent at the beginning of the period, lump-sum. Since we are now calling the bank deposits money, the average money-demand or 'cash' holding in period 1 is given by $\left(\frac{M}{P}\right)_1$ where

$$O\left(\frac{M}{P}\right)_1 = \frac{1}{2} [O\bar{C}_t + \bar{C}_t \bar{Y}_t + \bar{C}_{t+1} \bar{Y}_{t+1}] \quad \dots \quad (5.4)$$

Average cash-holding in period 2 would be $\frac{1}{2} O\bar{C}_{t+1}$, which is shown as $O\left(\frac{M}{P}\right)_2$ in the money-demand axis, which could be less than $O\left(\frac{M}{P}\right)_1$.

Without complicating fig. 5.4 any further, we can discuss some comparative static exercise with the help of it. Let us assume that there is an increase in the interest-rate. The levels of the interest rates need not necessarily be restricted to the positive domain. Real rate of interest can be negative and McKinnon's analysis can cope with that (see fig. 5.2 above). In fig. 5.4 for interest rate to be negative, the slope of the market opportunity curve, MM' , has to be less than 45° .

Now the increase in the interest rate would have both substitution and income effects, pivoting the MM' curve clock-wise, at point B. This would mean an increase in saving only if the positive "windfall" effect is swamped by the negative substitution effect. The increase in interest-rate would not pivot at B, if we assume the change to have come before the production, investment and consumption decisions have been undertaken. In that case, the individual's optimum production-plan would be indicated by the point of tangency between the steeper market opportunity (MM') curve and the production opportunity (PP') curve. The result here is again ambiguous on the extent of the financial investment, but not on the real investment.

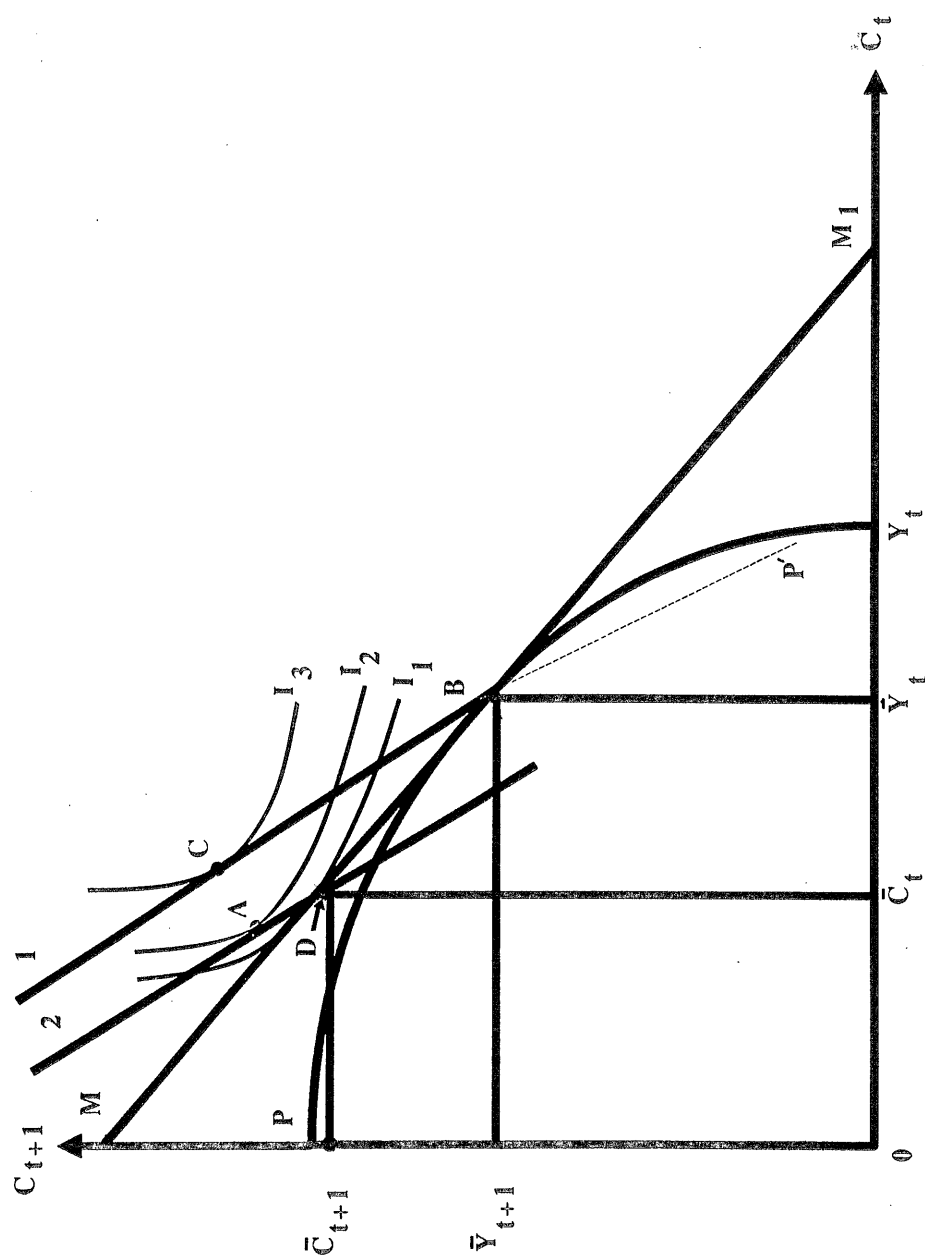


Fig. 5.5 No restriction lender. The case for an increase in interest rate after the production decision has been made.

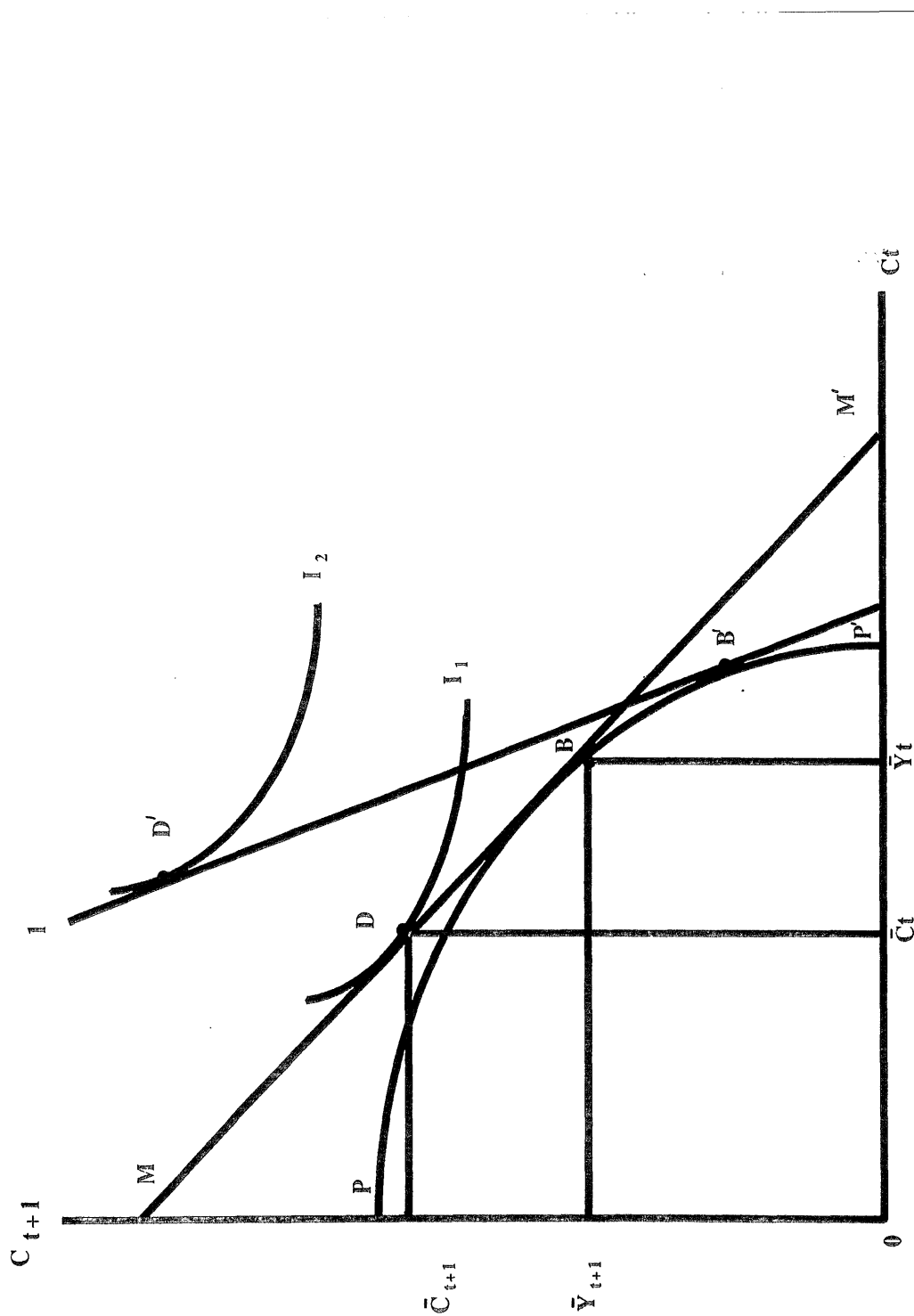


Fig.5.6. No Restriction Lender (II)

Let me elaborate the assertions made in the earlier paragraph. In the first situation the interest rate is assumed to have increased after the production, i.e. real investment decision has been made at point B in figure 5.4 above. In that case, the new equilibrium would move away from point D, but whether that would entail an increase or decrease of investment in financial capital (i.e. holding of money in the form of deposits with a bank) from $\bar{C}_t \bar{Y}_t$ in figure 5.4 would depend on the relative strengths of the income and substitution effects. This can be demonstrated in figure 5.5.

In figure 5.5, the higher interest rate indicated by the steeper slope of budget line 1 than that of budget line MM', induces the total price-effect from D to C. This can be split up into the negative substitution effect DA and the positive income-effect AC. Therefore, depending on the relative strengths of these two opposing effects, the final equilibrium at C could be to the left of or exactly above or to the right of point D, indicating higher, same or lower portfolio investment into the interest-yielding deposits.

The other case of the interest rate rising before the real-investment-production decision has been made, is presented in figure 5.6.

In figure 5.6, the optimal production-real-investment decision has been switched to B' from B when at the higher interest rate indicated by the budget line 1, the firm-household finds itself better-off at D' than at point D for the budget line MM'. It is possible in this case for the revised decision on financial investment (i.e. bank deposits) to be more, the same or even less than $\bar{C}_t \bar{Y}_t$, the earlier decision on it.

But there is an unambiguous comparative-static result here, and that is the reduction in the investment in physical capital. Physical capital is thus a substitute to financial asset (or money here) in the

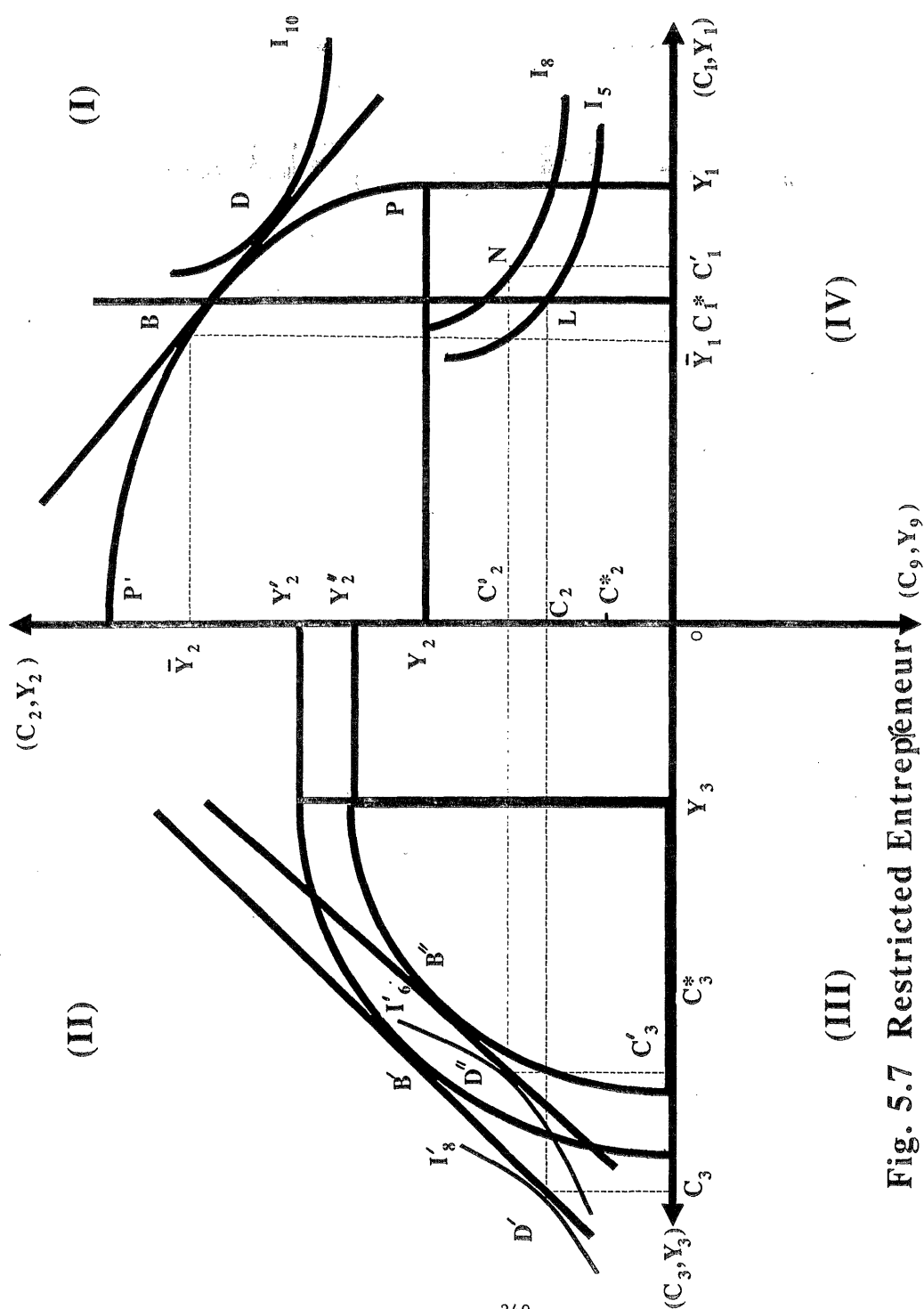


Fig. 5.7 Restricted Entrepreneur (C_9, Y_9)

sense that an increase in the rate of return on money leads to a decrease in the rate of "real" investment.

Let us now change some of the assumptions of this "developed" state of affairs and make them more relevant to (say) a firm-household in Katsina, for example.

First we assume that the initial endowment of the entrepreneur is rather low compared to his minimum consumption need and his average propensity to consume is closer to unity than, to half (say), in period one. He is also restricted to self-finance for whatever reasons, and faces discrete investment opportunities. His savings are kept in the form of interest-yielding bank deposits, which we shall call money here. We further assume that the individual maximises the following utility function:

$$U = U(C_1, C_2, C_3, \dots, T) \text{ which can be decomposed} \\ \text{as equal to } U_1(C_1, C_2) + U_2(C_2, C_3) + \dots + U_{T-1}(C_{T-1}, C_T) \quad (5.5)$$

where T is his planning horizon.

In figure 5.7 below we assume $T = 3$.

If there was none of the above restrictions imposed on our entrepreneur, he could be at point D in figure 5.7, starting with his initial endowment of (Y_1, Y_2) , borrowing, and also investing $Y_1 \bar{Y}_1$ on physical capital. But our restricted entrepreneur (i) cannot borrow and (ii) cannot invest in physical capital. He cannot borrow because of the financial constraint on him and he cannot invest in physical capital because:

- (a) his high minimum consumption in period 1, i.e. C_1^* leaves him with a fund of $C_1^* Y_1$ to invest which is too small for the minimum fund needed (i.e. $Y_1 \bar{Y}_1$) to operate on the PP' production opportunity curve. The restrictions (a) and (b) would jointly describe McKinnon's conditions of "lumpiness" of investment.

We now search for a static equilibrium position for our restricted entrepreneur of fig. 5.7 above. If we let him consume only C_1^* - the minimum acceptable for period 1, he would have $Y_1 C_1^*$ available for physical and/or financial investment in period 1. But his utility function and the market interest rates are such that he would rather be a borrower than a lender. But he is not considered viable or solvent enough to borrow. He cannot invest $Y_1 C_1^*$ in physical capital either because the minimum size of investment opportunity requires a funding of $Y_1 \bar{Y}_1$ which is greater than $Y_1 C_1^*$. Therefore, if we were to fix his first period consumption C_1^* , to its minimum acceptable level (which it need not be necessarily), he would 'save' $C_1^* Y_1$ in the form of interest-yielding deposit with a bank. Let this become $Y_2 Y_2'$ by the end of the period 1 or at the beginning of period 2. In other words, $C_1^* Y_1 [1 + (d - P^*)]^i = Y_2 Y_2'$, where i is the number of years. In figure 5.7 we assume, $i = 1$.

Let us now move on to the next sequence and quadrant II. The initial endowment of OY_2 in the beginning of period 2, gives our entrepreneur $OY_2' = OY_2 + Y_2 Y_2'$ to allocate between consumption in period 2, i.e. C_2 and physical and financial investment during this period. He still cannot borrow, and let us assume that he does not want to borrow, i.e. he is at point D', consuming $C_2 > C_2^*$ and $C_3 > C_3^*$. His optimum production-investment position is given by point B. If in period 2, this $C_2 < C_2^*$ or if the accumulating physical investment demand for money is less than the minimum needed for the venture in sight, the process will continue to quadrant (III). But in this particular example we assumed $U = (C_1, C_2, C_3) = U_1(C_1, C_2) + U_2(C_2, C_3)$ where a period need not necessarily be as short as one year. To solve the problem within period 3, let us assume that the value of the physical capital needed is less than the (accumulated) investment demand for money. The choice at point D' in quadrant (II) implies the consumer deciding on (C_2, C_3)

for the choice problem in period 2 & 3. This also determines the corresponding consumption point in period (1,2), i.e. for quadrant I. Since we assumed C_1^* to be the actual consumption in period 1, C_2 determines, where on the vertical C_1^* - line the consumer will be (point L) and also the corresponding utility level given by I_5 .

But L in quadrant (I) and D' in (II) is only a hypothetical solution. If the entrepreneur were to consume more than the minimum C_1^* indicated by (say) the biological and/or social norm, that would leave him with less for physical investment demand for money. If, in the next period, that comes out to be (with the accumulated interest) enough for the (physical) investment in prospect, the solution will be D'' in quadrant (II) and N in (I). There is nothing here to choose between D' & L and D' & N or between I_5' & I_5 and I_6' & I_6 .

Now, at a higher interest rate under the present paradigm with all the restrictive assumptions, the entrepreneur would have greater savings and be confronted with a pair of higher indifference curves (i.e. higher than I_5' and I_6' in similar circumstances, in quadrant II). But that does not vindicate the complementarity hypothesis; all it means that at higher interest rate, the accumulated value of savings would be higher - which is a truism.

But what may not be a tautology is the case of a lower interest rate. At a lower enough interest rate than the one used in figure 5.7, it is possible to visualize a situation when the accumulated savings would not be sufficient for the investment venture in sight to be financed in period 2 and our restricted entrepreneur may, in that case, have to wait yet another period with his savings enhanced by the next round. In this case, under McKinnon's binding restrictions for LDCs, a lower interest rate leads to a higher saving and a higher investment demand for money. Thus a fall in the real return on money leads to a rise in savings and therefore, to investment. This is exactly what is

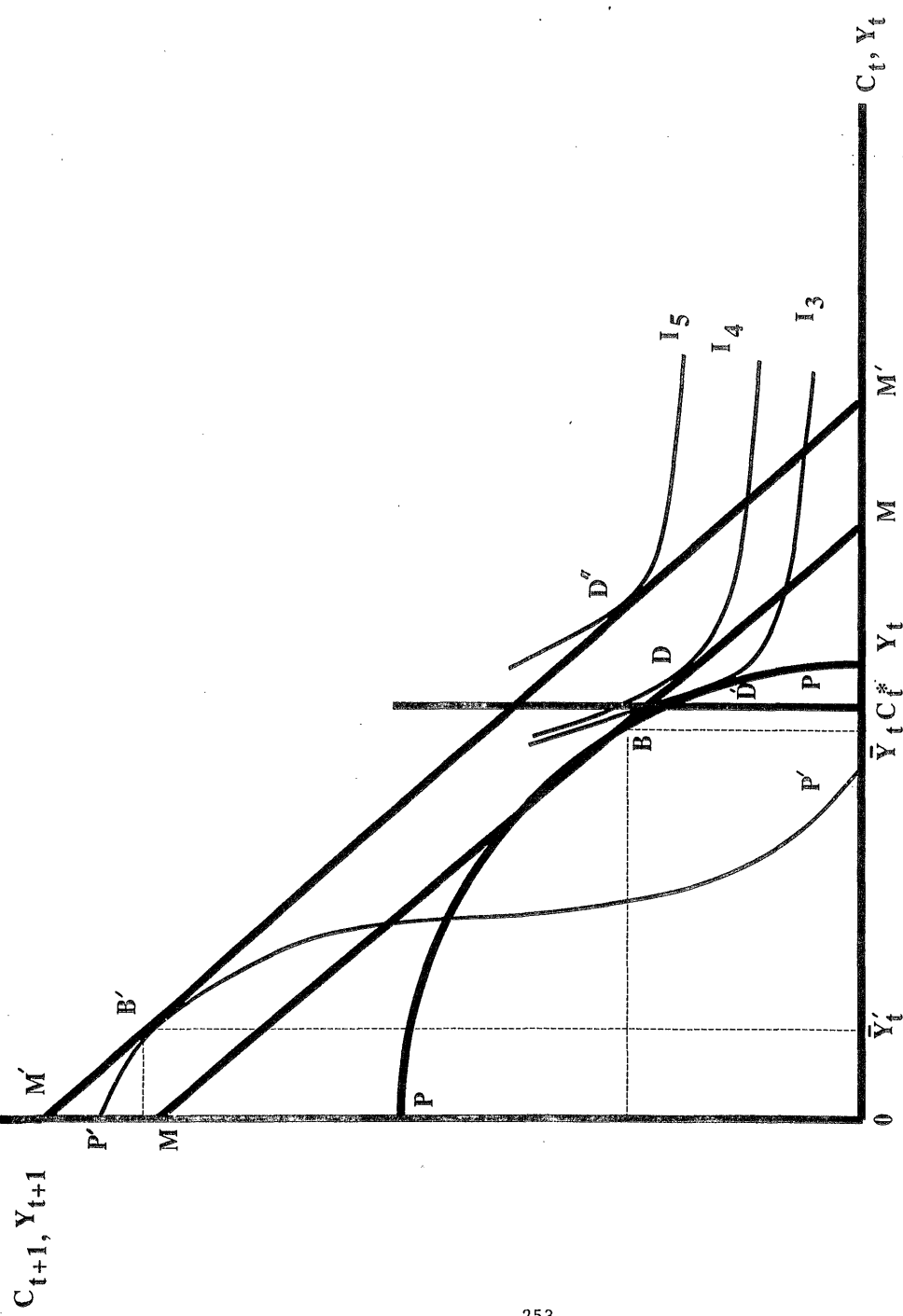


Fig. 5.8 Restricted Entrepreneur: Shift in the Production Opportunity Curve

prescribed by equation (5.3) above and is, therefore, a testable hypothesis.

