MONEY AND MONETARY POLICY IN A LESS DEVELOPED ECONOMY. THE CASE OF CEYLON (SRI-LANKA), 1950-1970.

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by

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CONTENTS

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ABSTRACT

The main object of this work is to discover quantitative information about Monetary Policy in an independent less-developed economy, the economy of Ceylon.
The examined period is 1960-1970, using annual data.

Chapter I serves as an introductory outline to the whole work.

Chapter 2 undertakes a brief overview of the main issues outstanding in Monetary Policy and to show how our study is relevent to some of these issues.

Chapter 3 looks at the basic characteristics of the economy by examining the general economic background and the institutional features of the monetary, banking and financial structure.
The implications of the high dependence on foreign trade for various features of the economy and for the working of the monetary system are outlined.

Chapter 4, with the background and the issues raised in chapter 3, examines the economic stabilization policies followed by the Monetary Authorities. The main problems encountered by the Authorities were:

(i) To mitigate the effects of fluctuations in the export sector which caused disequilibrium in the balance of payments with further effects throughout the economy.

(ii) To meet the consequences of the liquidity created because of the Government financing of its deficits through borrowings from the Central Bank.

(iii) Strong necessity for economic development.

The imposition of controls and restrictions on imports after 1960, created a new situation with important implications for the kind of the monetary measures adopted to check liquidity.
The relationship of changes in the price level and changes in the money supply and the changes in the public's portfolios to keep currency and demand deposits are examined too.
On the other hand, the difficulties that face fiscal policy in LDCs are brought out together with remarks that a strong conflict can exist between the price stability and economic development, the strong connection of the balance of payments situation and fiscal

actions, and the high interdependence of monetary and fiscal policy which cannot, therefore, be examined separately.

Chapter 5 investigates the properties of the demand function for money and is preceded by a review of the development of some basic issues in the subject. In our empirical investigation, the tests performed refer to some simple models, but particular attention is given to the dynamic formulations of the partial adjustment-income expectations models and to the stability of the function.

Chapter 6 takes up the supply of money. The analysis, based on the money supply-multiplier-Base formula ($M^S=mB$), proceeds from simple expressions of the multiplier, such as those of Cagan and Friedman, to more elaborate ones, by considering the evolution and the variability of the multiplier and the various ratios such as the currency ratio, the time deposit ratio, and the reserves ratio. In this context, the discussions of the "monetarist" view and "new" view of the money supply mechanism are entered. In addition, specification of behavioural equations for the various ratios is undertaken, with the object of specifying a money supply function together with the various interest elasticities. Attention is also drawn to the monetary base from the sources point of view and to the problems encountered in controlling the monetary base.

Chapter 7 develops a relatively simple model consisting of 14 structural equations and 7 identities, representing the Private sector, Commercial banks, real sector, and the Government sector, with the purpose of discovering quantitative information of these sectors and any particular characteristics in their behaviour, to find any links between the real sector and the financial variables, and finally, to evaluate the effectiveness of the various policy variables.

Chapter 8 states the main conclusions and suggests directions that future work could take.

CHAPTER I

INTRODUCTION

Since the 1950's period, there has been a tremendous increase in the number of investigations of the workings of monetary mechanisms and in the ways of designing monetary policy, by bringing econometric studies into the theoretical arguments; however, most of the studies have been of developed countries, such as U.S., U.K., Canada, and to a much less degree for less-developed countries (LDCs).(1)
One reason for this relatively limited amount of research in LDCs is that there is not adequate or accurate data available, together with the new established nature of these countries as independent nations.

The main object of this work is to discover quantitative information about the monetary policy in a less developed economy, the economy of Ceylon.(2)

A clarification about the term "monetary policy", as it is used in this work. It includes various quantitative measures of monetary policy such as discount policy, reserve requirements etc., but it does not include any qualitative measures of monetary policy such as moral suasion, recommendations etc. On the other hand, the effects of fiscal policy, particularly budgetary policy, the balance of payments and various other more or less endogenous factors, are brought out because of the need to finance government spending.

The examined period is 1950-1970, using annual data.
The choice of this period had been directed mainly by the availability of adequate data. This period coincides with the years of establishment of the Central Bank (28/8/1950(3)) and the years of independence of the country (1949). Furthermore, the case of Ceylon is interesting for two main characteristics:

(i) During the first period, 1950-1960, the economy is a typical example of a "classical" export economy, that is, exports of a limited range primary products is the main business of the country, while imports are almost free of any control.

(ii) During the second decade 1961-1970, though the economy retained the characteristic with respect to exports, on the imports side, exchange controls and restrictions were imposed and generally, during this period the role of Government has been a distinct one.