Let us look at the question of complementarity from a different point of view.

In figure 5.8 we try to bring in all the specifications of the McKinnon hypothesis and see in what sense money could be regarded as a complement to physical assets. The individual saver-investor starts with initial income (endowment) of Y_t only (for simplicity we assume zero endowment for period $t+1$). The production opportunity curve PP is tangential to the market opportunity curve MM at B, indicating $Y_t \bar{Y}_t$ to be the optimal investment for production in period t . But this is not possible, because of the minimum consumption requirement of C_t^* , which leaves the individual with too little fund to invest in physical capital for production. If the individual is at point D for optimal consumption, that will leave him with still less fund for investment. Because of the limitation of self-finance and high average propensity to consume, $Y_t C_t^*$ is kept in the form of interest-bearing deposit, which we call money, and as it turns out, it can also be described as the investment (production) demand for money here." The desired rate of capital accumulation (and hence private saving)" (McKinnon op.cit. p.57) is here $Y_t \bar{Y}_t / oY_t$, but the actual rate is only $\frac{C_t^* Y_t}{oY_t}$ (say). If there is now the possibility to moving on to the new advanced technology given by the production opportunity curve, P'P' [exhibiting the same type of discontinuity as in McKinnon's case, (figure 2.1, p.20)], the desired rate of capital accumulation increases to $\frac{\bar{Y}_t' Y_t}{o Y_t}$

But there cannot be an appropriate increase in the investment (production) demand for money in period t . The increase in this demand can only occur over time, i.e. the individual will now need a long period to accumulate the large savings needed out of his incomes to

finance the investment-venture. Thus, the equation (5.1) above,

$$\left(\frac{M}{P}\right)_d = L \left(Y, \frac{I}{Y}, d - \dot{P}^* \right)$$

where $L_1 > 0$, $L_2 > 0$ and $L_3 > 0$

can be interpreted only as a sum of a few periods of accumulation, rather than the observation on a certain single period. Again, the equation (5.2) above,

$$\left(\frac{M}{P}\right)_d = L \left(Y, \bar{r}, d - \dot{P}^* \right)$$

where $L_2 > 0$

is also depicted in figure 5.8, where the higher investment demand is due to an increase in the average return on physical capital; but in equilibrium it has to equate with the slope of the market opportunity curve $M'M'$. Since, McKinnon insists that his complementarity relation is one of equilibrium [i.e. unlike the Keynesian case of disequilibrium (Keynes, op.cit.)], the relation will hold only when we sum up the investment money holdings of the succeeding periods until it is large enough to self-finance a project involving $Y_t \bar{Y}'_t$ in figure 5.8 above.

Now this is for an individual saver-investor. When we add up all individuals in an LDC for a given period of time (say one year), the positive covariation between return on physical capital and the holding of investment money, indicating complementarity may be observed at the aggregate, macro level, if such observations are to be assumed to indicate equilibrium values.

Let us now look at the various possibilities on the basis of our analysis so far. At any point of time there may be various types of production opportunity curves depending on the primitive, intermediate or advanced technology of the period. The "best" or highest production opportunity curve may not be feasible with the existing financial structure. Or to put it in a different way, the financial innovation

needed (e.g. higher interest-rate structure, more use of cheques in trade and transactions, greater banking habits, etc) to cope with the technological innovation in production, may be enormous.

Therefore, given the financial structure in a LDC at a point of time, the production opportunity curve,

- (i) may not be shiftable;
- (ii) may be shiftable somewhat;
- (iii) may be enormously shiftable.

Complementarity is possible in all these three cases.

The merit of McKinnon relation is that it asserts money and physical capital to be complements for certain LDCs and hence it is a testable hypothesis, rather than a truism combining all three possibilities above.

Chapter 6 Money in Aggregate Production Function

A. Introduction

In the last chapter I investigated the microeconomic basis of complementarity of real balances with the physical capital at an atomistic, microeconomic level. In this chapter, I would apply the concept at the aggregate, macro level and test it under some restrictive assumptions. The assumptions, to be presented later, arise from the nature of our time period through which the Nigerian economy had been evolving since the independence and also from the difficulty in collecting certain macroeconomic data. Since the hypothesis I will be testing is contrary to the conventional view on the subject in neo-classical growth models, I will have a look into it in the next section to contrast it with the theory here.

The microeconomic basis for formulating the private and social productivity of money has been worked out in several articles¹ published in the early 1970's. From the middle 1960's, economists were looking for the price or value theory basis of money. They involved questions like : Why money, not barter? With perfect certainty, information a

¹ An unbiased sample of the authors in this field could be listed below while some other relevant works are to be referred to as we come along to such points.

(i) J. Benassy, "Disequilibrium Exchange in Barter and Monetary Economics", CEPREMAP, Discussion Paper, 1974

(ii) K. Brunner and A.H. Meltzer, "The Uses of Money : Money in the Theory of an Exchange Economy", American Economic Review 1971, Vol.61, pp.784-805.

(iii) J. Niehans, "Money and Barter in General Equilibrium with Transactions Costs", A.E.R., 1971, Vol.61, pp.773-783.

(iv) R.M. Starr, "The Structure of Exchange in Barter and Monetary Economics", Quarterly Journal of Economics, 1971, Vol.86, pp.290-302.

(v) J.M. Ostroy, "The Information Efficiency of Monetary Exchange", A.E.R., 1973, Vol.63, pp.597-610.

free good, and transactions costs assumed to be negligible, the explanation of the use of money relies on the adjustments needed for the uneven timing of the flows of receipts and payments. But this explanation uses an effect of the existence of money as the cause for creating it. Karl Brunner and Allan Meltzer (op.cit. 1971), among others, have shown, with the help of some nice, neat theorems, "that it is the uneven distribution of information that induces individuals to search for and social groups to accept alternatives to barter". Others like Niehans, Starr, Ostroy and Benassy (op.cit.) answered the challenge of integrating money and value theory. In the next section, I follow the models of J. Tobin² and D. Levhari and Don Patinkin³ for a brief outline of the role of money in a simple growth model. Next, I contrast the hypothesis of McKinnon (op.cit.), as spelt out earlier, and move on to the empirical testing of the theory against available Nigerian data.

B. Money as a Substitute Asset

In a simple barter type growth model of R.M. Solow,⁴ let us have an aggregate production function with constant returns to scale : $Y = F(K,L)$, where Y = net aggregate output, K = total capital input and L = total labour input. In its per capita version, the aggregate production function becomes $y = f(k)$, where $y = Y/L$ and $k = K/L$ and we also assume it to be "well-behaved". Tobin, (1965 op.cit.) uses this neo-classical growth model for looking into the impact of money on

² J. Tobin, "Money and Economic Growth", Econometrica, 1965, vol.33, pp.671-684.

³ D. Levhari and D. Patinkin, "The Role of Money in a simple Growth Model", A.E.R., 1968, Vol. 58(4), pp.713-753.

⁴ R.M. Solow, "A contribution to the Theory of Economic Growth", Q.J.E., 1956, Vol.70, pp.65-94.

economic growth. But Tobin does not include real balances specifically as an argument in the aggregate production function. In his model, government emerges and spends a certain proportion of the national income "..... which (it) finances either by levying taxes or by printing money". Money is here, therefore, outside money for which there is no storage cost and the administrative cost for running the monetary system is also assumed to be negligible. In Tobin's world, real balances would affect the real disposable income (Y_d), which would determine aggregate saving (and consumption):

$$Y_d = Y + \frac{d(M/P)}{dt} = Y + \frac{M}{P} (\mu - \pi) \quad \dots \quad (6.1)$$

where Y, Y_d are real and net disposable incomes respectively;

M = nominal stock of Money Supply;

P = the general price level;

$\mu = \frac{\dot{M}}{M} = \frac{dM}{dt} / M$, the rate of change of money supply,

$\pi = \frac{\dot{P}}{P}$, the rate of change of the general price level.

Here we have two assets: (i) real capital and (ii) real balances for which, the rates of return are, respectively,

$$r \text{ (real rate of interest)} = \frac{\partial F(K, L)}{\partial K} = f'(k),$$

and $-\pi$, i.e. the rate of deflation. If both are held by the individuals because of uncertainties and if the expected values of these two rates are to be assumed to be equal to their current values, the equilibrium condition for this portfolio problem would be, $-\pi < r$. This is so, because $-\pi$, the rate of return of real balances as defined here, does not contain an important element of its attractiveness, namely, liquidity. To follow Tobin further, we assume that individuals

save s - fraction of their disposable income, and hold λ - fraction of the national income in real balances. Since, $r - (-\pi)$ is the opportunity cost of holding real balances, it would vary inversely with $r + \pi$, the nominal rate of interest. For the equilibrium growth path, according to Tobin, we have:

(A) Investment = Income - Consumption

$$\text{or, } \dot{K} = F(K, L) - (1-s)[F(K, L) + \frac{M}{P} (\mu - \pi)] \quad \dots \dots (6.2)$$

(B) Demand for Real Balances = Supply of Real Balances.

Tobin's steady-state value of capital-labour ratio (k) is given by the relation :

$$[s - (1-s)\lambda\eta] \cdot f(k) = n \cdot k \quad \dots \dots (6.3)$$

where n is the rate of growth of the labour force.

The result we get from the above model is that, compared to the barter model of Solow, Tobin's monetary model indicates a lower equilibrium value of capital intensity.

Unlike Tobin, Levhari and Patinkin (1968, op.cit.), when they treat money as a producer's good, would put it in the aggregate production function directly:

$$Y = G(K, L, \frac{M}{P}) \quad \dots \dots (6.4)$$

Since real balance, $\frac{M}{P}$, is productive like real capital, a change in it would mean a change in the disposable income (Y_d):

$$Y_d = Y + \frac{d(\frac{M}{P})}{dt} = Y + (\frac{\dot{M}}{M} - \frac{\dot{P}}{P}) \cdot \frac{M}{P},$$

which is the same as equation (6.1). Again, with s at a value which lies between 0 and 1, i.e. $0 < s < 1$, the equilibrium condition

can be written as:

$$\text{Investment} = \text{Savings}$$

This equality implies,

$$\frac{dK}{dt} = Y - C = G(K, L, \frac{M}{P}) - (1-s) \cdot Y_d \quad \dots \quad (6.5)$$

The result we get from the above model is that real balance and capital stocks are substitutes, i.e. any increase in real balances (i.e. for $\dot{M} > \dot{P}$) would lead to a fall in the real rate of investment. Again, since real balances can be produced almost without cost, the optimal quantity for it is reached when its marginal physical output is zero.

The policy implication from the above theory, would be in favour of inflation, especially for Less Developed Countries. If LDCs are to raise enough surplus for capital formation and if that is not forthcoming from inefficient tax structure or inadequate tax base, the only other internal alternative is inflation. The tax base here is the amount of real balances held and the tax rate is the rate of inflation. Again, the substitution theorem above tells us that a reduction in the rate of return for real balances would lead to a switch to the holding of real capital by the private sector. This is, surely, not costless: reduction of real balance would mean less efficient transactions activity in the economy, the limit being the return to barter. So long as this limit is not approached or nearly so, there may be some net gain in the use of inflation for development finance of the LDC's.

This view of development finance is based on the substitutability between physical capital and real balances. But if they are related otherwise, in the context of a different type of financial environment for at least some LDC's, the policy implications based on the above

theorem will not hold any more, since those theories are foreign to the environment. Ronald I. McKinnon (1973, op.cit.) proposes a new set of assumptions for LDC's with underdeveloped money and credit markets (discussed in the earlier chapter) and builds up a theory which hypothesizes complementarity between real balances and physical capital.

C. Empirical Testing

There have been many theoretical and empirical studies of the role of money in the process of economic development⁵ and many of the issues involved would be directly or indirectly related to the question of whether money is to be treated as a substitute or complement factor to physical capital. The hypothesis has now been tested in the context of many countries (M.J. Fry, 1985, op.cit.) and I attempt yet another in that line for the Nigerian economy. Like many other LDC's, a major problem here lies in the availability of data. The specific problem here is with the information on capital and labour input. As I intend to test the above hypothesis directly in terms of an aggregate production function, time series data on GDP, money, capital stock and

⁵ A sample of such studies, both in terms of research papers and text books is as follows:
(i) R.W. Goldsmith, Financial Structure and Development, 1969, Yale University Press.
(ii) I.B.R.D, Capital Market Imperfections and Economic Development, World Bank, Staff Working Paper No.338, July, 1979.
(iii) E.B. Ayal (editor), Micro Aspects of Development, 1973, Praeger.
(iv) W. Coats and D.R. Khatkhate, Money and Monetary Policy in Less Developed Countries, 1980, Pergamon Press.
M.J. Fry, Money, Interest Banking in Economic Development, 1988, John Hopkins University Press.
(vi) A.P. Thirlwall, Growth and Development, 3rd Edition, 1983, Macmillan.
(vii) S. Ghatak, Monetary Economics in Developing Countries, 1981, Macmillan.

total employment are needed. There is not much problem with the first two, whereas only gross investment data are available for capital. One can make some strong assumptions to convert the relevant information into useable data. They are: (i) if in 1960, the capital-output ratio in Nigeria was 3 to 1, for example, I can convert the real GDP figure into a supposed value for capital stock in the country for that fiscal year. It turned out to be a N51.012b at 1980 prices and provided me with a bench-mark for further calculations. (ii) Since investment figures are published in gross rather than net terms, I also used a 3% depreciation rate all through the period (1960 to 1987), to arrive at a value of capital stock for each year. This depreciation rate was likely to be varying over the three decades - for example, during the oil boom period, the "natural" wear and tear was on the high side, as one could guess from casual empiricism in observing expensive machineries lying idle in need of some repair, and eventually being dumped aside. In fact, RITES (from Indian Railways) fixed a good proportion of locomotives, out of action for months, a few weeks after their arrival on a government-to-government contract to provide technical assistance to Nigerian Railways.

But the arbitrary nature of the numbers chosen for the capital-output ratio and also for depreciation (assumed constant, rather unrealistically, right through the period), is likely to cast doubts on the suitability of such a time series and may affect the testing adversely. The alternative is to use a reliable proxy and there is none better than the data on gross total (i.e. private and public) investment, itself. In my testing below, I try both of them.

The problem with the data on total employment is more serious. It is possible to find such data in great details (for example, foreign

and local labour, as we saw in Chapter 4 above) for many industries in the manufacturing, oil and few other sectors of the economy. But, when one looks for such information for the entire economy, there are a lot of problems. To solve that, I have to make some heroic assumptions again, to make use of the relevant information that is available. The assumptions here are such as to enable me to construct an index of total labour input based on : (i) Population, (ii) Civil Service employment, (iii) Manufacturing employment, (iv) index for crude petroleum production, (v) Metal Mining employment and (vi) available figure on unemployment, (based on limited coverage of the country) which enters with a negative weight. The weights I used are arbitrary and are based on my "guestimate" as to the importance of the sector or the series, for the whole economy. For example, the 1962/63 figure turned out to be 41.295, while the corresponding figure for 1981/82 was 207, coming down to 140 in the last year of our sample period (1987/88). Even here, sometimes, all the constituent data are not available and one has to make a guess about its magnitude, interpolating or extrapolating, as the case may be. The details of these and other data are presented in the Appendix. It may be appropriate to mention here the weights used for the various sectoral values, because of the importance of the issue on the empirical investigations into the macroeconomy of Nigeria. Population, Civil Service and Manufacturing receive 25% weight each, while the oil sector and the Metal Mining sectors each get 10% weight, leaving 5% for the data on unemployment (entered, negatively). I am ready to admit that this is no substitute for the actual data on employment, if ever available (data almost always exist; it is a matter of effective demand to dig them up). But, at the same time, I am claiming it and,

therefore, using the calculated index on labour input as preferable to using any other available single sectoral data on employment or related magnitudes.

On the other variables, the total output figures are those for the GDP at constant (1980) factor cost. The data on M_1 and M_2 are usually easily available, but there is some problem here. Prior to March, 1978, the definition of money included central government deposits with the commercial banks, and since then it did not. Money stock is the crucial variable in our study here and this anomaly deserves to be rectified; and if not, the reported results may suffer because of that. But I have to take the easy way out here, note it, and do nothing, since the IMF with all the resources at its disposal leaves it as such in its International Financial Statistics.

Let me now move on to the equally important issue of the specification of the model. The hypothesis that I am going to test here, is the complementarity of money with the physical capital. Since the method I am going to follow is more direct than the implications of the hypothesis as suggested by equations (5.1) and (5.2) above, I would use a production function approach. The arguments in the production function, as originally used for the U.S. data 1929-1967, by A. Sinai and H.H. Stokes⁶, were, capital stock, labour input and real balances. The particular type of production function they used, after allowing for neutral technical progress, was of the Cobb-Douglas type. Now the problem with C-D production function is that it restricts the

⁶ A. Sinai and H.H. Stokes, "Real Money Balances : An Omitted Variable from the Production Function?", Review of Economics and Statistics, 1972, Vol.54, pp.290-296.
----- "Real Money Balances : An Omitted Variable from the Production function? - A Reply", R E Stats, 1975, Vol.57, pp.247-252.

degree of substitution to a particular value (unity) while I am testing it for another (zero). But the zero elasticity of substitution in the case of our hypotheses here is between physical capital and real balances and not between physical capital and labour. This would then allow us to use CD production function as well as any other, CES, for example. Or, to put the same point slightly differently, the generality of the CES production function may have some merits of its own compared to the CD, but for the problem at hand here, it is not so relevant. One can test for complementarity between physical capital and real balance, leaving the elasticity of substitution between labour and capital take any particular value, or even be variable, as in the VES production function. This is the theoretical justification to use the CD production function. The empirical justification is provided by the work of Kazi and Odama (op.cit., 1981) who found the CD case to be more frequent than any other type in the context of Nigerian manufacturing industries.

After the initial work of Sinai and Stokes, there were many more⁷ attempts to estimate the same relationships with more refinements added in. One such refinement, which I would incorporate is by Ben-Zion and

⁷ U. Ben-Zion and V.W. Rattan, "Money in the Production function : An Interpretation of Empirical Results", R E Stats, 1975, Vol.57, pp.246-247.
M.S. Khan and P.J. Kouri, "Real Money Balances as a Factor of Production : A Comment", R E Stats, 1975, Vol.57, pp.244-246.
W.J. Boyes and D.C. Kavanaugh, "Money and the Production Function : A test of Specification Errors", R E Stats, 1979, Vol.61, pp.442-446.
G. Subrahmanym, "Real Money Balances as a Factor of Productin: Some New Evidence", R E Stats, 1980, Vol.60, pp.280-283.
H.U. Nguyen, "Money in the aggregate production function : re-examination and further evidence", Journal of Money Credit and Banking, 1986, Vol.18, pp.141-151.
P.S. Sephton, "Money in the Production Function revisited", Applied Economics, 1988, Vol.20, pp.853-860.

Rattan (op.cit.). To quote them:

"The theory of induced innovations, suggests that market conditions affect the demand for innovation and the realized technical change. Since money may be regarded as a proxy for short-run fluctuations in the aggregate demand, this theory suggests that money affects output and technological changes as a demand factor rather than as a factor of production". (ibid. p.246).

I would not go as far as that, but take their point on money and induced technological change. I would follow H.V. Nguyen (ibid. p.147) in splitting up the parameter for technological change between induced and autonomous parts and keep the rate of change of money as the proxy for causing induced technological change and also keep the level of real money as a separate item in the aggregate production function.

Let me now go back to the Nigerian scene and see what special adjustments one needs to the testing procedure. In chapter 3, I noted three different time periods in the recent past where structural changes may be assumed to have occurred in the economy. If that is so, the testing can be conducted on the three different parts in our sample period : (i) Pre-oil (1960-1969), (ii) Oil boom (1970-1980) and (iii) Depression (1981-1987). But the problem here lies on the number of observations. The data being annual, we will not have much degrees of freedom in testing the hypothesis in different formats involving a number of independent variables. The way out is to use dummy variables, which could also test the structural change as a hypothesis, rather than asserting it in the assumptions of the method just described.

Of course, one can conduct a Chow test to check if the structure of the economy has been changing over the three periods, in terms of

the stability of the relevant parameters or coefficients. But, here again, the degrees of freedom in the smaller truncated cases would pose a problem. However, suitable specification of the dummy variable⁸ can test if the supposed change in structure affected the intercepts and/or the slopes of the relevant relationships. I will describe it in greater details when I come a little closer to applying it.

Let me present the particular equation and propose how the hypothesis for complementarity is going to be tested. The aggregate production function can be presented as follows:

$$Q = A e^{\lambda t} L^{\alpha} K^{\beta} m^{\gamma} u \quad \dots \dots \dots (6.6)$$

- where Q = real output
- L = labour input
- K = capital input
- m = real balance input
- t = time
- α, β, γ are the corresponding elasticities
- λ = rate of neutral technical progress
- and u = error term.

Equation (6.6) can first be estimated in full, in the log-linear form. The resulting elasticities can then be compared with another version of equation (6.6), without real balance in it. The elasticity for physical capital, if it remains the same in the two cases, would then indicate complementarity between real balance and physical capital. This would enable me to test the hypothesis directly.

⁸ Strictly speaking, since all the reported D-W tables are restricted to six explanatory variables including the constant term, I can only claim this for the three smaller models. But a casual look at the D-W table would convince anyone of the d_L , d_u values change slowly as one moves horizontally across the table, with higher numbers of explanatory variables.

Let me now introduce the refinements indicated earlier. First is the case of technological change. Following Ben-Zion and Ruttan (1975) and Nguyen (1986) I rewrite equation (6.6) as follows

$$Q = A L^{\alpha} K^{\beta} m^{\gamma} e^{\lambda t} u' \quad \dots \quad (6.7)$$

where $\lambda = \delta + \pi \cdot \left(\frac{\Delta m}{m}\right)$

The technological change is now split up into two parts : (a) autonomous technological change, δ and (ii) induced technological change, $\pi \cdot \frac{\Delta m}{m}$. These changes can both be considered simultaneously or separately for one or the other.

Next, let me address the question of structural change, as already indicated above. The three civil-war years are rather straight forward. I can always use a dummy variable to take account of the war-time disturbances and, more specifically, of the exclusion of the eastern states in the data collection process during that time. This would imply the relevant regression 'intercepts' to have shifted for those years. But a structural change may also affect the 'slopes', or the nature of response of the dependent variable due to changes in the independent variables. Let us follow Gujarati (1982) in illustrating the points. But I use this example of a multiple regression, rather than the restricted case of one independent (i.e. other than the intercept term) variable, as used in the textbook (Gujarati, 1982, op.cit. pp.295-298).

There are four possibilities in the event of a supposed structural change : (i) no change in intercept or the slopes, (ii) change in intercept alone, (iii) changes in the slopes, alone and (iv) changes both in the intercept and in the slopes. Let me take the last possibility and assume that there has been only one set of structural

changes in the economy. For example, in our case, I can draw the line just after the civil war in 1969/70 and presume that to be the pre-oil period of the Nigerian economy, i.e. between 1960/61 to 1969/70 within our sample period and the time after that as the post-oil period. If this structural change has to be accounted for in the empirical testing under the fourth possibility above, remembering that I do not have enough observations, for at least the first era, to estimate different sets of regression equations like, for example, the U.S. case, I have to estimate a regression equation as follows:

$$Y_i = \alpha_0 + \alpha_1 D_i + \beta_1 X_{1i} + \beta_2 (D_i X_{1i}) + \gamma_1 X_{2i} + \gamma_2 (D_i X_{2i}) + \delta_1 X_{3i} + \delta_2 (D_i X_{3i}) + U_i \quad \dots \dots \dots (6.8)$$

where, Y_i = annual real GDP ;

X_{1i} = Capital stock at the middle of the same year ;

X_{2i} = Average employment for the year ;

X_{3i} = Average value of the real money stock (narrow or broad) for the year;

and u_i is the error term.

$D_i = 1$ when the year is in post-oil era,

$= 0$ otherwise (i.e. the year is in the pre-oil era)

This implies, with the usual assumption of $E(u_i) = 0$,

$$E(Y_i/D_i = 0, X_{ji}) = \alpha_0 + \beta_1 X_{1i} + \gamma_1 X_{2i} + \delta_1 X_{3i} \quad \dots \dots (6.9)$$

$$E(Y_i/D_i = 1, X_{ji}) = (\alpha_0 + \alpha_1) + (\beta_1 + \beta_2) X_{1i} + (\gamma_1 + \gamma_2) X_{2i} + (\delta_1 + \delta_2) X_{3i} \quad \dots \dots (6.10)$$

In this model, "..... α_1 is the differential intercept, and β_2 (γ_2 and δ_2

here as well) is the DIFFERENTIAL SLOPE COEFFICIENT(s)....." (Gujarati, 1982, p.297). ".....(T)he introduction of the dummy variable D in the MULTIPLICATIVE form enables us to differentiate between slope coefficients of the two groups, just as the introduction of the dummy variable in the ADDITIVE FORM enabled us to distinguish between the intercepts of the two groups" (Gujarati, ibid, p.297).

This procedure will enable us to test for the hypothesis of a structural change in terms of the intercept (statistical significance of $\hat{\alpha}_1$) and/or of the slopes (significance of $\hat{\beta}_2, \hat{\gamma}_2$ and $\hat{\delta}_2$)

It is now possible to combine all the different aspects of the proposed testing in one set of results. To recapitulate, the main interest of the experiment is to decipher the possible existence of complementarity between real balance and physical capital. In that endeavour, I cannot ignore the strong possibility of a structural change, the economy might have been undergoing. At the same time, the growth of output is also due to technological changes in addition to the contributions from the three factors: capital, labour and real balance. In all the results that I report in the following tables, these three themes are to be discussed in details. The progress of my reporting the results would follow the method of positive economics. I will move on to various types of testing on the basis of the knowledge from the earlier round. For example, if some results indicate negative productivity of a factor of production, at this aggregate or macro level, I can safely say that it is likely to be wrong. This could be due to the way the particular data have been defined, rather than that factor having reached a level where its marginal product is negative.

Such is the case with capital measured on the basis of a constant

rate of depreciation and an initial capital-output ratio (described earlier). In all the versions of the tests (i.e. different types of technological change and/or different treatments for structural changes) this measure of capital stock has always been indicating negative output elasticity (significantly), which could not possibly be right. So I use a different measure for capital, i.e. gross investment itself. In terms of the above equations (6.6) or (6.7), I have to replace the argument of $\log K$, by $\log \left(\frac{dK}{dt} \right)$ which is $\log I$. This transformation, or the use of gross investment as a proxy for capital stock, data for which are not easily available, indicates some sensible results which are not obviously wrong as the results from the 'manufactured' capital stock time series, would indicate.

Let me now present the first set of results in Tables 6.1 and 6.2, where I assume no autonomous or induced technological change, but two sets of structural changes. Therefore, I divide the whole time into three sub-periods, as already indicated, into : (i) pre-oil (1961-1969); (ii) oil boom (1970-1980) and (iii) depression (1981-1987) and make allowance for change only in the intercept and not in the slopes. Since there are three different types of structures, I need only two dummy variables on this count and I also use a civil-war dummy for the fiscal years starting on 1967, 1968 and 1969. To spell it out : for the first structural dummy, I have observations of ones for the years 1970 to 1980, zeroes elsewhere and for the second structural dummy, I have ones for the years 1981 to 1987 and zeroes elsewhere. Such points may not be totally trivial to note, since the way one puts the 1's and 0's would determine which way the intercept is expected to shift in a particular period and also from what base. For the third (civil war) dummy, I use 1's for the three affected years, and 0's elsewhere.

Table 6.1 Aggregate Production Function With and Without Narrow Money,
Model I.

$$\log Q = \log A + \alpha \log L + \beta \log K + \gamma \log m_1 + \delta_1 D_1 + \delta_2 D_2 + \delta_3 D_3 + U'$$

	With Money	Without Money
$\log A$	6.8593 (13.46)	7.3625 (26.93)
α	0.1202 (0.76)	0.2720 (3.03)
β	0.2140 (3.72)	0.1897 (3.50)
γ	0.1169 (1.17)	-
δ_1	0.2737 (4.48)	0.2699 (4.38)
δ_2	0.2322 (2.29)	0.2186 (2.16)
δ_3	-0.0618 (1.33)	-0.0769 (1.70)
R^2	.98	.9787
S.E.E.	.06	.06
D.W.	2.4995	2.6623

Numbers in parentheses are the corresponding t-values.

Table 6.2 Aggregate Production Function with and without Broad Money,
Model I.

$$\log Q = \log A + \alpha \log L + \beta \log K + \gamma \log m_2 + \delta_1 D_1 + \delta_2 D_2 + \delta_3 D_3 + U'$$

	With money	Without money
$\log A$	6.637 (12.02)	7.3625 (26.93)
α	0.0812 (0.53)	0.272 (3.03)
β	0.2293 (3.90)	0.1897 (3.51)
γ	0.1435 (1.50)	-
δ_1	0.2491 (4.06)	0.2699 (4.38)
δ_2	0.2014 (2.03)	0.2186 (2.16)
δ_3	-0.0694 (1.57)	-0.0769 (1.7)
R^2	.9808	.9787
S.E.E.	.06	.06
D.W.	2.4685	2.6623

Numbers in parentheses are the corresponding t-values.

To conduct the 'complementarity' test the production function in equation 6.1 has been estimated (without the trend variable) with and without real balance in it. The expectation is that it would keep the output elasticity of physical (or real) capital same on both the cases, if the hypothesis of real balance and real capital being complement assets is to be consistent with the evidence.

Let me now examine the parameters in Tables 6.1 and 6.2. For the narrow money (m_1) case in Table 6.1 all the four models indicate lack of positive autocorrelation at 5% level of significance, and they have reasonably high R^2 - values. The first point to note, to check the complementarity hypothesis, is the value of $\hat{\beta}$ in the first two columns. They are reasonably close to 0.2, let us say and both of them are significantly different from zero. But we do need a criterion or a statistic to test if the difference is significant or not. For that purpose, one may use a t-statistic to check⁹ if the sample means for

⁹ P.G. Hoel, Introduction to Mathematical Statistics, Third Edition, 1964, John Wiley, pp.276-279.

For testing the difference between two means, one can use the t-test,

$$\text{where, } t = \frac{(\bar{X} - \bar{Y}) - (\mu_X - \mu_Y)}{\sqrt{\frac{n_X s_X^2 + n_Y s_Y^2}{n_X + n_Y}}} \sqrt{\frac{n_X n_Y (n_X + n_Y - 2)}{n_X + n_Y}}$$

has a Student's t distribution

with $\nu = n_X + n_Y - 2$ degrees of freedom.

In this case $\bar{\beta}_X = 0.214$; $n_X = 27$; $s_X^2 = 0.0033$

and $\bar{\beta}_Y = 0.1897$; $n_Y = 27$; $s_Y^2 = 0.0029$

with appropriate change in the notations.

(Footnote 9 continued)

$$\begin{aligned}\therefore t &= \frac{.214 - .1897}{\sqrt{.0891 + .0783}} \sqrt{\frac{27.27 (27+27 - 2)}{27+27}} \\ &= \frac{.0243}{.4091} \cdot 26.5 = 1.574\end{aligned}$$

For 20 degrees of freedom, $t_{.025} = 2.086$

\therefore Null hypothesis, $\mu_x = \mu_y$
is accepted, implying in this case,
the value of β_y without money is
equal to β_x with money.

the corresponding β - values, are significantly different. Therefore, the null-hypothesis here is $\hat{\beta}_1 = \hat{\beta}_2$, against the alternative hypothesis $\hat{\beta}_1 \neq \hat{\beta}_2$. Since the alternative hypothesis is one of inequality, I conduct a two-tail test, and from the corresponding value in the t-table, I can say that the null-hypothesis is accepted, i.e. $\hat{\beta}_1$ and $\hat{\beta}_2$ are not significantly different from each other at 5% level. This could, however, bring in the question of specification bias.

Specification bias or specification error is the obvious problem to encounter when I propose to test the 'complementarity' hypothesis in the above method. To quote Gujarati (ibid. p.327) again,

"..... if a regression model omits a variable(s) from the model incorrectly, then the coefficients of the variables included in the model are likely to be biased if the omitted variable(s) is correlated with the variables included in the model."

This could show up in the autocorrelation magnitude of the model where a variable has been excluded from it. If such exclusion is false the effect of its omission would be reflected in the error term, which would no longer have its assumption of unbiasedness justified. Thus, to examine if the case in point here suffers from such a problem, I may look at the appropriate values. First, the correlation coefficient between the proxy for physical capital used here (gross investment) and the narrow definition of real balance (m_1) turns out to be +0.5451. The corresponding figure for m_2 , is + 0.5035. These values of R, which are just above 0.5, could be taken as some evidence against the possibility of making specification error. The other evidence lies in

regression equation in Table 6.1; D-W statistic is at 2.6623, which is above the upper limit for the evidence of positive autocorrelation (1.86). On both these counts, therefore, one may claim to have some evidence against specification bias, when real balance (m_1) is excluded from the regression equation in Table 6.1)

Next, I look into the question of structural change. To present the hypothesis, I artificially fix all the other explanatory variables at zero, and plot $\log Q$ against $\log L$. The graph can be presented in figure 6.1. As the parameters in Table 6.1 and the diagram, fig.6.1 suggest, the oil boom period did cause an upward shift in the structure of the Nigerian economy, so far that structure can be described by the broad macroeconomic relation of an aggregate production function. The model also captures the downward shift of the same relation from the height of the oil boom era to recession and depression, when the economy had to adjust to the unfavourable changes in the productions and prices in the petroleum sector.

Let me now look into the same parameters in Table 6.2, where the only difference occurs in the definition of real balance : in this case I use the broader definition of money. Here money includes savings and time deposits with the commercial banks, and therefore, is basically of different nature of asset from money, defined narrowly earlier. This difference is of particular importance to the hypothesis at hand, because it may add to the 'competitive' effect of money, rather than the 'conduit' effect (analysed in Chapter 5, above), since extra elements in the return of this asset in the form of interest rates to be earned would now add to the mere liquidity element of return, when the narrower version of money is in use.

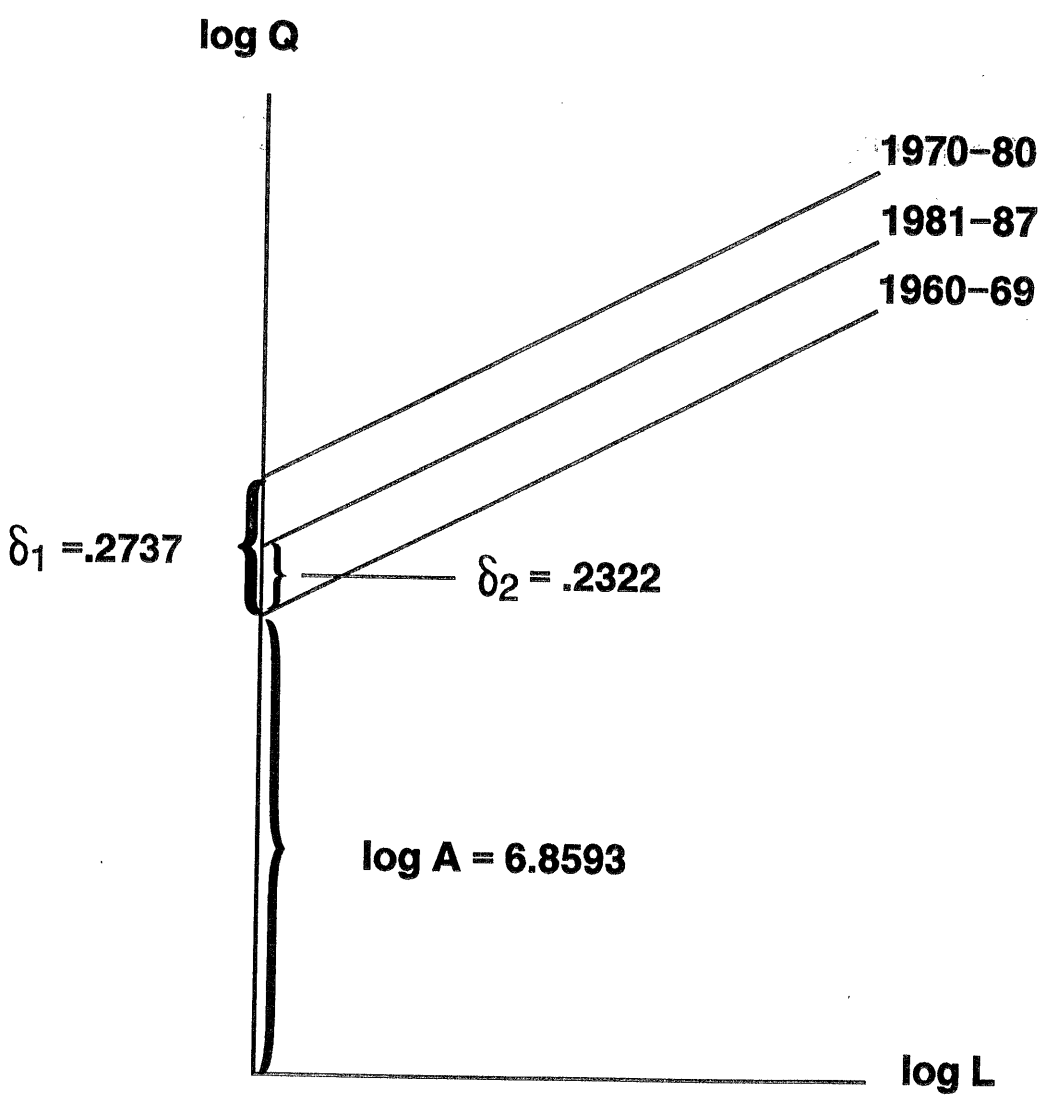


Fig. 6.1 Structural Change

For this model, the real balance elasticity of output would change in the same experiment, to 0.2293 from 0.1897. If I now do the same test to see if the two estimated parameters are significantly different or not, I come to the opposite conclusion.¹⁰ If this conclusion is accepted, the implication here is quite interesting. When money is defined broadly, it turns out not to be a complement of physical capital. But when money is defined narrowly, it is. The explanation of this phenomenon has already been given above. Since broad money has a good deal greater return than narrow money, it may be competing with the real capital, on the margin, to be included in the non-government public's portfolio of assets. Since I am regarding narrow money plus the savings and time deposits as assets, the banking sector is also excluded here, but the rest of the economy including, the personal and the company sectors are in it. A point to note in this interpretation is the real rate of return on m_2 . A considerable part of the sample period experienced a rate of inflation which was greater than the nominal interest rates on the deposits. During such times, the narrow money would still have a lower real rate of return than the broad money, even though the latter asset would have the negative real interest rates. One possible way to maintain the earlier conclusion is to infer that people must have had some money illusion, so that, even

¹⁰ The corresponding t-value here turns up to be 2.525. If we take the conventional 5% significance level, $t = 2.086$ for a two-tail test as in footnote 9, would lead to a rejection of the hypothesis that the two parameters are equal. At 1% level, however, I can accept the hypothesis, since $\Pr(|t| > 2.845) = .005$, and the t-value here, as already indicated, is 2.525. Or, to put it differently, I am 95% sure that the population values of the two parameters are different, though I cannot be 99% sure. Let me take the conventional 95%-level here, and conclude that the two parameters are different.

Table 6.3 Aggregate Production Function With and Without Narrow Money, Model II

$\log Q = \log A + \alpha_1 D_1 + \alpha_2 \log L + \alpha_3 (D_1 \log L) + \beta_1 \log K + \beta_2 (D_1 \log K) \\ + \gamma_1 \log m_1 + \gamma_2 (D_1 \log m_1) + \delta_1 D_2 + \delta_2 t + \delta_3 \left(\frac{\Delta m_1}{m_1} \right) t + U''$								
Sub-Models	1	1'	2	2'	3	3'	4	4'
$\log A$	4.517 (3.75)	7.216 (9.3)	4.109 (3.78)	6.946 (10.63)	7.092 (11.38)	7.354 (29.24)	7.206 (10.16)	7.404 (26.97)
α_1	3.536 (2.99)	0.535 (0.65)	3.742 (3.26)	0.784 (1.09)	0.276 (4.61)	0.273 (4.67)	0.266 (3.96)	0.261 (4.09)
α_2	0.761 (1.46)	1.26 (2.13)	0.759 (1.47)	1.264 (2.17)	0.152 (0.91)	0.225 (4.68)	0.12 (0.63)	0.16 (1.11)
α_3	-0.567 (1.04)	-1.144 (1.88)	-0.511 (0.95)	-1.055 (1.8)	-	-	-	-
β_1	-0.24 (0.95)	-0.267 (0.89)	-0.203 (0.83)	-0.232 (0.8)	0.225 (6.08)	0.213 (8.16)	0.24 (4.29)	0.237 (4.42)
β_2	0.48 (1.81)	0.513 (1.63)	0.41 (1.65)	0.442 (1.51)	-	-	-	-
γ_1	0.576 (2.89)	-	0.596 (3.04)	-	0.059 (0.46)	-	0.042 (0.3)	-
γ_2	-0.65 (3.03)	-	-0.629 (2.98)	-	-	-	-	-
δ_1	-0.275 (2.63)	-0.297 (2.41)	-0.248 (2.52)	-0.273 (2.35)	-0.066 (1.41)	-0.074 (1.78)	-0.073 (1.42)	-0.08 (1.82)
δ_2	0.007 (0.82)	0.006 (0.67)	-	-	-	-	0.003 (0.37)	0.004 (0.51)
δ_3	0.006 (1.14)	0.006 (1.30)	0.005 (1.00)	0.006 (1.39)	0.005 (0.81)	0.006 (1.45)	0.005 (0.85)	0.006 (1.39)
R^2	.9899	.9838	.9895	.9834	.9803	.9801	.9805	.9804
S.E.E.	.05	.06	.05	.05	.06	.06	.06	.06
D.W.	2.902	2.658	2.883	2.73	2.538	2.581	2.501	2.51

Numbers in parentheses are the corresponding t-values

if the real rate of return of broad money was negative, they regarded it as a substitute asset to investments in the physical capital, since the nominal return was always positive, and the liquidity of m_2 added further to its attractiveness.

Let me now move on to the next set of results, reported in Tables 6.3 and 6.4. For each definition of real balance, narrow (Table 6.3) and broad (Table 6.4), I now allow for structural changes which would affect both the intercept and the slopes of the estimated regression equations. At the same time, the technological changes are to include elements of both autonomous and demand-induced changes. These extra considerations are used to check on our original hypothesis of the complementarity of money with the physical capital. Thus for each definition of real balance, I can have four pairs of sub-models : (i) wide structural changes with wide technological changes (1 and 1' in Tables 6.3 and 6.4); (ii) wide structural changes with narrow technological change (only demand-induced) - sub-models 2 and 2'; (iii) narrow structural change (affecting intercept only) with narrow technological change (demand induced only) - sub-models 3 and 3' and (iv) narrow structural change (intercept only) with narrow technological change - sub-models 4 and 4'. The rationale behind these four different combinations of the sub-models are to be found in equations 6.7 to 6.10 above. Another point to note in these sets of results is that the entire historical period here is divided into two structural phases : pre-oil and post-oil, unlike the earlier cases of Tables 6.1 and 6.2, when three such phases (pre-oil, oil-boom and depression) were allowed for, but only in the case of a restrictive structural (intercept only) change and without any technological change.

With all these reminders, I have now the chance to look at the numbers, and let me start with the complementarity hypothesis for narrow money in Table 6.3. The values for β_1 in the sub-models 1 & 1' and 2 & 2' are rather close to each other, though they have the wrong sign and, in any case, statistically insignificant. Let me therefore concentrate on the values of β_1 in 3 & 3' and 4 & 4' and also of β_2 in 1 & 1' and 2 & 2'. But before I do so, it may be noted that even though the hypothesis of structural change in the slope of capital-variable fails in this test, the net values for $(\hat{\beta}_2 - \hat{\beta}_1)$ in 1 & 1' and 2 & 2' come close to the values of $\hat{\beta}_1$ alone in 3 & 3' and 4 & 4' - as it should.

When I leave out the real balance variable in the equations 1', 2', 3' and 4', the capital elasticity of aggregate output remains practically unchanged, thus confirming our original hypothesis of complementarity between these two inputs.¹¹ If I now look for the other features of the results, one point comes out clearly for the capital and labour inputs on the structural change element of the testing. If this change was supposed to have affected the slope coefficients as well, for capital and labour it has not done so 'significantly', whereas for real balance, it has done so adversely.

¹¹

The t-values are as follows:

- (i) case 1 & 1' (β_2) ; t = 0.4164
- (ii) case 2 & 2' (β_2) ; t = 0.4224
- (iii) case 3 & 3' (β_1) ; t = 1.3391
- (iv) case 4 & 4' (β_1) ; t = 0.2237

Since all the above values are less than 2.12 (for 16f at 5% level for a 2-tail test) I can accept the null hypothesis in each case that there is no difference in the corresponding values when the real balance argument is taken off the regression equation.

There is a hint that the structural change in the post-oil period has reduced the labour elasticity of output (negative values of $\hat{\alpha}_3$ in Table 6.3), after the change due to technological improvement has been accounted for. The results for real-balance are exactly similar, though more robust (significantly negative values for $\hat{\gamma}_2$), whereas the effect on the capital elasticity is positive (values of $\hat{\beta}_2$). But all these values are not consistently significant, thus denying me the opportunity of a legitimate conclusion, except in the case of real balance. The presence of the technological change variables might have caused some of these 'insignificant' results, when the rate of change of real balance itself is present as a proxy for the demand side of the economy, inducing change in the technology. The 'intercept' effect of the structural change as captured by α_1 parameter in Table 6.3, has been significant with the right sign everywhere except in 1' and 2'. The civil-war dummy (D_2) has also been significant in most cases, and always with the expected sign. But I fail to get the same type of result as Nguyen (ibid. p.150), who concluded for the US data of his time periods:

"..... the results invalidate the idea that trend is a proxy for money; rather, they suggest the reverse, that money is a proxy for trend, especially when it is growing rapidly."