Chapter 2, undertakes a brief overview of the main issues outstanding in monetary policy, in a broad sense, with the purpose of illustrating that these issues are quite vast and without clear-cut answers; hence, the necessity to restrict ourselves to a very limited number of these issues and to show how our study is relevant to these issues.

Chapter 3, looks at the basic characteristics of the economy, by examining the general economic background and the institutional features of the monetary, banking and financial structure. The economy is a less developed one with high dependence on the exports of a few products; imports constitute a large leakage from the income stream. This basic characteristic has its effects on the other characteristics of the economy and it is strongly connected with them, namely, fluctuations in income and other aggregates, the level of prices, balance of payments situation, composition of money supply, the changes in the money supply, the behaviour of commercial banks in their activities, the composition and direction of credit, existence of other financial institutions and state of money and capital markets. Some implications of these features for the working of the monetary system are outlined too.

With the background obtained in chapter 3, the economic stabilization policies followed are analyzed in chapter 4. These policies include not only monetary policy measures-quantitative and qualitative ones- but also, the liquidity effects of fiscal policy, the balance of payments and various other more or less endogenous factors. This analysis gives some insight into the problems faced by the monetary authorities in implementing their policy objectives, and the effectiveness of the various tools used. The main problems encountered by the Authorities were:

(i) To mitigate the effects of fluctuations in the export sector which caused disequilibrium in the balance of payments with further effects throughout the economy because of the high dependence on the trade sector.

(ii) To meet the consequences of the liquidity created because of the Government financing of its deficits through borrowings from the Central Bank.

The liquidity created by the Government deficits put pressures on imports and therefore, on the amount of foreign reserves of the country. Thus the dilemma over the long-run period was either restrictions on imports which could put pressures on the price level, or the running down of foreign reserves, which cannot go on indefinetely, particularly with adverse conditions in the terms of trade. So by 1960, restrictions and controls on imports had to be imposed which, however, created a new situation, with important implications for: the nature and extent of the monetary measures taken to check liquidity; the relationship of changes in prices and changes in money supply; the public's portfolios to keep currency and demand deposits.

On the other hand, the difficulties that face fiscal policy in LDCs are brought out together with remarks that a strong conflict can exist between the price stability and economic development, the strong connection of the balance of payments situation and fiscal actions, and the high interdependence of monetary and fiscal policy which cannot, therefore, be examined separately.

Chapter 5, investigates the properties of the demand function for money and is preceded by a review of the development of some basic issues in the subject. In our empirical investigation, the tests performed refer to some simple models, but particular attention is given to the dynamic formulations of the partial adjustment-income expectations models and to the stability of the function. The highly tentative conclusions on these issues, together with the single equation approach, do not permit us to draw firm conclusions for the conduct of monetary policy. At best, these relations suggest that there might be a strong connection between income and the money stock.

The object of the following chapter is to go beyond this single-equation approach to a more detailed analysis of the mechanism of supplying money and a disaggregation of the various sectors of the economy. So,

Chapter 6 takes up the problem of money supply. Tha analysis, based on the money supply-multiplier -base formula ($M^S=mB$), proceeds from simple expressions of the multiplier, such as those of Cagan and Friedman, to more elaborate ones, by considering the evolution and the variability of the multiplier and the various ratios, such as the currency ratio, the time deposit ratio, and the reserves ratio. In this context, the discussions of the "monetarist" view and "new" view on the question of the relative importance of the base and the multiplier as sources of change in the money supply are entered, which proved to be relevant only when we specify whether the discussion is in terms of a short-run or a long-run period.

In addition, specification of behavioural equations for the various ratios is undertaken, with the object of specifying a money supply function together with the various interest elasticities. Attention is also drawn to the monetary base from the sources point of view. This is of particular significance in our case, since during the I950-60 period the balance of payments situation was the dominant factor in determining the changes in the base, while during the second period, the dominant factor was the Government's position at the Central Bank. Besides, this examination of the underlying factors in these changes in the base highlights the problems encountered in controlling the monetary base. The answer to this problem is largely dependent upon the success with which the conflict between the price stability and economic development goals are reconciled.

Chapter 7 develops a relatively simple model consisting of I4 structural equations and 7 identities, representing the private sector, commercial banks, real sector and Government sector, with the purpose of discovering quantitative information of these sectors together with any particular characteristics in their behaviour, to find out any links between the real sector and the financial variables, and finally, to evaluate the effectiveness of the various policy variables.

Chapter 8 states the main conclusions and suggests directions that future work could take.