Neither does my evidence from the Nigerian data confirm "..... that the mechanism by which money enters the aggregate production function is in the contribution of its growth rate to productivity growth" (Nguyen, ibid. p.148). This I say, because $\hat{\delta}_3$ in Table 6.3 has never been significant, whether trend has been used along with it, or without. Maybe the trend is capturing the effect for money, though I have not any result supporting that either, as in the case of Sinai

and Sokes (1972). But there is very good statistical justification to keep real balance in the production function, as suggested by the estimates of γ_1 in sub-models 1 and 2.

All the above comments about Table 6.3 can be repeated for Table 6.4, qualitatively, though estimates of certain parameters and their significance levels would be different quantitatively, as one would expect. One important qualitative difference, however, is the rejection of the complementarity hypothesis in the sub-models 3 and 3' where the estimates of β_1 are significantly (5% level) different. This could be interpreted as a further evidence of broad money being a substitute for physical capital, though this conclusion is rejected for the case of sub-models 4 and 4'. The problem here may be due to the presence of the time trend in the latter case. The high correlation coefficient between the trend variable and $\log m_1$ (.9511) and $\log m_2$ (.9742) has been the source of multicollinearity in cases whenever real balance and trend have been used together in some of the models above.

Let me enlist the conclusions of the test reported in this chapter.

(i) There is evidence to suggest narrow money to be complement to physical capital.

(ii) Broad money, however, could be a substitute of physical capital.

(iii) The oil boom period (1970-80) has shifted the production function upward from the pre-oil period (1960-69), but this upward shift itself has diminished during the depression years (1981-87).

(iv) There is no definite evidence that the structural change(s) in the economy have influenced the input (labour, capital or money) elasticity of aggregate output, except in the case of real balance

Table 6.4 Aggregate Production Function With and Without Broad Money, Model II

$\log Q = \log A + \alpha_1 D_1 + \alpha_2 \log L + \alpha_3 (D_1 \log L) + \beta_1 \log K + \beta_2 (D_1 \log K) \\ + \gamma_1 \log m_2 + \gamma_2 (D_1 \log m_2) + \delta_1 D_2 + \delta_2 t + \delta_3 \left(\frac{\Delta m_2}{m_2} \right) t + U'''$								
Sub-models	1	1'	2	2'	3	3'	4	4'
$\log A$	5.513 (4.88)	7.145 (9.39)	5.089 (5.53)	6.958 (10.95)	6.978 (10.33)	7.358 (29.97)	6.935 (7.36)	7.388 (27.55)
α_1	2.761 (2.55)	0.607 (0.75)	2.824 (2.66)	0.782 (1.12)	0.267 (4.41)	0.278 (4.86)	0.268 (4.18)	0.27 (4.29)
α_2	0.875 (1.64)	1.267 (2.19)	0.865 (1.65)	1.269 (2.24)	0.122 (0.76)	0.216 (4.63)	0.126 (0.73)	0.174 (1.24)
α_3	-0.656 (1.18)	-1.13 (1.9)	-0.619 (1.14)	-1.067 (1.88)	-	-	-	-
β_1	-0.312 (1.2)	-0.261 (0.89)	-0.278 (1.11)	-0.236 (0.83)	0.238 (5.57)	0.217 (8.73)	0.235 (4.32)	0.232 (4.37)
β_2	0.54 (1.98)	0.499 (1.62)	0.48 (1.89)	0.449 (1.58)	-	-	-	-
γ_1	0.445 (2.33)	-	0.476 (2.58)	-	0.072 (0.61)	-	0.079 (0.5)	-
γ_2	-0.541 (2.6)	-	-0.508 (2.56)	-	-	-	-	-
δ_1	-0.314 (2.88)	-0.293 (2.42)	-0.288 (2.87)	-0.276 (2.44)	-0.069 (1.63)	-0.075 (1.83)	-0.068 (1.39)	-0.078 (1.81)
δ_2	0.007 (0.67)	0.004 (0.47)	-	-	-	-	-0.001 (0.07)	0.003 (0.32)
δ_3	0.008 (1.39)	0.008 (1.6)	0.007 (1.27)	0.008 (1.77)	0.006 (1.01)	0.009 (1.77)	0.006 (0.92)	0.008 (1.65)
R^2	.9893	.9845	.989	.9843	.9813	.981	.9813	.9811
S.E.E.	.05	.05	.05	.05	.06	.06	.06	.06
D.W.	2.972	2.657	2.943	2.703	2.506	2.546	2.512	2.505

Numbers in parentheses are the corresponding t-values

where post-oil structural changes might have affected this elasticity adversely. But there is a definite hint from the consistent pattern of signs, sometimes significant, that depression affected the labour elasticity also adversely, but the capital elasticity positively.

(v) There is no evidence that trend has been a proxy for money, or money a proxy for trend; neither is there any evidence for the growth rate of money contributing to the productivity growth.

Finally, in this chapter, let me indicate some limitations of the present approach and how it may be improved upon for further econometric testing. The inclusion of real balance in the aggregate production function as a separate argument contributing to national income can be based on the theoretical works (referred to earlier) on integrating money and value theory. The main reason here, to quote again, "..... is the uneven distribution of information that induces individuals to search for and social groups to accept alternatives to barter." (Brunner and Meltzer, *ibid.*, 1971) Why and how there could be a demand for money, in certain economies with underdeveloped money markets, which could respond positively to a rate of return on another factor like physical capital has been suggested by McKinnon (*op.cit.*) and spelt out in chapter five. The rate of change of money itself has again been used in the same production function as an agent for induced technological change. The idea here is to capture certain elements of the neutral technological progress which may be assumed to be endogenous or demand induced. Since income is already in our relation as the variable to be explained, we need the next best variable, i.e. money in this case, to measure the influence from demand generated innovation. The endogeneity of technological progress in a society may

be described by A.P. Thirlwall's account of Schumpeter's¹² ideas on innovation ;

"the characteristics commonly associated with business dynamism are themselves a function of business, and more particularly the form of organisation we call 'capitalism'." (Thirlwall, *ibid.*, p.126)

The simultaneity of the whole process is further emphasised by the endogeneity of money supply itself. This element of the relationships has been explored in the next chapter in a separate model on the determination of money stock. The point that is being made here for further refinement of the tests in this chapter, is the possible influence of output or income, not only on real balance, but on capital (or investment) and on total employment as well. Thus the system is basically simultaneous and the recognition of that feature in the econometric testing which has been ignored here, of the aggregate production function could make it both theoretically and empirically, more attractive.

¹² J. Schumpeter, Capitalism, Socialism and Democracy, Allen and Unwin, 1943.

Chapter 7 The Process of Money supply ¹
in Nigeria, 1971(I) to 1987(IV)

A. Introduction

The stock of money generated in an economy has important repercussions on the level of money income and inflation rate. The Nigerian experience with both these macro-economic magnitudes may be exhibiting these relationships especially after some wide fluctuations in the rate of change of the money stock. It is not the intention here, however, to study the impact of the rate of change of nominal money on changes ² in income and the price level in the post-civil war, oil boom and the subsequent era of the Nigeria economy. The subject of investigation here is the process involved in the determination of money stock during the same period and also examine how far this process can be controlled by the central authorities to steer the monetary growth towards some social goals like economic growth with tolerable inflation. The rest of this chapter is divided into four sections. The second section starts from the first principles and describes the institutional arrangements in the recent Nigerian context which develop

1. Parts of this chapter have been adapted from my earlier works on the subject:

i) "The Theory of money supply and the Nigerian Experience." The Nigerian Journal of Public Affairs. Vol 8 1978-79 pp.94-114

ii) "Money stock, Monetary base and the process of money supply in Nigeria." Discussion Paper No. 22. Department of Economics, University of Leicester, July 1981.

2. There have been a number of studies of this relation both in the context of developed and developing countries. Two such examples for the latter group can be found in;

i) S. I. Ajayi, "On the Directional Causality Between Money and Prices." NJESS, Vol 25, No. 3, November 1983 pp.319-326

into a hypothesis on the determination of money stock in the third. The fourth section takes up the empirical verification of the preceding hypothesis while in the final section I discuss some policy implication that emerge from the testing of the theory. In conclusion it is maintained that it is possible to control the money stock in Nigeria, and it need not be determined by the vagaries of foreign trade but by the requirements of federal government finance, as may be the case during the period under study. It is also revealed from the results of this empirical investigation that the relative lack of response of demand/supply of money to changes in interest rates in Nigeria makes it easier for the authorities there to control the money stock than would be the case in an economy with comparatively developed financial institutions, markets, and monetary behaviour.

B. The Institutional Arrangements

i) The Definition of Money

Money has three types of functions: (1) medium of exchange, (2) unit of account and (3) store of value. Different commodities may perform one or the other functions and in that sense may exhibit different degrees of "moneyness" in them. Notes and coins in circulation in Nigeria are most widely accepted as the medium of exchange and in the absence of hyper-inflation they are the commonest

2. cont.

ii) Subrata Ghatak and Derek Deadman, "Money, Prices and Stabilisation Policies in Some Developing Countries". Applied Economics, Vol. 21, (forthcoming, July 1989, pp. 853-865).

units of accounts and store of value. Notes and coins outside the banking system should, therefore, be regarded as more "money" than others except in the unusual circumstances of very high rate of inflation when, as the recorded history in some European countries showed, notes and coins could gradually be avoided from all the three functions.

After notes and coins in circulation, one may consider demand deposits in the commercial banks to be regarded as money. Even when cheques are not widely used in Nigeria as a medium of exchange, compared to, let us say England, the ease with which cash could be withdrawn from one's current account deposits, would indicate the inclusion of it in the definition of money. In the same vein, deposits of other kinds with the commercial banks like savings deposits and time deposits, or deposits with other financial institutions like the Post Office Savings Banks, should also be considered as likely candidates to be included in the definition of money. Another definition of money in Nigeria adds the demand deposits with the savings and the time deposits at the commercial banks to notes and coins in circulation and draws the line on deposits there. Other agencies like the World Bank ³ did at one time include only the savings deposits with the commercial banks, in their definition of money in Nigeria. Thus, the definition of money seems to be somewhat arbitrary and may vary from person to person depending on where one wants to draw the line among various types of deposits and also among various types of financial institutions.

3. World Bank Country Economic Report. Nigeria; Options for long term Development, 1974, The John Hopkins University Press, Baltimore.

But, fortunately, a consensus could have emerged in economics about the definition of money.⁴ The definition which leads to a stable demand/supply for money function should be the one to be used. Definitions, like classifications have some particular purpose to serve, and the purpose to serve in this context is the understanding or explanation of an economy in terms of its aggregate magnitudes like national income and output, general price index, employment etc. - how they are determined and what causes a rise or fall in their values. This understanding would require some stable relationships involving those macro-economic magnitudes. This could be one purpose in defining money in a particular economy. In the case of Nigeria three different definitions have so far, been used. They are as follows:

(i) M_1 = Currency outside banks and demand deposits at the commercial banks.

(ii) M_2 = M_1 + savings deposits at the commercial banks.

(iii) M_3 = M_2 + time deposits at the commercial banks.

But, in recent years, M_2 has virtually disappeared from use while M_1 and M_3 had gained currency. There is another practical problem in the handling of official statistics on M_3 in Nigeria. As already noted, prior to March 1978, the central government deposits with the commercial banks were

4. A detailed and authoritative analysis of the subject may be found in D. Laidler, "The Definition of Money, Theoretical and Empirical Problems" in Money Credit and Banking, May 1969.

included in M_3 , and since that month, it did not. This poses yet another problem for the empirical testing of certain hypotheses involving the published data on M_3 , in Nigeria.

The data on (i) currency outside banks, (ii) M_1 and M_3 over the period, 1971 (I) to 1987 (IV), are presented in the Appendix below.

ii) Commercial Banks as Financial Intermediaries

Now that we know, some deposits in the commercial banks may be regarded as part of the money stock, we need to look at the special position of these institutes among the general groups of financial intermediaries like the insurance companies, unit trusts, building societies, post office savings banks etc. All these financial institutes have something in common - all of them transfer funds from the surplus sectors of the economy, like the Personal Sector to the deficit sectors like the Industrial or the Commercial sectors. Through these different types of resource allocation, the financial firms would seek to maximise profit, at whatever end of the deposit and loans markets they may be operating in. By charging more interests on the loans and advances they supply, than the interests they pay on the deposits, the financial intermediaries would make profit. There are different types of "deposits" going into different intermediaries. Through specialization in particular types of borrowing and lending markets and also through economies of scale involved in such operations, there emerge, for example, commercial banks at the short end of the market and insurance companies, at the long end. There would be many other types of financial institutions in

a country, depending on its stage of development of the money and credit markets and all of them may be looked upon as performing different roles in the scheme of general equilibrium of money and credit markets in an economy.⁵

But such a global view of the determination of, say, Commercial Banks deposits in a country would require rather detailed information of the balance sheet, the interest rates and also of other incomes and outgoings for each financial institution. This perfectionist approach may, however, be replaced if one starts with a rather simple analysis for the determination of the commercial banks deposits and then notes the inadequacies of such an analysis and gradually improves on it. Let us look into one such explanation.

If bank A received N100 from some of its customers in demand deposits and if the required reserve ratio is 10%, then the bank can keep N10 in reserve and lend up to N90 in loans and advances. Now, this legal requirement of 10% is there to ensure that banks would have enough currency any time to meet the withdrawal need on demand. For a bank, it is profitable to invest as much fund as it can raise and any idle fund not invested in loans or advances would not earn any profit, though it may be needed to meet the withdrawal demand. This poses a danger to the depositors, specially when an adventurous bank manager may tend to keep little fund for meeting the withdrawal demand and the slightest hint of his inability to do so may start a run on the bank.

5. For a rigorous treatment of this general portfolio problem under balance sheet and liquidity reserve constraints in a partial and also in a general equilibrium context, one may consult the relevant references in Chapter 4 above: (i) Parkin, Gray and Barrett (1970); (ii) Clayton, Dodds, Ford and Ghosh (1974); Ajayi (1978).

There had been plenty of such cases in the Nigeria monetary experience, as we noted in the earlier chapters. To guard depositors against such possibilities, the banks are legally required to keep a certain percentage of deposits in cash or near-cash liquid form. But the point to note here is that, even when there is no legal requirement to keep some reserves, the banks would tend to maintain some, just to be able to run smoothly the day-to-day banking business. So, when there is a legal minimum, the banks would naturally keep reserves above that minimum so that the legal requirement may be heeded and also enough fund is kept for withdrawal demands. Such extra fund is called the excess reserves, i.e. the excess over the legal minimum.

If we now go back to our bank A, receiving N100 from some of its customers in demand deposits, and requiring to keep at least N10 on reserve, we noticed that the bank can lend or invest up to N90. This N90 may come back to the banking system as deposits again, from various sources, where bank A originally invested. Out of this new deposit of N90 now, the banking system as a whole may again lend or invest up to N81, keeping N9 this time as required reserve. We may sum this series until the deposit creation wears itself out to zero, and this sum would be N1000. Before noting the problems with this approach, it should be mentioned here that commercial bank demand deposits hold a special position among all other liabilities of all types of financial intermediaries: they can be used as medium of exchange through the use of cheques, whereas others cannot.

There are, no doubt, many problems with this analysis of commercial banks deposit creation process, even though it captures the general trend. The total sum of N1000 is the

maximum amount of deposit creation under the given circumstances. The maximum may not be reached, however, when we consider the excess liquid reserves for banks and also the possibilities of borrowers retaining some of their loans in cash and returning only a part of the loan in deposits. There is another element of deposit creation which may considerably reduce the actual amount from the maximum amount. The banks may not find, in their opinion, enough viable sources to lend or to invest, or they may find such sources abroad, but only if there is no problem with convertibility of the domestic funds into foreign financial assets. In either case, the initial deposit in the banking system of the country would not create the chain of the secondary deposits as indicated earlier. The pre-independence Nigerian experience involved both these limitations while the recent problem with the Nigerian Commercial Banking revolves round the first.

iii) The Central Bank of Nigeria

Let us now look at the other important financial institutions on the stock of money, namely the Central Bank of Nigeria. The CBN determines, along with the Treasury, or the finance department of the central (federal) government of Nigeria, what is known as the high-powered money or monetary base in the economy. The monetary base (H) is made up of the currency outside the banks (C) and the reserves (R) of the commercial banks. It may be useful at this point to introduce the concepts of the demand for (H^d) and the supply of (H^s) the monetary base. The non-bank public may be visualised as choosing between (and therefore "demanding") the various forms of their financial assets,

e.g. currency, demand deposits and time and savings deposits, at the commercial banks, deposits with the other types of financial institutions, (government) development bonds and shares of private companies. Since the first two assets satisfy similar types of need, namely high degree of liquidity, there may be a certain element of complementarity between them depending on the acceptability of cheques to settle all types of business and financial transactions.

The other part of the monetary base is made up of the vault cash of the commercial banks and their deposits with the CBN. The arguments for their demand we already looked into, in the earlier section. The supply of the high-powered money (H^*) can be said to be determined simultaneously by the Treasury and the CBN, and hence can be regarded as being totally controlled by them, jointly. Let us see how.

High-powered money in any economy can change through changes in the activities in the foreign sector and also through changes in the government budget deficit, or more particularly in the way the budget deficit is financed. Let us take up the last possibility first. There may be many different ways to finance the budget deficit. First, the federal and the state governments can spend from their current account balances with the commercial banks. This may not change total reserves, or the currency outside banks, because it changes ownership of some money from the government sector to the public or the personal sector. Second, the federal government can sell bonds or bills to the commercial banks and this move would not change the stock of high-powered money either. The banks will have to readjust their (other) asset holdings by lending less to the public so that the extra government bonds, bills or

certificates can be accommodated without disturbing their reserves balances with the CBN. Thirdly the treasury can sell development bonds to the non-bank public. This will also leave both the R and C part of the monetary base unchanged, so long as the government spends the whole sale proceeds. Once they do so, it restores the public money holding and the banks' demand for reserves. Finally, when the budget deficit is financed by the Treasury selling bonds to the CBN and/or withdrawing some funds from its deposits already with them, it is adding to the stock of high-powered money. If we regard the CBN as part of the general body of the federal government, the first of the two procedures can be described as printing money.

For the other source of changing the monetary base, let us look at the foreign-trade sector. If the nature of the balance-of-payments for a country is changing, it could affect the monetary base, though these effects can be "sterilized", and in the recent Nigerian case, permanently. When a part of the balance-of-payments surplus accrues to the private sector, it results in the commercial banks depositing foreign exchange at the CBN. This would increase the banks' reserves by the appropriate amount, and therefore, the stock of the high-powered money. When some part of the surplus accrues to the government, like in the case of Nigeria during the oil boom, it increases the foreign exchange at the CBN, and it also increases the deposits of the federal government with the CBN. When the government spends from that deposit, it increases the high-powered money. In both these cases, the impact of the balance-of-payments surplus can be sterilized. If the CBN refuses to consider some part of the foreign exchange

deposits as reserves, the commercial banks would obtain equivalent amount of domestic deposits, but they would not be regarded as reserves for the creation of further deposits. The CBN can also sell bonds to the commercial banks to absorb these resources, in which case the relevant part of the surplus may not increase the high-powered money. In the case of the federal government earning most of the surplus, as may be the recent Nigerian experience of the oil-boom era, its impact on the monetary base may be delayed by the postponement in spending from their increased deposits with the CBN by the federal authorities.

Thus, the two major sources of (supply) of high-powered money in Nigeria have been: (a) government bonds held by the CBN less the government deposits with them and (b) foreign assets of the CBN. The two uses (demand) for high-powered money are notes and coins in circulation and the reserves of the commercial banks. It follows, therefore, that a look at the CBN balance sheet, reformulated in terms of the sources and uses of the high-powered money, would indicate how this element of money stock in the country has been changing during the recent past.

Abridged balance sheets of the CBN for the
sources and uses of high-powered money (N million)

Balance sheet 1: 31st December 1975

<u>Assets</u>		<u>Liabilities</u>	
Total foreign assets	3380	Currency	1155
Government securities	313	(held by the	
Rediscounts and advances	241	public and vault	
		cash)	
Less government deposits	908		
Less net other assets		Commercial Banks'	
and liabilities	1167	deposits	704
Monetary base (sources)	<u>1859</u>	Monetary base	<u>1859</u>
		(uses)	

Balance sheet 2: 31st December 1981

<u>Assets</u>		<u>Liabilities</u>	
Total foreign assets	2441	Currency	4348
Government securities	6047	(held by the	
Rediscounts and advances	651	public and	3862
		vault cash)	486
Less government deposits	1585		
Less net other assets		Commercial Banks'	
and liabilities	2316	deposits	890
Monetary base (sources)	<u>5238</u>	Monetary base	<u>5238</u>
		(uses)	

Balance sheet 3: 31st March 1987

<u>Assets</u>		<u>Liabilities</u>	
Total foreign assets	2768	Currency	5307
Government securities	17039	(held by the	
Rediscounts and advances	1354	public and	4880
		vault cash)	427
Less government deposits	3596		
Less net other assets		Commercial Banks'	
and liabilities	11487	deposits	771
Monetary base (sources)	<u>6078</u>	Monetary base	<u>6078</u>
		(uses)	

Looking at the three balance sheets above, spread over a span of our sample period we can see how the stock of high-powered money changed by 327 per cent in a little over eleven years, representing an average monthly (simple) growth rate 2.42 per cent and the annual rate of 29%. What is rather interesting to note is the decline of the relative importance of foreign assets to act as the source of the monetary base: from nearly double the amount of the high-powered money at the end of 1975, it declined to well below half towards the beginning of 1987. The corresponding ratios for government securities varied from 17 per cent to 280 per cent. Thus, there has been a fundamental and far-reaching change in the monetary manipulation of the economy, which might have been forced upon the authorities due to the gradually worsening situations on the balance of payment. But one by-product of such events has been the final emancipation of the Nigerian "Central" banking system from the age-old, historical close connection between the availability of foreign assets reserves and the currency in circulation in the country. The monetary authorities in Nigeria have now moved a long way from the 100 per cent sterling cover for the currency in circulation, as was the case for decades since the 1920's and have finally been forced to emerge as a provider of notes and coins based mainly on domestic government assets. But the monetary base is only a base of total money supply. The money multipliers

(i.e. $m_1^* = \frac{M_1}{H}$ and $m_2^* = \frac{M_2}{H}$) have been varying over the years, during our sample period, and the data on them are presented in the Appendix.

iv) The non-bank public

The demand for notes and coins by the personal sector would determine to a large extent, the overall demand for high-powered money in an economy. The currency demand would depend on the preferred currency depositor ratio $\frac{C}{D}$. If in

Nigeria, currency is regarded as about the only medium of exchange by the majority of the public, the currency would be a big proportion of deposits. In fact, the March 1987 position of this ratio was over two-thirds of demand deposits. This ratio over the sample period, for both the narrow (demand) and broad (time and saving) definitions of deposits, is also presented in the Appendix.

C. A hypothesis on money supply in Nigeria.

The determination of real money stock in an economy can be visualised as the interaction of demand for and supply of real money.⁶ The demand for real money (m_d) is mainly determined by income (y), whereas the supply of it (m_s) may be looked upon as the result of the demand for and supply of the real monetary base (h) or high-powered money. The monetary base is made up of the currency with the non-bank public (C) and the vault cash held by the commercial banks along with their deposits with the Central Bank of Nigeria (R). The money stock, M , on the other hand, is the sum of the currency with the non-bank public (C) and the deposits (D) with the commercial banks.

6. The demand/supply analysis of money in Nigeria had been widely studied though hardly put together in a simultaneous determination of the money stock. Reference to such works are already indicated in Chapter 4 above. Another point to note here is the treatment of the price level as an exogenously determined variable.

It can be said, therefore, that the non-bank public's demand for currency and the commercial banks' demand for reserves would indicate the total demand (or the "uses") for high-powered money in the economy. In the case of the recent Nigerian experience, we assume that the non-bank public is always at equilibrium with its portfolio choice between deposits with the commercial banks (D) and notes and coins (C) held by them. The demand for reserves (R) by the commercial banks, however, would depend on the required reserve ratio, the uncertainty about the cash inflows and outflows with them and also on the rates of returns to be earned on the loans and investments made out. The rediscount rate might also affect this demand for reserves. But the existence of large amounts of excess reserves (i.e. the excess over the legal minimum) during the period under study would leave the possibility of the commercial banks borrowing at the discount window of the central bank, to be rather remote.

On the supply (or the "sources") side of the high-powered money there are many factors⁷ like the public sector deficit, operations in marketable debt by the authorities, movements in the Federal and State Government deposits with the Central Bank of Nigeria and also the external currency flows to and from the economy as we saw in the CBN balance sheets in the earlier section. In the context of the present Nigerian experience, again it is possible to emphasize some factors like the external

7. For a detailed examination of the sources side of the monetary base, in the context of the British monetary system for example, one may consult C. Goodhart, "Analysis of the Determination of the Stock of Money", in Essays in Modern Economics, ed. M. Parkin, Longman, AUTE, 1973

currency inflow due to the oil boom in preference to either the public sector deficit or the open market operations, in our analysis of the sources side of the monetary base in the economy. This supply of and demand for high-powered money would interact to determine the supply of money itself. Let us see how.

It is apparent from the commercial banks' balance sheet that their credit (cc i.e. commercial bank credits in the form of loans and investments) and reserves (r) would be equal to the deposit (d) with them, all at the constant price level. We have, therefore,

$$cc + r = d \dots\dots\dots(7.1)$$

But we already have

$$m_m = C' + d \dots\dots\dots(7.2)$$

$$\text{and } h_a = C' + r \dots\dots\dots(7.3), \text{ where } C' \text{ is } C \text{ at constant prices.}$$

By substitution,

we can now write:

$$cc = m_m - h_a \dots\dots\dots(7.4)$$

The relation between cc and d, and therefore between cc and m_m , is direct, since banks would create credit (i.e. make loans and buy securities) by increasing deposits. The relation between the equilibrium value of h (i.e. h^*) and m_m also, is one of proportionality as shown below.

In equilibrium,

$$\begin{aligned}
 h_m & \text{ (supply of high-powered money)} \\
 &= h_d \text{ (demand for high-powered money)} \\
 &= C' + r \quad \dots\dots\dots(7.4')
 \end{aligned}$$

With the help of the equations (7.2), (7.3) and (7.4') it can be shown that

$$\begin{aligned}
 h^* &= \frac{\frac{c'}{d}}{1 + \frac{c'}{d}} m_m + \frac{\frac{r}{d}}{1 + \frac{c'}{d}} m_m \\
 &= \left(\frac{\frac{c'}{d} + \frac{r}{d}}{1 + \frac{c'}{d}} \right) m_m \quad \dots\dots\dots(7.5)
 \end{aligned}$$

Equation (7.5) can be rewritten in the usual form ^a of the money multiplier as follows:

$$m_m = \frac{1 + \frac{c'}{d}}{\frac{c'}{d} + \frac{r}{d}} h^* = m h^* \quad \dots\dots\dots(7.6)$$

where m is the money multiplier.

Equations (7.5) and (7.6) indicate equilibrium between h_d and h_m . When they are not in equilibrium, say $h_d > h_m$, we have a situation of excess demand for high-powered money which would reduce money supply. In a situation of excess supply of the high-powered money (i.e. when $h_d < h_m$) money supply would rise. The adjustment process in the two cases would operate through the contraction and expansion of

8. There are various ways of hypothesising the money supply relation. For a list of some possible ways, one may consult, M. Friedman and A. J. Schwartz, A Monetary History of the United States, 1867-1960 Princeton University Press, 1963. Appendix B.

commercial bank credit, respectively, and therefore through the contraction and expansion of the commercial bank deposit. In the present Nigerian experience under study, however, the spectacular increase in money supply during the oil-boom period, has come through a different channel. The increased foreign exchange earnings of the Federal Government due to the oil revenues pushed up their deposit with the Central Bank and the CBN account on foreign assets. When these deposits were being withdrawn for all kinds of federal government expenditures, it would add to the currency in circulation and deposit with the commercial banks, and therefore, to the money stock of the country. In terms of high-powered money, we can say that the successive doses of increase in the stock of the monetary base had been creating excess supply of it, leading to the eventual increase in money supply.

In the context of the foregoing analysis let us now present a model to capture the essence of the determination of the money stock during this period in history in Nigeria. The model is made up of the following three equations:

$$m = \alpha_0 + \alpha_1 Y + \alpha_2 m_{-1} + \alpha_3 i_1 \dots\dots\dots(7.7)$$

$$m_b = \beta_0 + \beta_1 h + \beta_2 i_2 \dots\dots\dots(7.8)$$

$$h = \gamma_0 + \gamma_1 Y + \gamma_2 \left(\frac{R}{P}\right)^w \dots\dots\dots(7.9)$$

where m = stock of real balance, m_{-1} is real money stock lagged one quarter;

y = Real income;

i_1 = Interest rate on deposit;

m_s = Supply of real balance;
 h = high-powered money at constant purchasing power;
 i_2 = Interest rate on commercial bank advances;
 and $\left(\frac{R}{P}\right)^*$ = Foreign-exchange assets/reserves at the CBN at the constant purchasing power for naira.

Equation (7.7) above represents the demand for real balance, which has been thoroughly investigated in isolation to the money supply process in Nigeria.⁹ The lagged value of the dependent variable (m) appearing in the equation is open to dual interpretation of either partial adjustment to the current equilibrium value during the span of the decision period (i.e. one quarter in our model) or of adaptive expectation of the real income level from the past values of it. When I look at the result of the econometric testing of an earlier model, I take up the position that (Ghosh & Kazi, op.cit 1977) this is a case of partial adjustment rather than that of adaptive expectation.

Let me spell out the demand for money and the disequilibrium process in the following two equations:

$$m_{dt} = a_0 + a_1 Y_t + a_2 i_{1t} \dots\dots\dots (7.10)$$

$$\text{and } m_t - m_{t-1} = \alpha (m_{dt} - m_{t-1}) \dots\dots\dots (7.11)$$

9. E. Akinnifessi Olulana and T. Phillips, "The Determination and Control of the Money Stock". Economic and Financial Review, Vol.16. No. 1. Central Bank of Nigeria, June, 1978. The authors here discuss the money demand/supply process together, but the intended simultaneity of the two relations could not possibly be properly handled in their OLS model for testing. In the other example of the joint treatment in Ghosh and Kazi (op.cit. 1978), the authors considered two separate relations for money demand/supply in their annual macro-economic model for Nigeria which was tested with the help of the 2SLS technique.

Equation (7.10) depicts the theoretical relation between the demand for real balance (m_d) and the real income (Y_t) which we also assume to be equal to permanent real income, and between the interest rate on deposits, as well. The expected sign for a_2 would vary according to the definition of m_d . But if it includes only demand deposits, for which there is no interest payment, it would depict the opportunity cost for holding money and would therefore, result in negative response implying $a_2 < 0$. If m_d is taken into its broader interpretation to include savings and time deposits, along with demand deposits, the response could then be the own-rate-response in terms of the portfolio theory for that part of m_d which is time and savings deposits. The sign of a_2 is thus left to be rather ambiguous, depending on whether the opportunity-cost effect or the own rate effect is more powerful.

Equation (7.11) indicates the partial adjustment (α) of the actual money stock from its preferred i.e. demand level during one observation period. Through some substitution, equation (7.11) can be rewritten as:

$$m_t = \alpha a_0 + \alpha a_1 Y_t + \alpha a_2 i_{1t} + (1 - \alpha) m_{t-1} \dots (7.11')$$

Equation (7.11') can, in this case be presented as equation (7.7), when $\alpha_0 = \alpha a_0$; $\alpha_1 = \alpha a_1$, $\alpha_3 = \alpha a_2$ and $\alpha_2 = 1 - \alpha$. Equation (7.8) indicates the relation between the supply of money stock and the demand for high-powered money. Since we, have assumed the monetary base to be always in equilibrium, this equation looks quite close to the money-multiplier relation in equation (7.6). The implication of this supposition is that the disequilibrium in high-powered money

between demand for and supply of it, is adjusted almost instantaneously whereas the adjustment between the money demand and the money supply follows the pattern in equation (7.11) above. Thus, the observed money-stock at any point of time is the supply of money, whereas, only in equilibrium in the money market, it is also the demand for money.

Thus, to reiterate, Equation (7.8) rewrites equation (7.6) above, in a slightly different form where money supply is determined by the equilibrium value of the high-powered money and the money multiplier. The money multiplier is a function of the currency deposit and the reserve-deposit ratios. I already assumed that the currency-deposit ratio to be in equilibrium; this value has been steadily declining during our sample period indicating the increasing monetisation of the economy and/or the increasing banking habit of the population. Lower currency deposit and reserve-deposit ratios mean lower public and bank demand for high-powered money per naira of money stock and "....therefore that a given supply of high-powered money can support a larger stock of money"¹⁰. But, we do not observe any such trend in the reserve-deposit ratio in our period under study. Again, much of the rationale behind requiring cash "reserves" is replaced by the need for liquidity reserves, made up of the cash and short-term assets held by the banks. In that situation, a bank would diversify its loans, advances, investments and cash portfolio in such a way that it satisfies the statutory liquidity ratio requirement, keeps enough cash and short-term assets to guard against the uncertainty of cash inflows and outflows,

10. R. Dornbusch and S. Fischer, Macroeconomics, Fourth Edition, McGraw Hill, NY, 1987.

and at the same time, makes sufficient profits from viable financial ventures. In the case of the Nigerian commercial banks, I assume that the reserve-deposit ratio would be low (therefore, the money supply would be high) when the interest rate on bank advances is high, although I do recognise that a fuller treatment of the assets (and liabilities) portfolio of the bank would need the knowledge of the whole vector of the rates of return on all the debit and credit items. Finally, on equation (7.8), the variations in the money-multiplier itself due to the instability of the relations is sought to be captured by the intercept β_0 , to infuse non-proportionality in the relation. Presence of i_2 - argument emphasises its positive impact on money supply rather than leaving it to work its way through reserve-deposit ratio and ultimately the high-powered money.

The last equation (7.9) in our model describes the supply conditions of the high-powered money. I have already examined the demand and supply factors behind the monetary base and in the model specification for the supply relation I choose only two variables to recognise their importance, in preference to others. On the demand side of the monetary base (i.e. equation 7.3 and in equilibrium, equations 7.5 and 7.6) I have the money stock and the money -multiplier, made up of the two ratios, i.e. the currency-deposit and the reserve-deposit ratios. On supply of the monetary base, I bring in the foreign exchange reserves/assets and the level of income, to capture most of the supply influences, discussed earlier. The "endogeneity" argument for money supply ¹¹ could be traced here when income is assumed to

11. Professor N. Kaldor considered the endogeneity of the money supply process in his article called "The New Monetarism", Lloyds Bank Review, July 1970, pp.1-17.

influence the supply of high-powered money. It may be so, since income is being determined by, among other things, net export and government budget deficit, both of which contribute to the supply of the money base. The foreign exchange reserve for a part of the historical period under study had mostly been accumulating due to the oil revenue accruing to the federal government whose naira deposit at the central bank of Nigeria also had similar impacts. When part of this deposit was being withdrawn to finance expenditure, the supply of high-powered money was being pushed up. I may present the demand/supply relations for the monetary base and its effect on the supply of money stock in figure 7.1.

In figure 7.1, the mechanics behind equations 7.8 and 7.9 above is presented through H_d and shifting H_s (i.e. the supply of the monetary base) curve. With an increase in income (i.e. $Y_1 > Y_0$) and in foreign exchange assets (i.e. $R_1^* > R_0^*$), the H_s line shifts upward. With an unchanging H_d -curve, this would mean an increase in money supply, M_s . A fall in the currency-deposit (i.e. c) and/or in the reserve-deposit (i.e. r') ratio would mean the H_d -curve sliding downward which would accentuate the effect of an upward shift of the H_s line on its impact on money supply, M_s . A backward slide of H_d would have the opposite effect. Thus, we can visualise any change in M_s to be made up of a combination of these shifts and slides, the final direction of the change depending on their relative magnitudes.

Finally, let me now have a look at the demand-supply relations for money in the context of the hypothesised Nigerian experience. It has been common knowledge by now (see the works on the Nigerian demand-supply of money,

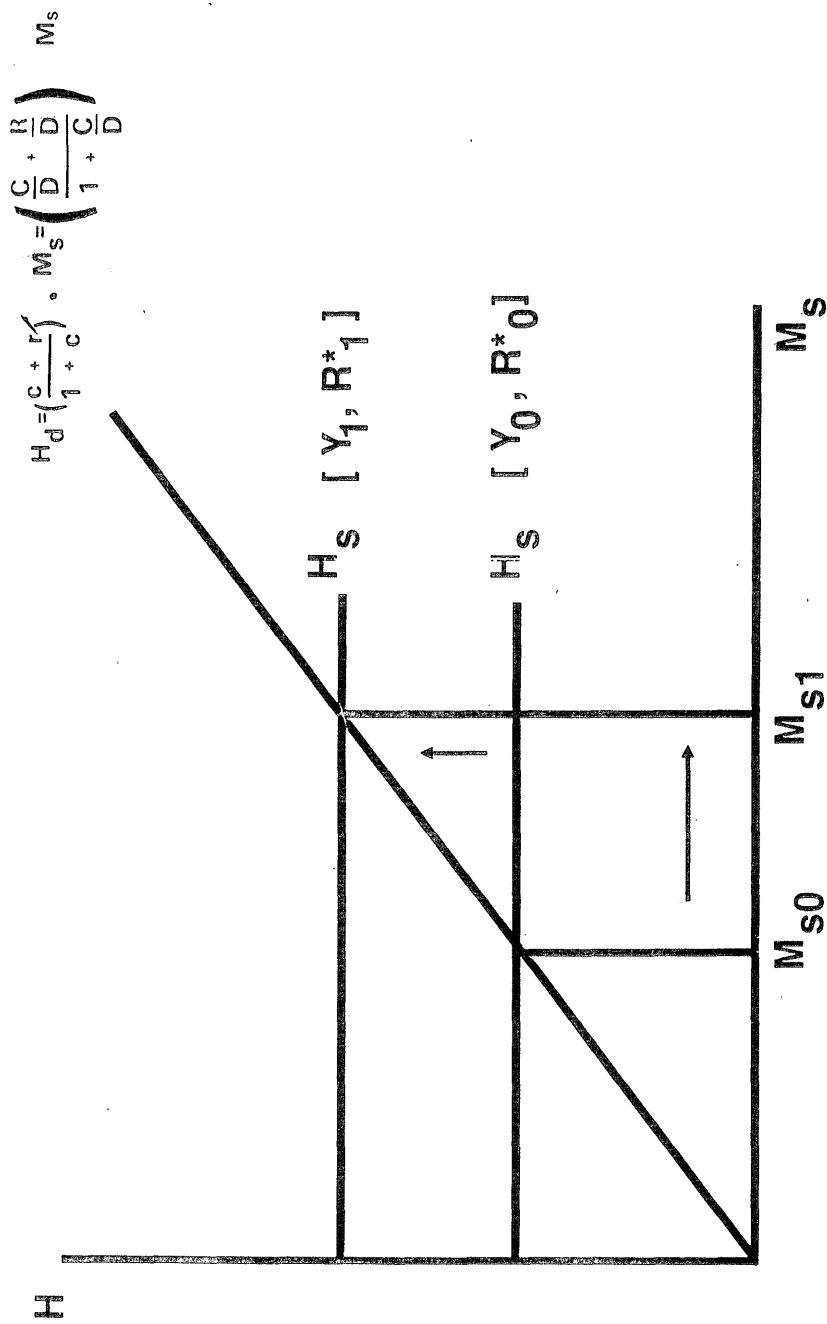


Fig.7.1 Demand / Supply of the high-powered money and the supply of money stock, all at current prices.

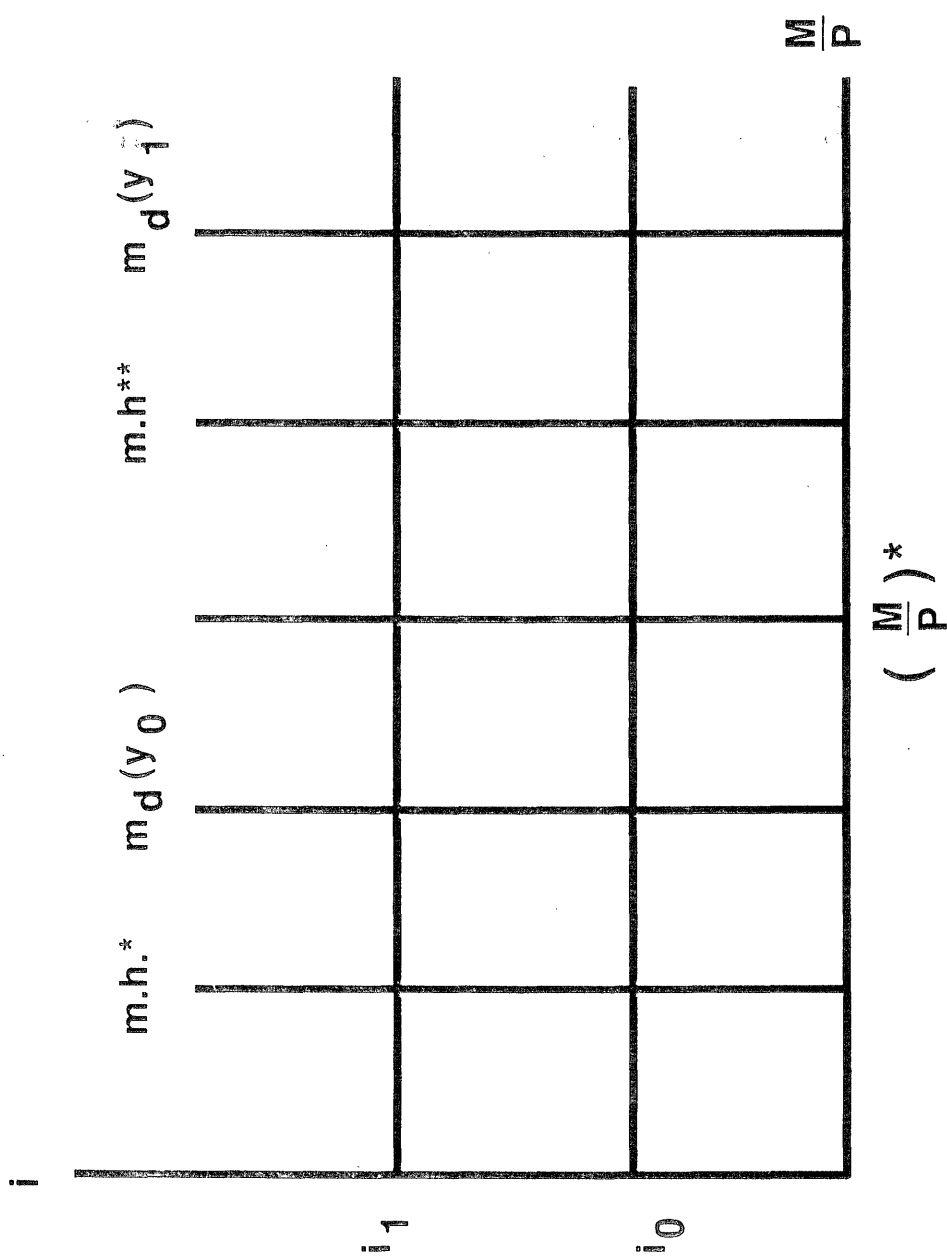


Fig.7.2 Equilibrium in the (interest-inelastic) money market.

footnote 6) that the demand for money or the supply of money is fairly inelastic to interest rate. The lack of a developed money market and the dearth of viable (or sufficiently profitable) applications for loans and advances (as the banks see it) from the commercial banks could account for such empirical findings. In such a situation, the demand-supply relation may be presented in figure 7.2 above. $m_{.n}^*$ and $m_{.n}^{**}$, vertical lines in figure 7.2 indicate the interest-inelastic supply of real balance, where m stands for the money multiplier whereas h^* and h^{**} ($h^{**} > h^*$) for the equilibrium values of the monetary base. The larger demand for money is indicated by the $m_d(Y_1)$ vertical line, compared to $m_d(Y_0)$, where $Y_1 > Y_0$ and the demand for real balance is also interest-inelastic. Let us say, the demand and supply of real balance is equal at $\frac{(M)^*}{P}$,

which, we may note, is totally inelastic to changes in the interest rates. If the demand for real balance (i.e. m_d) is less than its supply (i.e. m_s), people would get rid of it until the equality is restored. This adjustment process would come through income rising as a result of increased expenditure and this higher income having greater effect on the demand for money than on the supply of the monetary-base and therefore, through the money-multiplier, on the money supply itself. It follows then, that if we were to interpret the dependent variable in equation 7.7 as the demand for real balances, then the system of equations in 7.7, 7.8 and 7.9 would guarantee stability of the adjustment process (intuitively speaking) if $\alpha_1 / 1 - \alpha_2 > \beta_1$. But, it should also be conceded that the equations 7.8 and 7.9 are here specified in a way to enable us to estimate the system on the basis of the available data. The data

restriction would leave out some independent variables, considered in the context of the above equations, thus attributing to the existing ones, perhaps, a greater influence on the corresponding dependent variable(s) than they would warrant otherwise.¹² Let us look at the stability question again, this time on the basis of the four basic equations: 7.10, 7.11'', 7.8' and 7.9' as follows:

$$m_{at} = a_0 + a_1 Y_t + a_2 i_{1t} \dots\dots\dots(7.10)$$

$$m_{at} - m_{a,t-1} = \alpha(m_{at} - m_{a,t-1}) \dots\dots(7.11'')$$

$$m_{at} = \beta_0 + \beta_1 h_{at} + \beta_2 i_{2t} \dots\dots\dots(7.8')$$

$$h_{at} = \gamma_0 + \gamma_1 Y_t + \gamma_2 \frac{(R^*)_t}{P} \dots\dots\dots(7.9')$$

This set of equations can be rewritten following K. C. Kogiku's¹³ notations.

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ -\alpha & 1 & 0 & 0 \\ 0 & 1 & -\beta_1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} m_{at} \\ m_{at} \\ h_{at} \\ h_{at} \end{bmatrix} = \begin{bmatrix} a_0 + a_1 Y_t + a_2 i_{1t} \\ (1-\alpha) m_{a,t-1} \\ \beta_0 + \beta_2 i_{2t} \\ \gamma_0 + \gamma_1 Y_t + \gamma_2 \frac{(R^*)_t}{P} \end{bmatrix} \dots\dots\dots(7.12)$$

Or $\underline{A} \underline{Y} = \underline{B}$, with the appropriate definitions.

$$\text{We can solve for } \underline{Y} = \underline{A}^{-1} \underline{B} \dots\dots\dots(7.13)$$

given all the informations about A and B above. But, to determine the stability conditions of the model, let us rewrite equation 7.12 in a slightly different form.