NOTES TO CHAPTER I

(I) Though the distinction "less developed-developing", is not clear-cut, and today the term "developing" is mainly used to suggest the dynamic character of the economy and the efforts of these countries to promote economic development, our use of the term "less developed", obviously, does not exclude such considerations.

(2) Today's name is Sri-Lanka, but we retain the old name as it is better known.

(3) Monetary Law Act No 58/I949 establishing a Central Bank in Ceylon.

CHAPTER 2

ISSUES IN MONETARY POLICY: A BRIEF OVERVIEW

In any economy, the study of monetary policy may be examined in two stages. The first concerns the impact various tools may have on monetary variables. The second stage, concerns the relationships between monetary variables and expenditure flows in the economy, changes of which are related to certain objectives, i.e., the transmission mechanism. Both aspects are necessary in order to understand how the authorities can influence the level and distribution of expenditures through the monetary system.

In this process numerous issues arise. We are going to state only the major of these issues and to give a general description of the present state of knowledge. Otherwise, detailed exposition would carry this work far beyond feasible scope.

Unfortunately, most of the issues have not yet been settled. The arguments are not in the kind of either...or, but, usually of the type: on the one hand... and on the other hand... and besides... and furthermore... Some of the issues will be dealt in more detail as they relate more directly to later stages of this work.

We should note here that most of the literature on monetary policy has been concerned with some developed countries, primarily with U.S and occasionally with U.K. About the other countries, especially the less developed ones, little work has been done, and where it has, it is mainly concerned with the first stage, stated above, and not with the second stage - the transmission mechanism. Obviously, one of the main reasons for this lack of research, is the paucity of detailed and consistent data.

Let us take more specifically the existing issues, contrasting in some cases, the differences between developed and less developed countries. We should point out, however, that, though the exposition of the issues takes place separately, they are in fact interrelated in many ways.

2.I. Policy objectives.

What are the major policy objectives (goals) of monetary policy? There is a general agreement about the desired objectives: Price stability, high level of employment, high rate of economic growth and balance of payments equilibrium. Some writers add some more such as: Reduction in the inequalities of income and wealth, to increase the efficiency of the system to keep a stable market demand for Government securities. These objectives are usually stated in the official documents and statements, both of developed and less developed countries.

There are, however, differences over time and among countries, in the emphasis given to these objectives. It is usually stated, for example, that price stability is a more pressing problem in developed countries, while for less developed countries, fluctuations in the balance of payments situation and the achievement of high growth rates, are more predominant.

There is disagreement in what is meant by each objective. We do not always have clear-cut ideas, both on theoretical grounds and on quantitative definitions. So, in the case of the price stability objective, should we measure it by the consumer price index, the wholesale price index, or by something else? What quantitative change in the used index would be consistent with price stability? The same problem of quantitative definition is met in the other objectives too. e.g., is a rate of unemployment 2-3 per cent consistent with the meaning of full employment? How should we define economic growth? We usually use some measure of income- real, nominal, per capita, per worker- but many other things can be used to define the state of growth and development. Whatever the answers to these questions, they clearly imply different policy prescriptions in each case.

There is disagreement about the extent to which the various objectives are compatible with each other. Taking into consideration the vague meaning of "compatible", because of the above mentioned difficulties in defining the various goals, it can be said that the various objectives are interrelated and, although there is some degree of complementarity, there is also some potential for conflict

among them. So for example, full employment and price stability may conflict in several ways. In this context, there has been extensive discussion about the relation between unemployment and changes in wages (The so-called "Phillips curve").
Similarly, there has been extensive controversy over to what extent economic growth is compatible with price stability.
Price stability and balance of payments equilibrium can conflict too. Granted that inflation tends to worsen the balance of payments, an attempt, for example, to restrict imports can put more inflationary pressures on the domestic price level.
Full employment and rapid economic growth can be also incompatible with balance of payments equilibrium since both full employment and rapid growth are likely to lead to an increase in imports greater than any offsetting forces resulting from improvements in exports and/or in the capital account.

Does the degree of conflict differ systematically between developed and less developed countries?
It is argued for example, that in the LDCs the conflict between economic growth and price stability is more strong than in developed countries, due to the existence of some "basic factors", such as immobility of factors of porduction, lack of enterpreneurship and skilled labour, scarce foreign exchange etc., arguments usually stated in the context of the "structuralist-monetarist" controversy, very vivid in the Latin America countries. The conflict between price stability and balance of payments equilibrium is likely to be relatively stronger in LDCs particularly when imports constitute a large proportion of the total income. Furthermore, balance of payments equilibrium, full employment and economic growth can be in a relatively strong conflict in LDCs, because of the high proportion of imports in total income, the difficulty LDCs have in affecting their exports and the existence of weak financial markets. In addition, there is a relatively greater danger that LDC Governments will commit themselves to financing of their expenditure which will turn out to be inflationary because of, on the one hand, the desire for rapid economic growth and, on the other hand, the inability to finance Government expenditures from market borrowing and taxation because of low per capita incomes, inefficient administrative systems etc.