12. J. Tobin and W. C. Brainard, "Pitfalls in Financial Model Building", A.E.R., Papers and Proceedings, Vol.58, No.2., pp.99-122

13. See K. C. Kogiku, An Introduction to Macro-Economic models. McGraw Hill, 1968, pp55-58.

$$\underline{A} \cdot \underline{Y}(t) = \underline{C} \cdot \underline{Y}(t-1) + \underline{X}(t) \dots\dots\dots (7.14)$$

where

$$\underline{C} = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 1-\alpha & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} \quad \text{and} \quad \underline{X}(t) = \begin{bmatrix} a_0 + a_1 Y_{1t} + a_2 i_{1t} \\ 0 \\ \beta_0 + \beta_2 i_{2t} \\ \gamma_0 + \gamma_1 Y_t + \gamma_2 (R^*/p)_t \end{bmatrix}$$

From equation (7.14), we can have

$$\begin{aligned} \underline{Y}(t) &= \underline{A}^{-1} \underline{C} \underline{Y}(t-1) + \underline{A}^{-1} \underline{X}(t) \\ &= \underline{P} \underline{Y}(t-1) + \underline{Q} \underline{X}(t) \dots\dots\dots (7.15) \end{aligned}$$

where $\underline{P} = \underline{A}^{-1} \underline{C}$ and $\underline{Q} = \underline{A}^{-1}$.

The matrix \underline{P} in this model turns out to be equivalent to:

$$\begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 1-\alpha & 0 & 0 \\ 0 & \frac{1-\alpha}{\beta_1} & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

The above system would be stable if the characteristic root(s) of the \underline{P} matrix have absolute value(s) each less than one. In this case it turns out to be ¹⁴, $1-\alpha$. Therefore, our first shot, intuitive requirement for the condition of stability, guessed above has to be replaced by the conditions $|1-\alpha| < 1$. Since α is defined

14. S. Goldberg. Introduction to Difference Equations. John Wiley & Son. New York. 1961. p. 227, 237.

to be partial adjustment of the money stock to its demand during a particular time period, it can, at most be equal to one. Therefore, stability requires that this adjustment is not over fulfilled, neither it is completed fully in one period.

This stability requirement is now being interpreted in terms of the coefficient of partial adjustment (α) alone. No matter, how the supply of and the demand for money may be determined during a period, so long the stock of money supply does not adjust fully to its demand during that period, the system may settle down to some constant equilibrium values for the endogenous variables (m_a , m_s , h_d , h_s).

14. cont.

The "characteristic equation" for P matrix is given by

$$|P - \lambda I| = 0$$

or

$$\begin{vmatrix} -\lambda & 0 & 0 & 0 \\ 0 & 1-\alpha-\lambda & 0 & 0 \\ 0 & \frac{1-\alpha}{\beta_1} & -\lambda & 0 \\ 0 & 0 & 0 & -\lambda \end{vmatrix} = 0$$

or

$$-\lambda \begin{vmatrix} 1-\alpha-\lambda & 0 & 0 \\ \frac{1-\alpha}{\beta_1} & -\lambda & 0 \\ 0 & 0 & -\lambda \end{vmatrix} = 0$$

or $-\lambda^3 (1-\alpha-\lambda) = 0$

i.e. $\lambda^4 + \alpha\lambda^3 - \lambda^3 = 0$

i.e. $\lambda + \alpha - 1 = 0$ with $[\lambda^3 \neq 0]$.

Therefore $\lambda = 1-\alpha$ is the characteristic root of the above characteristic equation.

D. Testing the hypothesis

The above hypothesis is tested for two sample periods, not mutually exclusive. The first set of results are reported for the sub-period 1971 - 1977 and the second for 1971 - 1987. Availability of data in the suitable format is the main reason for this rather arbitrary division.¹⁵ With these reminders, let us now look at the econometric testing of the model, outlined in this section.

(a) Results: 1971 - 1977

I now present the results of the econometric testing of the model discussed in the section above. The model has been tested for all the three definitions of money stock, i.e. m1, m2, and m3 where m1 is the real value of currency in circulation plus demand deposits with the commercial banks; m2 is m1 plus the real value of the savings deposit with the banks; and m3 is m2 plus the real value of the time deposits with the banks. The model has been tested for the quarterly values of the variables ranging from 1971 first quarter to 1977 fourth quarter. Since income figures are not available in Nigeria for any shorter duration than the annual, I had to use the quarterly indices of industrial production as a proxy for the income data. Based on such data limitation, I present three sets of results in table 7.1.

15. The division between time and savings deposits may not be easy to discover after a certain period, neither is it possible to gather information on foreign exchange reserves, uniformly throughout our sample period. Hence I present two sets of results, which are comparable only up to a limited extent.

Table 7.1 Estimates* of the Money Supply Model for m_1 , m_2 and m_3 , 1971-1977

Coefficients		Equation 7.7										Equation 7.8										Equation 7.9									
Estimators		α_0	α_1	α_2	α_3	\bar{R}^2	F.	β_0	β_1	β_2	\bar{R}^2	F.	γ_0	γ_1	γ_2	\bar{R}^2	F.														
m_1	OLS	-28.36 (78.36)	0.81 (0.69)	1.04 (0.07)	-19.50 (23.31)	.99	317	237.26 (74.34)	0.94 (0.09)	-27.85 (27.58)	.90	56	-418.58 (159.05)	6.06 (1.47)	0.21 (0.06)	.82	52														
	2SLS	-351.80 (260.03)	5.19 (3.26)	0.73 (0.25)	-26.99 (38.49)	-	-	223.44 (75.31)	1.00 (0.10)	-32.21 (27.91)	-	-	-851.11 (230.49)	10.16 (2.15)	0.12 (0.07)	-	-														
3SLS		-498.90 (148.19)	7.74 (1.75)	0.65 (0.13)	-60.22 (19.70)	-	-	146.14 (53.81)	1.06 (0.09)	-10.79 (17.64)	-	-	-1194.21 (201.81)	13.37 (1.77)	0.06 (0.03)	-	-														
	m_2 OLS	-28.10 (93.48)	0.72 (0.84)	1.03 (0.08)	-15.49 (27.51)	.99	326	317.11 (84.16)	1.12 (0.10)	-33.45 (31.22)	.91	61	-418.58 (159.05)	6.06 (1.47)	0.21 (0.06)	.82	52														
2SLS		-456.30 (304.94)	6.54 (3.82)	0.79 (0.29)	-11.29 (45.13)	-	-	300.18 (85.38)	1.19 (0.11)	-38.79 (31.64)	-	-	-851.11 (230.49)	10.16 (2.15)	0.12 (0.07)	-	-														
	3SLS	-632.92 (181.46)	9.58 (2.15)	0.70 (0.16)	-50.60 (24.44)	-	-	209.90 (60.70)	1.25 (0.10)	-12.74 (19.88)	-	-	-1400.00 (201.56)	13.41 (1.76)	0.06 (0.03)	-	-														
m_3 OLS		-73.96 (145.16)	1.50 (1.23)	0.96 (0.09)	-9.33 (41.90)	.99	270	399.53 (87.58)	1.48 (0.10)	-33.33 (32.49)	.94	99	-418.58 (159.05)	6.06 (1.47)	0.21 (0.06)	.82	52														
	2SLS	-111.51 (571.87)	13.60 (7.17)	0.46 (0.54)	58.52 (84.65)	-	-	379.42 (89.14)	1.57 (0.11)	-39.68 (33.03)	-	-	-851.11 (230.49)	10.16 (2.15)	0.12 (0.07)	-	-														
3SLS		-1554.33 (334.02)	20.33 (3.96)	0.22 (0.29)	-8.59 (44.73)	-	-	288.33 (59.64)	1.59 (0.11)	-8.26 (19.10)	-	-	-1231.29 (194.99)	13.07 (1.69)	0.06 (0.03)	-	-														

* Numbers within parentheses indicate the corresponding standard errors.

We can see in table 7.1 that each definition of money for equation (7.7), gives us the right sign for almost all the cases for α_1 , α_2 and α_3 though the significance level varies between estimations, i.e. OLS, 2SLS and 3SLS. The upper limit for α_2 , namely 1, has been maintained in all cases except for the OLS estimates of m_1 and m_2 . In the estimation of equation (7.7), α_3 appears with the right sign and statistical significance only for the 3SLS cases for m_1 and m_2 and elsewhere it is not significantly different from zero. This is in line with the other empirical works on the demand for money in Nigeria which induced us to present the demand for real balance relation in figure 7.2 above, as vertical lines. But it should be noted that the 3SLS estimates of α_3 for m_1 and m_2 do indicate some evidence of interest rate being regarded as the opportunity cost of holding money by the Nigerian public during the period under study.

Let us now look at the estimation of the other two equations. The estimates β_1 and β_2 in each case appear with some consistency - for β_1 we get the right sign and the statistical significance whereas for β_2 the sign is always negative, though it is always statistically insignificant. This supports the widely held belief that like money demand, money supply is here also inelastic to interest rate. This would confirm the position we have taken about the shape of the money supply relation in figure 7.2 above. The consistently "correct" result for β_1 is not surprising when we notice that the currency in circulation (i.e. C) forms a major part of both money stock and the high-powered money during the period under study. Of all the parameter estimates reported in table 7.1 those of γ_1 and γ_2 for

equation 7.9 have been most 'successful', since both of them are statistically significant with the right sign in all of the nine different cases involving m_1 , m_2 and m_3 and OLS, 2SLS and 3SLS. The strong result for γ_1 , i.e. the influence of income on the supply of high-powered money, suggests that the endogeneity of money supply through this channel may be rather important in this particular case, though admittedly this contention would need a much more detailed break-up of the monetary base than we have done here, followed by a scrutiny of the movement of various parts of it as being influenced by the effective demand (i.e. income) in the economy. The case for γ_2 is, however, less controversial and is rather apparent from a look at the central bank balance sheet in the relevant years, where changes in the foreign exchange reserves and in the Bank's liability of the clearing banks' reserves and in the currency outside banks, follow a close covariation.

Let us look at the stability of the whole model and also at that of the adjustment process between the demand for and the supply of real balance. The stability of the simultaneous system depends on the parameter $(1-\alpha)$ being less than one in absolute value. This condition is met in all the nine different estimates for α_2 , though the OLS estimates for m_1 and m_2 indicates negative values for α - the coefficient for partial adjustment! If we concentrate on the 2SLS and 3SLS estimates of $(1-\alpha)$, for the cases where they are significantly different from zero, we get the following table.

Table 7.2. Some Estimates for the Partial Adjustment coefficient (α).

Real balances	m1	m2
Estimators		
2SLS	.27	.21
3SLS	.35	.30

Table 7.2 indicates that the greater simultaneity of the estimator (i.e. 3SLS in place of 2SLS) makes the measure for adjustment larger and also the narrower definition of real money quickens the adjustment process. The second feature may be expected since the narrower the definition of money, the quicker it would take to adjust to its desired level compared to a broader version, since there are restrictions on withdrawals.

One important implication of our results is that contrary to textbook condition for the money supply process, that the central bank cannot control both the money stock and the interest rate at the same time, the Nigerian monetary authorities may be able to do so, within limits. Barring the extreme cases of too high or too low interest rates, it appears (see figure 7.2 above) that the interest inelasticity of both the demand for and the supply of real balances would mean that the target for the supply of high-powered money (and, therefore, for the stock of money) may be set forth without much notice being taken of the levels set up for the interest rates. This would give the monetary authorities an extra degree of freedom to manoeuvre the money market which is not possible in economies with developed money and credit markets where the sharp responses of money demand and supply to interest rate changes would force the authorities there to take careful

notice of one set of targets (e.g. interest rates), when trying to control the other (i.e. money stock).

(b) Results: 1971 - 1987

The results for the period 1971, first quarter, to 1987, fourth quarter, are presented in table 7.3. Unlike Table 7.1, in table 7.3, I present only the results for narrow money ($m1$) and for broad money ($m2^*$), which was described as $m3$ in the earlier Table 7.1. The other difference is in the estimator, 3SLS, not being presented in table 7.3. On data, while foreign exchange reserves were used in table 7.1, for $(\frac{R}{P})^*$ in equation (7.9) above, total foreign assets were used in table 7.3, due to my inability to decipher such data on the basis of a uniform definition.

With all these reminders let me now look at the results in table 7.3, in comparison to those in table 7.1. There are certain similarities and some differences in the values of α_1 , α_2 and α_3 in these two tables for both the narrow money and broad money. The α_1 parameter, has always the right sign in both tables, but only in table 7.3, it is always so "significantly". But the α_3 parameter, though negative almost always in table 7.1, as expected, it has been so significantly only for $m1$ and $m2$ (3SLS). For table 7.3 however, the result is always positive, and significantly so. There may be some justification of such a sign in the case of $m2^*$, as already indicated, when the own-rate response may dominate the opportunity-cost response. But this explanation cannot, obviously, be carried on to the narrow money case of $m1$, where the significantly positive values for α_3 , provide contrary evidence to the hypothesis. One explanation of such an

Table 7.3 Estimates of the Money Supply Model for Narrow and Broad Money, 1971-1987																			
Coefficients		Equation 7.7					Equation 7.8					Equation 7.9							
Estimators	α_0	α_1	α_2	α_3	R^2	SEE	F	β_0	β_1	β_2	R^2	SEE	F	γ_0	γ_1	γ_2	R^2	SEE	F
m_{OLS}^1	-1057.618 (2.1)	10.214 (2.12)	0.899 (22.54)	174.953 (2.96)	.9866	528	1567	-764.15 (1.59)	1.917 (24.21)	60.392 (0.76)	.9613	889	808	2495.913 (1.62)	2.581 (0.14)	0.345 (1.96)	.0649	2180	2.25
χ^2_{OLS}	-4816.76 (3.39)	47.81 (3.38)	0.74 (11.06)	418.46 (4.05)	.9878	503	1728	-326.72 (0.9)	2.06 (33.48)	-53.46 (0.88)	.9788	658	1499	3939.96 (1.41)	-14.97 (0.45)	0.40 (2.03)	.0674	2177	2.35
m_{OLS}^{2*}	-1347.1 (2.63)	10.88 (2.31)	0.93 (34.68)	271.93 (3.72)	.9958	552	5008	-4789.18 (4.51)	3.16 (18.1)	577.04 (3.31)	.9459	1957	568	2495.913 (1.62)	2.581 (0.14)	0.345 (1.96)	.0649	2180	2.25
χ^2_{OLS}	-4713.47 (3.12)	43.66 (2.98)	0.86 (21.9)	480.31 (4.23)	.996	539	5265	-3676.41 (4.93)	3.53 (27.5)	287.41 (2.29)	.9741	1354	1223	9573 (2.71)	-83.42 (1.96)	0.617 (2.93)	.1169	2119	4.3

Numbers within parenthesis are the t-values

anomaly could be the limited application of the portfolio approach here, where other non-financial and financial assets are not taken into account. The upper limit for α_2 parameters i.e. unity, has been maintained in all the cases here, and always significantly so. Quantitatively, however, the values for α_2 come close to each other in the two tables, only in the case of the 2SLS estimate for the narrow money: 0.73 for table 7.1 and 0.74 in table 7.3.

To calculate the mean short-run elasticity for the demand for real balance with respect to the index of measured income, I use the 2SLS estimates for the relevant parameters. This value ¹⁶ for the narrow money turns out to be 0.6653, and for the broad money, 0.3548. The corresponding long run elasticities come out as 2.559 and 2.534 respectively.

For equation 7.8, the results of table 7.3 are similar to those of table 7.1 for β_1 , significantly positive, as expected. The values of this "marginal" money-multiplier in the case of table 7.3, however are consistently higher than those of table 7.1. For β_2 however, the results in table 7.3 are "better" in the sense that, I have some evidence for the positive response of money supply to changes in the interest rate. That happens in the case of

16. Short run mean elasticities are calculated as follows:

$$e_{S_1}^S = \frac{\Delta m_1}{\Delta Y} \cdot \frac{\bar{Y}}{\bar{m}_1} = 0.6653$$

$$e_{S_2}^S = \frac{\Delta m_2}{\Delta Y} \cdot \frac{\bar{Y}}{\bar{m}_2} = 0.3548$$

The corresponding long-run elasticities are:

$$e_{L_1}^L = \frac{.6653}{1-0.74} = 2.559 \quad e_{L_2}^L = \frac{.3548}{1-0.86} = 2.534$$

the broad money alone, significantly which never occurred in table 7.1. For equation 7.9, the results for γ_1 , are much worse in table 7.3, suggesting negative influence of income on money supply. That never happened in the case of the shorter time-period of table 7.1. Such results for table 7.3 can perhaps be explained in terms of the structural change that might have occurred during the depression phase of the case of the larger span of table 7.3. When allowance is made for such a change in the later case, through the technique of dummy variable as applied in the earlier chapter, I get similar type of response as in table 7.1, (i.e. positive). But in that case, the other results are much worse than those reported and discussed above. Thus I leave it in table 7.3 as an evidence of an inconsistency with the a priori theoretical expectation, which was, however, not the case in this instance for the more homogenous period in table 7.1. Finally for γ_2 , the results for both the tables are significantly positive, as expected. It may be noted, however, the R^2 values for equation 7.9 in table 7.3 are unusually low, which improves considerably once I make an allowance for the structural change in the way already indicated.

Let me present another set of results in Table 7.4, covering the same period as in Table 7.3, but this time restricting the relevant elasticities to constant values. Thus, I transform all the endogenous and the exogenous variables in the log form and then re-estimate the parameters in equations 7.7 to 7.9. The results are presented in Table 7.4.

The parameter estimate for the short-run elasticity of money demand (α_1) in Table 7.4 is significantly positive in

Table 7.4 Estimates of the Money Supply Logarithmic Model for Narrow and Broad Money, 1971-1987.																			
Coefficients		Equation 7.7						Equation 7.8						Equation 7.9					
Estimators	α_0	α_1	α_2	α_3	R^2	SEE	F	β_0	β_1	β_2	R^2	SEE	F	γ_0	γ_1	γ_2	R^2	SEE	F
m_1 OLS	-0.19 (0.71)	0.077 (1.02)	0.991 (42.81)	-0.021 (0.44)	.995	.08	4270	0.064 (0.41)	0.981 (47.89)	0.373 (4.24)	.9839	.14	1991	1.381 (0.56)	0.418 (0.67)	0.62 (5.47)	.407	.8	22.26
2 SLS	-14.633 (4.7)	4.433 (4.72)	.029 (0.14)	1.824 (4.58)	.9963	.07	5672	-0.108 (0.92)	0.999 (64.17)	0.326 (4.91)	.9909	.1	3556	-1.617 (0.41)	1.203 (1.20)	0.55 (4.13)	.4152	.78	23.08
m_2^* OLS	-0.16 (0.86)	0.067 (1.26)	0.993 (57.72)	-0.015 (0.42)	.9975	.06	8454	-0.064 (0.39)	0.965 (44.78)	0.674 (7.29)	.9833	.14	1991	1.381 (0.56)	0.418 (0.67)	0.62 (5.47)	.407	.8	22.26
2 SLS	-5.916 (2.79)	1.85 (2.82)	0.593 (4.03)	0.793 (2.66)	.997	.05	9276	-0.107 (0.88)	0.982 (60.96)	0.63 (9.17)	.9908	.11	3514	-0.916 (0.22)	1.019 (0.94)	0.567 (4.09)	.4103	.8	22.61

Numbers within parentheses are the t-values

both the 2SLS estimates for narrow and broad money. But the lag structure for narrow money is quite different here, indicating no difference between short- and long-run income elasticity of 4.43. The corresponding value for the broad money turns up to be 4.55, from a significant lag structure of nearly sixty per cent adjustment in the current period. Thus, these two elasticities are estimated to have close values, like the case in Table 7.3, when we could only calculate the long-run mean elasticities of 2.6 and 2.5, respectively. All these values are much higher than the same parameter estimates in chapter three above, where the long-run estimate was close to unity. But there, the relevant coefficients were not significant at 95% level, even though the actual GDP figure has been used for income, whereas I could only use the proxy of the index of industrial production in Tables 7.1, 7.3 and 7.4. This might explain the higher values in the latter cases. On the interest-elasticity of the demand for money, I get similar results in both the tables - positive response. As already indicated, while there may be ample justification of the demand for broad money having a positive interest-rate elasticity of nearly 0.8, there does not seem to be any reason behind the corresponding positive value of over 1.8 for narrow money.

On equation 7.8 in Table 7.4, the marginal money-multiplier in both the cases for narrow and broad money indicate values vary close to unity, implying a 1% increase in the high-powered money would lead to 1% increase in both the narrow and broad money. On the interest-elasticity of the supply of money, the results in Table 7.4 are marginally better, indicating significant positive values for both the definitions of money. A point to note for the estimation of

β_1 and β_2 parameters in Table 7.4 is that the OLS and the 2SLS estimates are significantly positive in all the four cases, and their corresponding magnitudes are not that far apart.

On equation 7.9 in Table 7.4, there is a definite improvement in the explanatory power, compared to Table 7.3. The R^2 values of 0.4, though low, recorded a four-fold increase. Quantitatively also, Table 7.4 recorded positive impact of effective demand (income) on the stock of high-powered money, as in Table 7.1, though not significantly. Finally, the estimate for γ_2 -coefficient in equation 7.9 turns out to be significantly positive in all the three tables. This is not surprising and may be expected in the special circumstances of the recent Nigerian experience. Both during the oil-boom and the depression period, the change in the high-powered money closely followed Nigeria's fortunes in the foreign trade, which was dominated by the oil sector. During the depression phase, however, as we already saw above in the balance sheets of the CBN, the fall in the oil revenue was balanced by raising the domestic credit by the federal authorities in the form of Nigerian Government Securities. But this did not break up the close link between the change in the foreign exchange assets of the CBN and the concurrent change in the stock of high-powered money.

E. Policy and other Implications

In this section I make use of the results obtained in the empirical verification of the money demand/supply relations above to formulate a macro-economic model for Nigeria and discuss certain policy issues in that context. For the first part of our sample period the nominal interest-rates in Nigeria were rather low, indicating negative real interest rates for quite some time. The lack

of response of demand for and supply of real balances with respect to the relevant interest rates is another feature of the present state of the Nigerian economy. These two features of the money market are incorporated in the following macro model, involving only the goods and the money markets with constant price level.

In figure 7.3, the four-quadrant diagram could describe the "closed" macro-economic model for Nigeria. In the fourth quadrant, we have the speculative demand for money, which does not seem to exist in the relevant sample period in Nigeria. The use of this hypothetical relation is, therefore, to present the policy freedom the authorities may have in formulating economic growth.

The low nominal interest rate i_1 , guarantees a saving S_1 , for the income level Y_1 . This needs transaction (and precautionary) demand for money at OM_1 , which let us say, is also supplied. If the demand for money had a speculative component, as for example, in quadrant IV, the required supply of money had to be $OM_1 + OM_1'$, to leave enough for the transactions demand at the given income level Y_1 . For a higher interest rate, i_2 , greater saving (S_2) would be forthcoming for a greater level of income, Y_2 . This would require a demand for money OM_2 , if speculative demand is ignored. If not, the total demand for money would be $OM_2 + OM_2'$. The equilibrium in this system will be achieved when the interest rate is at \bar{i} , for an income level of \bar{Y} , leading to a transaction demand for money, \bar{OM} . If speculative demand is added, supply of money has to be $\bar{OM} + \bar{OM}'$, to guarantee equilibrium in the money market. The first part of our time period might have exhibited situations where the administered interest rates are at i_1 ,

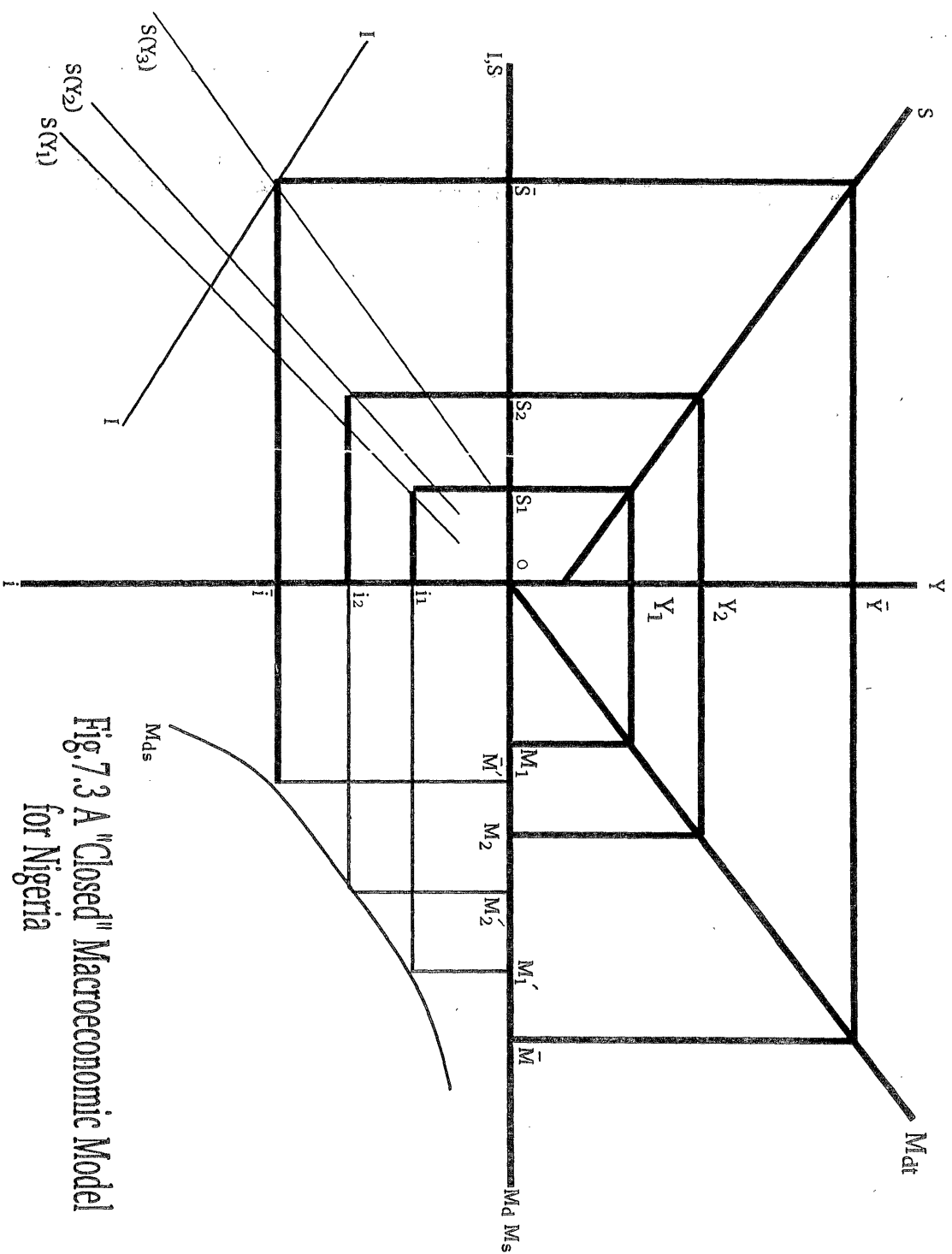


Fig.7.3 A "Closed" Macroeconomic Model for Nigeria

or i_2 in figure 7.3, whereas, by the end of 1987, with interest rates around 15 to 18 per cent, they might have

reached, \bar{i} , or gone beyond that, creating excess supply of loanable funds. Whatever the case may be, it is right to say that this obvious inadequacy of monetary policy have been rectified and interest rates may now be observed much closer to their equilibrium region than was the case before.

Let us now relax the restrictive assumption of the closed economy. The main features of the Nigerian economy over the recent decades are tied to the foreign sector, and one can not discuss policy matters without bringing that sector in the centre of discussion and analysis.

To do so in the context of a policy discussion, it is now appropriate to use the case of the flexible exchange rate regime. For given price levels, both domestic and foreign, I present the equilibrium in terms of the Nigerian version of the IS, LM and the BP curves in figure 7.4.

The apparent interest inelasticity of demand for and supply of money would suggest a vertical LM curve in figure 7.4. But there is some hint of such response in tables 7.1 (demand) and 7.3 (supply), which may allow us to consider a LM - curve with a steep slope. There is evidence of the interest elasticity of investment (Ghosh and Kazi, 1978, p146) which would make the IS curve downward sloping. On the case of the administered interest rate, it is possible to assume now, the CBN and the other monetary authorities are seeking to keep close to the domestic equilibrium interest rate and at the same time hoping that would be attractive for foreign investors, and acceptable to international agencies like the IMF and the World Bank. This is not to say that the Fund and the Bank would expect this high

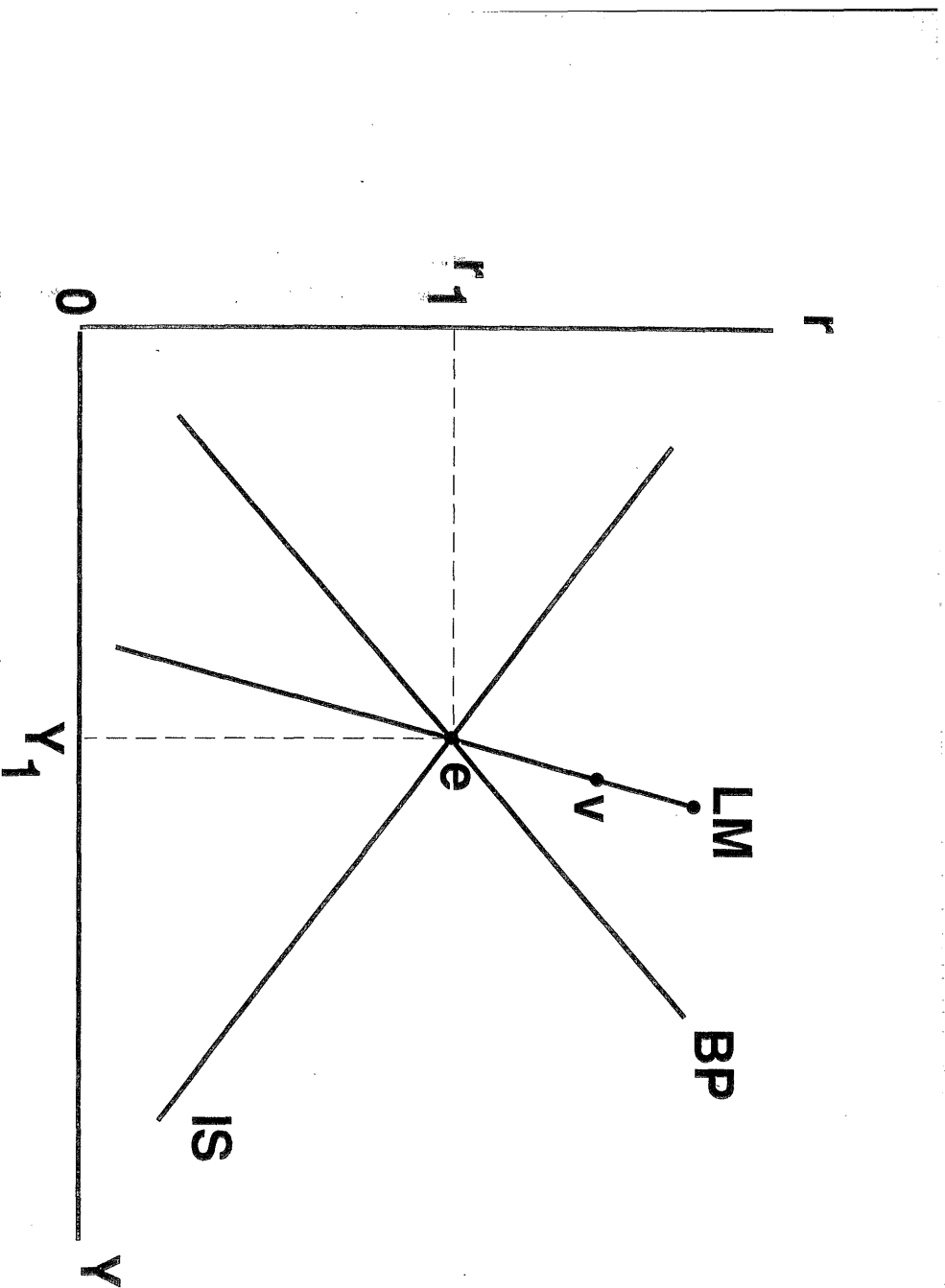


Fig.7.4 **Equilibrium in the open**
Macroeconomic model for Nigeria

interest rate for any loan that may be forthcoming from them. But the structure of the Nigerian interest rates, not out of line with the world rates, might meet with their approval which, as we already saw in chapter three above, is important for private capital flows into the country from the international markets. I now put together all the above points in figure 7.4

Under flexible exchange rate system, as is the case now (Summer, 1989), it is possible for the CBN to fix the money supply corresponding to its foreign exchange assets and the net domestic credit of the CBN itself and of the commercial banks. For the given domestic price level the position of the LM curve is fixed, showing a high degree of interest inelasticity in figure 7.4. I also assume relative lack of capital mobility in response to the interest differential between the domestic and foreign rates for Nigeria. This would make the BP curve also relatively inelastic and I assume that it is less so than the LM curve in fig. 7.4. Since it is a case of flexible exchange rate regime, BP and IS curves adjust, if they did not do so initially and eventually intersect on the LM curve, at a point like e, where the equilibrium interest rate and income are at r_1 and Y_1 , respectively. The exchange rate fluctuations would shift these two curves until the equilibrium is reached. This would also lead to the equilibrium value of the exchange rate, E (nairas per unit of pound sterling, £, for example) and of the real exchange rate, $\theta = E.(P_f/P_d)$ where P_f and P_d are the foreign and domestic price levels respectively.

If, for example, IS curve were to intersect the LM curve in figure 7.4 at a point like V, this would indicate

balance of payments surplus leading to a fall in the exchange rate E , (currency appreciation), and also in the real exchange rate, θ . This would cause a downward shift both in the IS and BP curves, the shift in the BP curve being greater because of the leakages for the IS curve are for saving, tax and import whereas, for the BP curve, it is only import. The eventual equilibrium in such a case would be a higher interest rate, a higher level of income and also a lower value of naira per unit of dollar and pound and franc, and whatever Nigeria's trading partners' currencies happen to be.

Such cases are analysed in great detail in any standard textbook on macro-economics ¹⁷ (for example, Parkin and Bade, 1988, pp.288-292). The result for a foreign shock like say greater demand for Nigerian crude, would lead to no change in income and interest rate, but to an appreciation of naira in its foreign exchange value. If the money supply was allowed to increase in such a case then it might lead to a rise in income. Thus the CBN along with the rest of the monetary authorities in Nigeria would have a choice between a high value of naira and no increase income or a low value of naira and an increase in income.

Such analysis of the comparative static results ought to be based on the dynamics of the relations which are hardly worked out in great detail. Other than providing the stability conditions an investigation into the dynamics of the system could also indicate, at least qualitatively, the nature of the time-paths of the endogenous variables,

17. For an analysis of such relations with the usual assumptions one may consider a standard textbook, like, Michael Parkin & Robin Bade, Modern Macroeconomics, Second Edition, Philip Allan, 1988, Chapters 15 and 16.

whether stable or unstable. It could also throw light on the direction of change of an endogenous variable on some policy change if the relevant lapse of time cannot be construed to be long enough for the full adjustment to the next equilibrium situation.

The dynamic analysis is presented in figure 7.5, in terms of a two variable phase diagram.¹⁸ The r, Y space here is divided into six regions, I to VI. For each region I note the latent forces on interest and income for a particular point. Such forces are generated due to (i) excess demand for loanable fund and excess demand for money on the interest rate and to (ii) excess demand for output and excess supply of money on the income level. For example, in region II at a given interest rate, investment is less than saving at any point which is not on the IS curve, and therefore faces a downward pressure on income. But the same point, since it is not on the LM curve either, has a demand for money which is less than the money supply, thus sustains an upward pressure on income. The net result would depend on the magnitude of the two forces. But the effect on the interest rate in this region is not ambiguous. For a given level on income the demand for loanable fund is less than the supply of it at a point in region II, which is not on either the IS or the LM curve and thus will experience a downward pressure on it. Similarly, the speculative demand for money at that point, and therefore the total demand will be less than the supply of money, thus generating a downward force on the interest rate. On both

18. A detailed analysis of this technique, one may find in Alpha C. Chiang, Fundamental Methods of Mathematical Economics, Third Edition, 1984, McGraw Hill, pp. 628-638.

these counts, any point in region II would experience a definite downward force.

The same argument is carried throughout all the six regions where the horizontal arrows indicate the pressure on income from its source of the goods market and the money market.

The vertical arrows similarly indicate forces on the interest rate. The resultant forces are also indicated as a direction of the movement of both r and Y . In the event of a two arrowhead case, for example, in regions III and IV on the interest rate, the greater force would first indicate the ultimate direction of its change and the time path would be determined by the parallelogram of forces. This way, I can indicate the direction of the time path for the phase-diagram at any point, so long as both the forces on the opposite direction on a variable can be quantified. This, however, rules out the case where the point may be on either the IS or the LM curve. In such cases, there will be no ambiguity. A point on the IS curve for example, will only experience forces coming from the money market and therefore, could slide along it (though not necessarily) towards the intersection of the IS and LM curves.

The position of the BP curve affects the relative areas of the various regions, as one follows a particular time path. A point above the BP curve indicates surplus thus leading to a fall in the exchange rate, E , (currency appreciation) and also in the real exchange rate θ . This would lead to a fall in the net export, pushing the IS curve backward and the BP curve upward. Thus the six-way division of the r, Y space itself will be changing with time, but each region would always maintain its dynamic properties analysed

above, at every point in time. In such a scenario, a point like V may generate a stable focus in relation to the original configuration of the six regions. Another feature of this dynamic system is that both the demarcation curves, IS and LM are themselves stream lines and they turn out to be four cases of stable nodes. In comparative static analysis of this economic system only such cases of dynamics are usually reported, to the neglect of the other possibilities. As we can see from figure 7.5, the stability of the system is no way assured thus doubting the existence of the static equilibrium, which is everywhere assumed to be the case.

That is the negative implication. On the positive side, the time path in a particular case may explain the variation of r and Y which can not be explained either by the prediction from the comparative statics, or from the assertion of the type of a time path which is presumably stable. This is not to say that whatever may be the observed variations in r , Y and E , the above dynamics can explain that: in such a case it would not be even a theory, not being able to be proved wrong! The explanation of the various forces behind the variables would allow us to understand some cases (not all cases) which are not explained by stable time paths. Such paths may exist in reality and the possibilities outlined in figure 7.5, can explain some of them.

Chapter 8 Conclusions

In this final chapter of the thesis, I summarise the results of the research from the earlier parts. They are not always quantitative in nature, neither are they directly related to a policy issue in every case. Some broad policy issues may be indicated based on the conclusions of this and some other works on the present theme, referred to earlier. In the first part, therefore, the results from the previous chapters are summarised and in the second, policy issues are discussed primarily based on such findings.

In the second chapter the recent history of the banking industry has been reinterpreted in terms of the dominant firm oligopolistic market structure where the futility and inefficiency of the local government's backing of the indigenous banks has been put into sharp focus in a period without the Central Bank of Nigeria. This chapter also provides a descriptive account of the post-CBN monetary experience of the Nigerian economy by dividing the entire period into three separate sub-periods, each of which is very likely to have a distinct structural feature of its own, quite different from the other two. This distinction has been made use of in chapter three where many broad macroeconomic relations relevant to economic growth and development have been proposed and tested. These results vary a great deal in terms of their statistical robustness, even when one takes into account the dramatic structural changes indicated above. But the broad underlying features of the interactions between the real and monetary variables in the development process are still discernible. For example, a 1% increase in the money stock would lead to a 0.27% increase in the inflation rate, in the same year. It would also lead to an increase in the growth rate of income, but not monotonically. The contemporaneous growth maximising rate of expansion of the money

stock turns out to be over 50 percent a year. In a normal year, such a monetary measure could lead to an income growth of 15 percent in the same year. There are likely to be some underlying relations behind such results, some of which have also been estimated. For example, the relation between the investment rate for a given value of income and the inflation rate could be non-linear, peaking at a value of 15% for price rise, which may lead to an investment rate of 16% of income, in the same year if it is a normal one.

There are certain other findings worked out in chapter three, some of which may be relevant for policy issues. One such result indicated that around 5% of the total investment in 1987 could have been financed by the newly created high-powered money, without its effect being felt on the inflation rate. But the inflationary finance of economic development may be hampered, if the country suffers from financial repression and in a situation like that, a different type of economic policy may be called for. The importance of this issue engages the present work for two full chapters in five and six. But here, in chapter three, an indirect text is provided and the results remain inconclusive about the degree of maturity of the Nigerian financial system. There is no doubt, however, in the positive influence of the spread of financial intermediation on the investment-income ratio as worked out in this chapter.

Chapter four brings together the results from the monetary and related research works on the economy and indicates some ways for further investigations. The question of complementarity between money and physical capital seems to be an important issue not yet tackled in the existing literature and that has left room for the present thesis to investigate. It also looks into various models on the demand for and supply of money and points out the inadequacy of the single equation models on the determination of the money stock. This obvious

gap in the literature is also bridged here in a model for the simultaneous determination of the demand/supply of base money and money itself.

In chapter five I look into the microeconomic logic behind the complementarity hypothesis. The constraining assumptions on a typical entrepreneur under financial repression of his environment have been imposed in a period analysis. With the help of many diagrams describing the basic choice problem in such a case, the purpose and also the result of this chapter has been to show the distinction between the complementarity hypothesis from the complementarity truism involved in a dynamic adjustment process. The complementarity proposed is one of (comparative static) equilibrium rather than of disequilibrium and chapter five spells out that distinction.

Chapter six tests this hypothesis in the context of an aggregate production function. It has not been the case of putting real balance in the production function and testing it - the theoretical basis at the micro-level has been worked out in the earlier chapter in the context of an equilibrium value for a portfolio problem. The aggregation of such relations would lead to a macro relation which would be the aggregate production function. The complementarity hypothesis has been tested for both narrow and broad monies, with the associated hypothesis of a structural change in the economy due to the oil boom and also due to depression. The possibility of technological change, both autonomous and induced, has also been investigated along with the main hypothesis of complementarity. All these options led to various combinations for the tests which have been summarised and presented in Tables 6.1 to 6.4 above. The results of chapter six can be listed as follows:

- (i) Narrow money turns out to be a complement asset to physical capital, when gross investment has been used as a proxy for it.

- (ii) Broad money, however, could have been a substitute for physical capital during our sample period (1960 to 1987).
- (iii) The oil boom period (1970-80) has caused a structural upward shift in the Nigerian aggregate production function but the depression (1981-87) has shifted it backward, though not totally.
- (iv) There is some evidence to suggest that the real balance elasticity of gross domestic product for both narrow and broad money has been adversely affected during the depression and there is some hint for such effect being positive for capital but negative also for labour.
- (v) When money itself has been used as the agent for demand-induced technological change, there is no evidence supporting that hypothesis. Neither is there any evidence for money being a proxy for trend or trend a proxy for money.

In chapter seven, a model for the determination of the money stock in the country has been proposed and tested. Assuming that demand and supply of high-powered money are always observed on their equilibrium values even at quarterly intervals, whereas the demand/supply of money are not, the whole system is first found to be stable so long as there is partial adjustment of the stock of money to its desired value. The model has been tested for two overlapping intervals : (a) 1971 to 1977 and (b) 1971-1987. In the earlier period, it was possible to test the hypothesis for three different definitions of money. But such degree of freedom has been denied to the researchers due to the present publications of data on money only on two definitions. The three sets of results (two versions for the longer period) are comparable only up to a limited extent, also because of other reasons indicated earlier.

In both the tests, the partial adjustment coefficient turns out to be less than unity when simultaneous estimators are used. They come

close to each other only in the case of narrow money when 2 SLS has been used, i.e. 0.27 for the earlier period and 0.26 for the other. For the earlier test, there is some evidence of the negative response of demand for money to changes in interest rates whereas for the longer time-period, there is no such evidence. In contrast, there is significant positive response, which can be interpreted for m_2 as the own-rate response dominating the opportunity-cost response, especially when deposit interest rates picked up quite considerably towards the end of the sample period for the longer test case. For the response of demand for money due to changes in (proxy for) income, I always get the right sign, but always significantly so, only for the second case.

The response of money stock to changes in the high-powered money, i.e. the marginal money multiplier, is significantly positive in all the tables, but the value for the longer time case, comes out as larger. There is also some evidence in the second case of some positive response of the broad money to changes in the rates of interest on advances by the clearing banks. This is something which never happened in the earlier table, and may be due to the high rates of interest towards the end of our longer sample period.

On the endogeneity of money supply, I get much better results for the shorter time span than the other where there is no positive evidence of effective demand in the form of income (industrial output index used as a proxy) influencing monetary base. For the impact of foreign exchange reserves on the monetary base, the results are significantly positive, as expected for all the cases. In the event of restricting all the elasticity estimates to constant values for the longer period test, the regression equations registered similar results, to the case where they were not. But it did indicate certain improvements including, (i) stable values of the money supply equation parameters, irrespective of the type of estimators and (ii) a

substantial increase in the R^2 values of the monetary-base equations. Finally, in chapter seven, the dynamics of the IS/LM/BP model under flexible exchange rate has been investigated and shown to be not necessarily stable.

Let us now look at some policy issues which may be related directly or indirectly, to the findings of the thesis. First, in chapter three we saw how monetary expansion could lead to increase in the inflation rate and also in the growth rate of income. But there seems to be good evidence for some non-linear relationship in the latter case. Also, inflation itself may be conducive to growth, up to a point, and after that any further inflation would be detrimental to growth. There are good theoretical reasons, why one should expect such relations and they are also confirmed in the evidence for the recent Nigerian experience. Thus, there is a definite trade-off between inflation and growth after a point, and the authorities may be well advised to decide on the optimal combination between this social good (growth) and social bad (inflation). The estimates of the various relevant parameters suggest that the highest possible growth rate of 15% may have to be bought with a more than fifty percent expansion of money stock, leading to an inflation rate of 14% or more, all in the first year of the policy being undertaken. The non-linearity of the opportunity lines suggest, that under the weakest assumptions on social preference, the optimum policy would aim for less growth and lower inflation. Another result in this chapter indicates that a growth of financial intermediation may lead to higher investment per naira of GDP. So there may be a case to encourage that, as a matter of economic policy. In the Nigerian context, such intermediation can be typically measured by the deposits with the commercial banks in the absence of a developed stock market and also of substantially competing savings institutions. This brings us to the findings of chapters five and six.