The existence of possible conflicts among the various objectives, puts on the Authorities the task of specifying the relative importance attributed to the various objectives, that is, of specifying the "trade-off" functions in their behaviour.
Generally, very little is known on these issues.

2.2. Policy instruments

I) What are the tools (instruments) the Authorities can use to achieve the various policy objectives? Usually, in broad terms they are:

Open market operations

Bank rate or discount rate

Reserve requirements

Direct measures such as price and distribution controls, rationing, regulation on imports through licensing and quotas.

Other qualitative measures, such as moral suasion.

Various questions arise concerning the use of these tools. For example, what are the functions of each policy instrument? What are the advantages and disadvantages of pursuing a specific policy or of direct and indirect measures?(I) The arguments reveal large disagreements. We should note, however, that the comparison of various tools is relevant only in the context of a specific country.(2)

How do the various tools interact? Are they complementary to each other or they are competitive?
On the one hand, each of the various tools has its own set of advantages and disadvantages and, hence, they can be used to complement each other. On the other hand, it can be said that, in a broad sense, most of the tools try to affect the reserve position of the banks and that, therefore, a decision has to be made in each case on which one should be used. In this way they are competitive.
For example, a decrease in the reserve requirements and an increase in the discount rate, may be considered as competitive, if one looks at their effect on the reserve position of the banks and, therefore, on their ability to expand credit. On the other hand, these policy actions can be considered as complementary ones, if the purpose of the decrease in reserve requirements is to help the reserve position of the banks in order to expand credit during a recession period, while the increase

in the discount rate is made in order to encourage savings[3] by inducing other rates to change in the same direction (or the discount rate may simply change to keep up with market rates).
Implicitly in these policy actions, it is assumed that the reserve position of the banks is important for their credit policy, while the discount rate is not considered as strong in affecting banks' discount policies and in turn their credit policies.

2) Notice, however, that most of the tools involve changing bank reserves. These changes are important if they have further effects on the economy through changes in the money stock and in interest rates. Therefore, a whole series of issues arise in this context such as:

How do changes in reserves bring changes in the money stock and changes in interest rates and, more important, to what extent are these effects predictable? In this context, the supply of money arguments are entered.

The discussions run from the simple traditional treatment of deposit creation multiplier, to more analytical examination of the behaviour of commercial banks, public and Government, trying to specify their behavioural relationships. In addition to the multiplier, the monetary base requires considerable attention, by examining the underlying factors in the changes of the base. In this manner, quite complex money supply functions can be developed.

Furthermore, a lot of discussion is concerned with how changes in the money stock affect interest rates. For example, changes in the monetary base through open market operations can affect interest rates; or changes in reserve requirements may bring changes in the portfolios of the commercial banks and, hence, changes in interest rates. What is the effect of these changes on the term structure of interest rates and on the real variables?

Furthermore, in many writings in the context of a specific country, the institutional set up of the banking system, of the money market together with the capital market conditions, are examined. It is sometimes from this kind of examination, together with the main characteristics of the economy, that some writers come to the conclusion that monetary policy, especially in LDCs, is not effective

or, at least, that its scope is limited.

3) Even if the various tools can produce changes in the monetary variables - money stock, interest rates etc.- we need to know what the impact is on expenditure, which is the ultimate objective, and how this effect is transmitted. In other words, we want to know the transmission mechanism. Whether the transmission mechanism is according to the Keynesian scheme or the new quantity theory scheme is an outstanding issue in the current debate. The theoretical differences are not as deep as they look since in both the transmission mechanism works mainly through interest rates, but the new quantity theorists consider a much broader range of interest rates - implicit and explicit rates both for financial and real variables. In terms of predictive value, however, it is asserted that the new quantity theory scheme is superior to the Keynesian scheme, though there is much discussion about the specification of the variables-autonomous expenditures, money supply etc.

What comes out overall is that monetary policy does affect expenditure variables, price level etc. But it is not enough to point out that it has some effect; the question is what is the extent of this effect. In other words, is monetary policy strong enough to play a significant role in achieving the various policy objectives?

Furthermore, we must consider the following questions:
How is the effect on nominal income divided between real output and prices? What are the time paths in this process?
Should we expect, a priori, different degrees of strength in the transmission mechanism between developed and less developed countries?