The empirical results from chapter six suggest that narrow money could be regarded as a complement for physical assets, whereas the broad money could be a substitute. The rapid increase in interest rates on saving and time deposits towards the end of our sample period might have induced this element in the broad money. In such a case, therefore, there is a good argument for inflationary finance of economic growth, subject to the limits indicated in the earlier paragraph. This is the usual case of using inflation as a major instrument to finance development, when money could be regarded as a substitute asset for physical capital. It is being argued here, that the financial repression of the Nigerian monetary system has been relieved substantially with a deposit rate around 15% towards the end of our sample period. But, that itself does not solve financial underdevelopment overnight. The lack of easy access to small loans for the typically small farmer or businessman, let us say, still inhibits the financial system. The evidence, at the macro level confirms narrow money being a complement to physical capital. This implies a small farmer or investor still has to save first to be able to invest and he would save typically in money. Therefore, to encourage him to do so, interest may be offered on demand deposits, if not all over the federation, preferentially to rural areas and in all development and agricultural banks. Since the major proportion of the agricultural output is produced by a great number of small farms, such a move may have more far-reaching impact than financing certain major projects with the development loans from abroad. This policy would also be consistent with the strategy of inflationary finance, so long as the interest offered on demand deposits helps the depositors at least to retain their real value. Otherwise the two policies would be working against each other. The initial cost of paying for such interest payments may be financed by reduction in government consumption and/or

by creation of government money. In the latter stages, extra income earned by the banks on extra loans and advances, may make the scheme eventually self-financing and even profitable.

Let us now consider the results from chapter seven on the determination of money supply. Even though the parameter estimates indicate some element of endogeneity in the money supply, under the present flexible exchange rate regime, it is possible to control the money supply. The special case of Nigeria, when for a large part of the sample period the federal government had been the main source of foreign exchange earner, thanks to the oil sector, indicates that even under its fixed exchange rate regime, it had the freedom to control money stock. A look at the balance sheets of the CBN at different periods reported in chapter seven, would tell us how the federal authorities had been increasing the domestic credit when the other source of high-powered money from foreign assets was proving inadequate.

Thus, under the present flexible exchange rate regime, the policy makers can control money stock and they have been doing so over the years. But there could be a choice here. In the event of an increase in the world demand for Nigerian oil, the authorities have the choice of appreciating the foreign value of naira, with little or no increase in income by letting money stock grow a little, or increasing income with naira not appreciating, by letting money stock grow substantially.

DATA APPENDIX

Data used in the thesis are presented in six tables in this section. The major source of the data are the various publications of the Central Bank of Nigeria and the Federal Office of Statistics, Lagos. Since they revise their estimates, like any other source of statistics on an economy, the latest publication on a datum for a particular time is sought to be reported here.

Table A.1 Some Annual Data (N million)

Year	GDP * Deflator = P	Gross Investment = I	$\frac{I}{P}$	Real Capital	Labour** Index	GDP at 1980 factor cost
1960	0.1410	258	1,830	51,012	35	17,004
1961	0.1350	258	1,911	51,393	36	17,570
1962	0.1350	305	2,259	52,110	41	18,580
1963	0.1460	393	2,692	53,239	46	20,136
1964	0.1470	503	3,422	55,064	47	21,373
1965	0.1530	615	4,020	57,432	53	21,930
1966	0.1680	602	3,583	59,292	49	21,498
1967	0.1730	484	2,798	60,311	52	17,052
1968	0.1500	438	2,920	61,300	54	19,194
1969	0.1580	550	3,481	62,381	62	24,336
1970	0.1780	883	4,961	63,990	72	31,584
1971	0.1900	1,283	6,753	67,032	81	37,392
1972	0.1920	1,401	7,297	71,774	91	40,118
1973	0.2880	2,506	8,701	76,917	97	38,119
1974	0.4400	2,956	6,718	83,311	106	42,741
1975	0.5250	5,020	9,562	87,530	111	41,453
1976	0.6000	8,107	13,512	94,466	137	45,970
1977	0.6540	9,421	14,405	105,144	152	49,712
1978	0.7710	9,386	12,174	116,394	154	46,072
1979	0.9140	9,095	9,951	125,077	158	47,233
1980	1.00	10,841	10,841	131,275	165	49,755
1981	1.1460	11,044	9,637	138,178	207	45,580
1982	1.2620	8,981	7,116	143,670	158	45,630
1983	1.3360	6,451	4,829	146,476	161	37,703
1984	1.4470	3,789	2,619	146,910	155	32,817
1985	1.5870	4,818	3,036	145,122	141	35,592
1986	1.6740	5,270	3,148	143,804	141	34,841
1987	1.8449	6,180	3,350	142,638	140	35,258

Sources: (i) International Financial Statistics, IMF.
(ii) Central Bank of Nigeria:
(a) Annual Report and Statement of Accounts
(b) Monthly Report, Economic and Financial Review
(iii) Federal Office of Statistics, Digest of Statistics

Notes:

* GDP Deflator is calculated by comparing GDP at current factor costs and GDP at constant factor cost. Since the GDP at constant factor cost changed base a few times in official publications, I have linked all such figures to 1980 factor cost.

** A separate table is presented to explain the calculations for the Labour Index

Table A.2 Annual Monetary Data (N Million)

Year	Narrow Money (M1)	Broad Money (M2)	m1 = $\frac{M_1}{P}$	m2 = $\frac{M_2}{P}$
1960	241	296	1,709	2,099
1960	243	314	1,800	2,326
1962	253	333	1,874	2,467
1963	269	362	1,842	2,479
1964	318	431	2,163	2,932
1965	328	469	2,144	3,065
1966	257	520	1,867	3,095
1967	323	454	2,253	2,624
1968	338	522	2,829	3,480
1969	447	663	3,612	4,196
1970	643	979	3,526	5,500
1971	670	1,042	3,891	5,484
1972	747	1,204	3,215	6,271
1973	926	1,508	3,993	5,236
1974	1,757	2,730	4,962	6,205
1975	2,605	4,178	6,440	7,958
1976	3,864	5,843	8,498	9,738
1977	5,558	7,813	6,616	11,946
1978	5,101	7,521	6,725	9,755
1979	6,147	9,849	9,227	10,776
1980	9,227	14,390	9,227	14,390
1981	9,745	15,239	8,503	13,298
1982	10,049	16,694	7,963	13,228
1983	11,283	19,034	8,445	14,247
1984	12,204	21,243	8,434	14,681
1985	13,227	23,153	8,335	14,589
1986	12,663	23,605	7,565	14,101
1987	14,906	28,895	8,080	15,662

Sources: (i) International Financial Statistics, IMF.
(ii) Central Bank of Nigeria:
(a) Annual Report and Statement of Accounts
(b) Monthly Report, Economic and Financial Review
(iii) Federal Office of Statistics, Digest of Statistics

Notes:

Prior to March 1978, M2 included Central Government deposits with the Commercial Banks.

M₁ = currency in circulation plus Demand Deposits with the Commercial Banks.

M₂ = M₁ plus Time and Savings Deposits.

Table A.3. Background Data for Total Employment Index

Year	Unemploy- ment ('000)	Popula- tion (mill- ion)	Civil Service ('000)	Manufac- turing ('000)	Crude Petrol- eum Pro duction Index	Metal Manufac- turing ('000)	Labour Index
1960	6.86	42.95	(49)	32.8	0.8	36.9	34.614
1960	13.75	44.05	(50)	34.3	2.2	40.4	35.660
1962	15.06	45.17	51	53.1	3.3	44.0	41.295
1963	16.82	46.32	54	65.8	3.7	45.5	45.609
1964	20.73	47.19	47	76.3	5.8	47.8	46.943
1965	20.94	48.68	51	95.6	13.2	54.0	53.118
1966	26.63	49.89	55	65.9	20.2	54.5	48.838
1967	20.10	51.12	59	76.4	15.5	51.7	52.340
1968	12.90	52.42	62	80.8	6.9	50.1	53.860
1969	12.20	54.69	62	102.6	26.1	49.1	61.733
1970	13.50	56.35	64	127.1	52.5	51.8	71.618
1971	14.41	58.67	73	145.4	75.4	51.6	81.247
1972	15.37	59.85	84	167.5	88.2	54.9	91.379
1973	19.10	61.71	100	166.8	99.5	54.2	96.543
1974	21.82	63.65	123	175.3	109.1	56.3	105.938
1975	19.07	67.65	134	244.2	86.4	56.2	110.509
1976	18.97	70.07	155	271.4	100.4	33.9	136.599
1977	15.85	72.58	160	324.4	101.4	33.2	151.912
1978	16.66	75.18	188	305.5	92.4	(37.4)	154.317
1979	16.04	77.84	197	(299.9)	111.6	41.6	158.203
1980	16.88	80.56	231	294.3	100.0	48.1	165.431
1981	15.70	83.31	256	448.7	69.7	33.2	206.508
1982	16.34	85.63	265.5	248.5	62.2	31.3	158.441
1983	35.90	89.03	292	233.6	59.7	27.8	160.613
1984	33.60	92.04	302	(200.0)	67.0	18.2	155.350
1985	32.80	95.20	255	(188.0)	71.4	10.9	141.140
1986	33.00	98.48	(250)	(190.0)	(66.7)	(10.0)	140.640
1987	(33.00)	101.49	(245)	(190.0)	62.0	(10.0)	139.673

Source: Federal Office of Statistics, Digest of Statistics.

Notes:

Labour Index is calculated on the following basis:

25% weights for (i) Population (in million)
EACH (ii) Civil Service Employment (in thousands)
 (iii) Manufacturing Employment (in thousands)

10% weights for (i) Index of Crude Petroleum Production
EACH (ii) Metal mining employment (in thousands)

5% weight for unemployment (in thousands) entered negatively.

For example: 1962:

$$\begin{aligned}
 & (.05) (-15.00) + (.25)(45.17) + (.25)(51) + (.25)(53.1) \\
 & + (0.1)(3.3) + (0.1)(44) \\
 & = -.753 + 11.293 + 12.75 + 13.275 + .33 + 4.4 = 41.295
 \end{aligned}$$

Numbers in parentheses are estimates due to unavailability of data.

Table A.4 Some Quarterly Data (N. million for the last four columns)

Time	Index of Income	Price Index	Deposit Rate	Advance Rate	Foreign Assets	High Powered Money	Narrow Money	Broad Money
1971 I	60.9	26.0	3.00	7.00	208	376	648	1,012
II	62.1	27.8	3.00	7.00	246	359	646	1,036
III	59.7	28.6	3.00	7.00	211	368	601	965
IV	66.6	28.3	3.00	7.00	283	393	651	1,018
1972 I	67.4	28.9	3.00	7.00	238	388	703	1,108
II	69.6	29.5	3.00	7.00	217	370	658	1,061
III	73.1	27.9	3.00	7.00	252	362	675	1,115
IV	75.7	27.3	3.00	7.00	254	430	748	1,195
1973 I	76.4	28.6	3.00	7.00	289	423	761	1,243
II	78.7	30.2	3.00	7.00	340	403	775	1,276
III	81.6	30.5	3.00	7.00	292	418	814	1,376
IV	89.3	31.5	3.00	7.00	389	502	830	1,369
1974 I	87.3	32.5	3.00	7.00	809	503	932	1,540
II	87.8	34.2	3.00	7.00	1,491	544	1,058	1,768
III	89.7	33.8	3.00	7.00	2,469	752	1,141	2,022
IV	89.6	34.6	3.00	7.00	3,454	901	1,330	2,270
1975 I	79.8	39.2	3.00	7.00	3,761	1,461	1,833	2,905
II	78.3	44.5	3.00	6.00	3,787	1,326	2,017	3,235
III	84.3	47.5	3.00	6.00	3,548	1,396	2,208	3,552
IV	91.0	49.0	3.00	6.00	3,586	1,893	2,342	3,752
1976 I	96.3	53.3	3.00	6.00	3,470	2,534	2,681	4,471
II	99.2	54.2	3.00	6.00	3,766	2,698	2,900	4,700
III	97.6	55.9	2.50	6.00	3,702	2,940	3,400	5,265
IV	103.8	56.9	2.50	6.00	3,293	2,547	3,568	5,531
1977 I	104.6	59.5	2.50	6.00	3,223	2,612	4,120	6,211
II	106.7	64.9	3.00	6.00	3,133	2,792	4,562	6,635
III	104.7	70.6	3.00	6.00	3,069	2,887	4,870	6,957
IV	97.7	72.6	3.00	6.00	2,766	3,148	5,468	7,601
1978 I	94.3	75.5	3.00	6.00	2,510	3,116	5,241	7,465
II	100.8	81.9	4.75	7.00	1,821	2,916	5,241	7,392
III	107.3	83.4	4.75	7.00	1,352	2,821	4,880	7,227
IV	113.7	84.8	4.75	7.00	1,308	2,998	5,574	7,836
1979 I	120.5	86.6	4.50	7.00	1,588	2,868	5,348	7,847
II	121.9	92.0	4.50	7.00	1,767	3,127	5,305	7,982
III	118.8	92.8	5.00	7.00	2,750	3,215	6,149	9,504
IV	122.3	92.3	5.50	7.50	3,109	3,274	6,184	9,926
1980 I	104.7	93.6	4.75	7.50	3,701	3,605	6,945	10,778
II	91.6	94.5	5.75	7.00	4,563	3,417	6,188	10,494
III	101.0	105.2	5.50	7.00	5,608	3,675	7,087	11,628
IV	102.7	106.7	5.75	9.00	5,622	4,738	8,379	13,491
1981 I	107.3	113.1	5.75	9.00	5,705	4,608	8,703	13,783
II	94.6	119.6	5.75	8.75	6,074	4,681	8,844	13,940
III	89.9	125.1	5.75	8.50	4,659	4,749	8,988	14,320
IV	96.6	125.5	5.75	9.50	2,842	5,258	8,869	14,373
1982 I	106.2	126.6	6.17	8.83	1,504	4,934	9,159	14,928
II	106.9	128.9	8.00	10.25	1,043	5,102	9,508	15,627
III	102.8	131.2	8.08	10.67	1,087	5,415	9,445	15,665
IV	97.0	133.8	7.92	10.42	1,313	6,246	9,533	15,979
1983 I	81.8	140.3	7.13	10.12	986	5,865	9,767	16,355
II	92.0	152.6	7.36	9.80	857	5,325	9,944	17,035
III	89.7	168.0	7.22	9.84	860	5,424	11,026	18,564
IV	84.5	180.3	7.94	10.15	918	6,128	11,283	19,035
1984 I	97.1	193.6	7.00	9.67	847	6,280	11,103	19,196

II	78.5	225.4	8.25	9.17	1,070	4,836	10,749	19,473
III	72.3	242.7	8.73	10.03	955	5,946	11,540	20,260
IV	78.7	233.3	9.03	12.10	1,216	5,935	12,204	21,243
1985 I	101.2	235.5	9.10	9.53	1,285	5,748	11,503	20,710
II	80.5	240.3	9.17	9.53	1,128	5,642	11,944	21,435
III	81.4	236.1	9.17	9.10	819	5,769	13,181	23,198
IV	89.8	232.7	9.03	9.57	1,686	5,734	13,227	23,153
1986 I	83.6	231.0	9.25	8.75	1,610	5,877	12,992	23,455
II	77.4	240.9	9.25	9.00	1,590	5,843	12,074	22,731
III	71.1	261.2	9.13	9.73	2,062	5,989	11,119	23,220
IV	66.7	262.1	9.51	10.57	3,637	6,684	12,663	23,605
1987 I	63.5	264.3	11.90	11.83	2,818	6,121	11,977	23,215
II	66.1	267.6	11.72	10.64	3,002	6,008	11,736	23,749
III	71.5	277.8	13.82	15.42	4,212	6,668	12,404	25,395
IV	77.4	287.0	14.92	17.96	4,661	8,501	14,906	28,895

Sources: (i) International Financial Statistics, IMF.
(ii) Central Bank of Nigeria:
(a) Annual Report and Statement of Accounts
(b) Monthly Report, Economic and Financial Review
(iii) Federal Office of Statistics, Digest of Statistics

Notes:

Since quarterly figures for income are not available for Nigeria in published form, the index for industrial production has been used as a proxy for it. Values for the last eight quarters are not available and they have been estimated on the basis of the growth rate of the index for crude petroleum production.

The quarterly price indices are the consumers price indices with the base at 1980.

Deposit rate is the 3-month rate and advance rate is for first class advances.

Foreign assets are the total foreign assets of the CBN and the high-powered money is currency in circulation plus reserve money of the commercial banks at the CBN plus their vault cash. This is calculated as the sum of Row 20 and Row 14a in the tables for Nigeria in IFS.

Narrow and Broad Money are defined in the same way as in table A.2.

Table A.5. Some Quarterly Monetary Data. (N million)

Time	Currency in Circulation	Demand Deposits D1	Saving and time Deposits D2
1971 I	343	329	366
II	328	298	350
III	338	272	365
IV	355	315	372
1972 I	348	332	389
II	334	319	407
III	346	354	430
IV	385	362	457
1973 I	380	444	483
II	366	435	504
III	382	422	545
IV	436	490	582
1974 I	460	544	638
II	474	618	743
III	496	725	890
IV	570	829	973
1975 I	833	1,081	1,073
II	922	1,165	1,203
III	956	1,249	1,350
IV	1,031	1,564	1,572
1976 I	1,109	2,153	1,613
II	1,119	2,040	1,844
III	1,199	2,093	1,904
IV	1,351	2,513	1,979
1977 I	1,489	3,168	2,069
II	1,544	3,112	2,049
III	1,666	3,474	2,081
IV	1,941	3,617	2,255
1978 I	2,080	3,455	2,226
II	2,075	3,024	2,281
III	2,046	3,401	2,390
IV	2,157	2,944	2,420
1979 I	2,147	3,145	2,467
II	2,108	3,514	2,746
III	2,136	4,071	3,419
IV	2,351	3,796	3,702
1980 I	2,435	4,726	4,022
II	2,456	4,145	4,386
III	2,657	4,795	4,588
IV	3,186	6,041	5,163
1981 I	3,235	5,003	5,089
II	3,388	5,217	5,118
III	3,464	5,534	5,527
IV	3,862	5,883	5,494
1982 I	3,728	5,151	5,951
II	3,744	5,082	6,186
III	3,839	5,260	6,469
IV	4,223	5,826	6,645
1983 I	4,204	5,563	6,588
II	4,225	5,719	7,091
III	4,511	6,515	7,538
IV	4,843	6,440	7,752
1984 I	4,856	6,247	8,093
II	3,596	7,153	8,724
III	4,646	6,894	8,720
IV	4,884	7,230	9,039

1985 I	4,512	6,991	9,207
II	4,360	7,584	9,491
III	4,464	8,717	1,017
IV	4,910	8,317	9,926
1986 I	4,927	8,065	10,463
II	4,734	7,337	10,657
III	4,880	6,239	12,101
IV	5,178	7,485	10,942
1987 I	4,880	7,097	11,238
II	4,834	6,902	12,013
III	5,191	7,213	12,991
IV	6,299	8,607	13,989

Sources: (i) International Financial Statistics, IMF.
(ii) Central Bank of Nigeria:
(a) Annual Report and Statement of Accounts
(b) Monthly Report, Economic and Financial Review
(iii) Federal Office of Statistics, Digest of Statistics

All figures are for the quarter ends.

Table A.6. Some relevant ratios

Time	Ratios			
	$\frac{C}{D_1}$	$\frac{C}{D_2}$	$\frac{M_1}{H}$	$\frac{M_2}{H}$
1971 I	1.04	0.94	1.79	2.76
II	1.10	0.94	1.74	2.72
III	1.24	0.93	1.67	2.65
IV	1.13	0.95	1.70	2.65
1972 I	1.05	0.89	1.75	2.76
II	1.05	0.82	1.76	2.86
III	0.98	0.80	1.93	3.12
IV	1.06	0.84	1.74	2.80
1973 I	0.86	0.79	1.95	3.09
II	0.84	0.73	1.99	3.24
III	0.91	0.70	1.92	3.23
IV	0.89	0.75	1.84	3.00
1974 I	0.85	0.72	2.00	3.26
II	0.77	0.64	2.01	3.37
III	0.68	0.56	1.62	2.81
IV	0.69	0.59	1.55	2.63
1975 I	0.77	0.78	1.31	2.04
II	0.79	0.77	1.57	2.48
III	0.77	0.71	1.58	2.55
IV	0.66	0.66	1.37	2.20
1976 I	0.52	0.69	1.29	1.92
II	0.55	0.61	1.17	1.85
III	0.57	0.63	1.12	1.77
IV	0.54	0.68	1.52	2.29
1977 I	0.47	0.72	1.78	2.58
II	0.50	0.75	1.67	2.40
III	0.48	0.80	1.78	2.50
IV	0.54	0.86	1.77	2.48
1978 I	0.60	0.93	1.78	2.49
II	0.69	0.91	1.75	2.53
III	0.60	0.86	1.93	2.78
IV	0.73	0.89	1.70	2.51
1979 I	0.68	0.87	1.85	2.71
II	0.60	0.77	1.80	2.68
III	0.52	0.62	1.93	2.99
IV	0.62	0.64	1.88	3.01
1980 I	0.51	0.60	1.98	3.10
II	0.59	0.56	1.93	3.22
III	0.55	0.58	2.03	3.28
IV	0.53	0.62	1.95	3.04
1981 I	0.65	0.64	1.79	2.89
II	0.65	0.66	1.84	2.93
III	0.63	0.63	1.89	3.06
IV	0.66	0.70	1.85	2.90
1982 I	0.72	0.63	1.80	3.01
II	0.74	0.61	1.73	2.94
III	0.73	0.59	1.68	2.87
IV	0.72	0.64	1.61	2.67
1983 I	0.76	0.64	1.67	2.79
II	0.74	0.60	1.87	3.20
III	0.69	0.60	2.03	3.42
IV	0.75	0.62	1.84	3.11
1984 I	0.78	0.60	1.77	3.06
II	0.50	0.41	2.22	4.03

III	0.67	0.53	1.94	3.41
IV	0.67	0.54	2.06	3.58
1985 I	0.65	0.49	2.00	3.60
II	0.57	0.46	2.12	3.80
III	0.51	0.45	2.32	4.08
IV	0.59	0.49	2.31	4.04
1986 I	0.61	0.47	2.21	3.99
II	0.65	0.44	2.07	3.89
III	0.78	0.40	1.86	3.88
IV	0.69	0.47	1.89	3.53
1987 I	0.69	0.43	1.96	3.79
II	0.70	0.40	1.95	3.95
III	0.72	0.40	1.86	3.81
IV	0.73	0.45	1.75	3.40

Sources: (i) International Financial Statistics, IMF.
(ii) Central Bank of Nigeria:
(a) Annual Report and Statement of Accounts
(b) Monthly Report, Economic and Financial Review
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