Unfortunately, no answers have yet been provided to these questions.

2.3. Other issues.

Besides the question whether monetary policy is powerful or not, there are some other equally important aspects.
First, how long does it take for various policy actions to have their effects and achieve their objectives? In other words, are there any lags in the transmission process in the various stages described? And if there are, what sorts of lags are they and what is the

magnitude of them? How do they modify our policies? The empirical research of the lags problem is still in its infancy.
Second, does monetary policy have undesirable side effects on the pattern of production, investment, consumption and generally in the allocation of resources?
There is a lot of discussion of these issues. It is asserted for example, that some monetary actions are blunt in the sense that they affect economic units without discrimination while others, e.g., direct controls, fall overwhelmingly on certain groups.
Third, most of the literature on monetary policy deals with a closed economy. The case of the open economy is usually considered as a separate subject. The question, therefore, arises of how things should be modified in dealing with an open economy. This aspect is equally crucial for developed and less developed countries.

There has been disagreement about the extent of the contribution of various economic policies in implementing the various objectives. An excursion into the economic history would be very illustrative of the way opinion has fluctuated widely on this issue. For example, before I930's there was full faith in the strength of monetary policy. After the Keynesian revolution, opinion swung to the other extreme, relying on the strength of fiscal policy and after I950 there has been revival of interest in monetary policy, at least in the developed countries.

Finally, what are the interelationships of monetary policy with other policies, such as fiscal policy, balance of payments policy etc. So, for example, Government expenditures can be financed:

(i) By equal increases in taxes revenues (balanced budget method).

(ii) By utilizing accumulated idle cash balances and/or printing new money (monetary expansion method).

(iii) By obtaining loans from the public sector through the issue of bonds and securities (The method of debt finance).

The method adopted (or a combination of them) to finance a given amount of Government expenditure, will produce differnet effects on the aggregate variables.

2.4. Direction of our work.

Given our interest in a less developed country, the choice of Ceylon has been based on the following considerations:

The availability of fairly reliable data and for a period over 20 years, which permit us to undertake a statistical investigation of various relationships.

The published material by the Monetary Authorities, and particularly the Annual Reports of the Monetary Board, constitute a unique example of clarity in understanding the intentions and the problems faced by the Monetary Authorities in pursuing their economic objectives.

Some of the most important issues discussed in earlier sections of this chapter can therefore be examined in detail in the context of Ceylon's economy, such as:

The less developed character of the economy together with the large dependence on the trade sector, can illustrate the strong interdependence and the potential conflict of the various economic objectives pursued by the monetary authorities, in particular, between economic development and price stability, balance of payments equilibrium and price stability, and the strong interdependence between monetary policy, fiscal policy and balance of payments policy.

The nature of the demand function for money- and the issues related to it, such as the variables used, the definition of money, the stability of the function etc.- is closely connected with the effectiveness of monetary policy and the transmission mechanism of changes in monetary variables to the real sector.

The money supply mechanism deserves particular attention because of the dominance in the monetary base changes of the foreign sector and the Government's operations to finance the budget deficits, together with the role of commercial banks in the money supply mechanism.

Examination of the behaviour of the various sectors of the economy, such as non-bank public, commercial banks, and Government, is also feasible. In addition, the various relationships put together in an aggregate econometric model, will enable us to examine some issues such as how variations in the monetary sector transmit their

effects throughout the economy, the effectiveness of the various policy variables used by the authorities and the predictability of this econometric exercise.

The above issues will be considered in due course. For the moment, an outline of the basic characteristics of the economy is undertaken in chapter 3, followed by an analysis of the economic stabilization policies pursued in Ceylon, over the examined period I950-70, in chapter 4.

NOTES TO CHAPTER 2

(I) A discussion of the various tools is undertaken in chapter 4 p. 76ff.

(2) A comparison between ASCHHEIM (9), and SEN (I62) would be very illustrative of these points.

(3) The implicit assumption here is that the saving provided, because of the expansion in economic activity, is not considered adequate.

CHAPTER 3

BASIC CHARACTERISTICS OF THE ECONOMY OF CEYLON

In this chapter, we attempt a brief and general account of the economic background of Ceylon and of the institutional features of the monetary, banking and financial structure.

This examination is a necessary first step in order to be able to identify the major economic problems that the authorities face and, particularly, to evaluate the role of monetary policy as an instrument for the implementation of certain objectives.

Section 3.I. gives an outline of the economic structure, while section 3.2 is concerned with the monetary, banking and financial structure of the economy.

3.I. ECONOMIC STRUCTURE OF THE ECONOMY

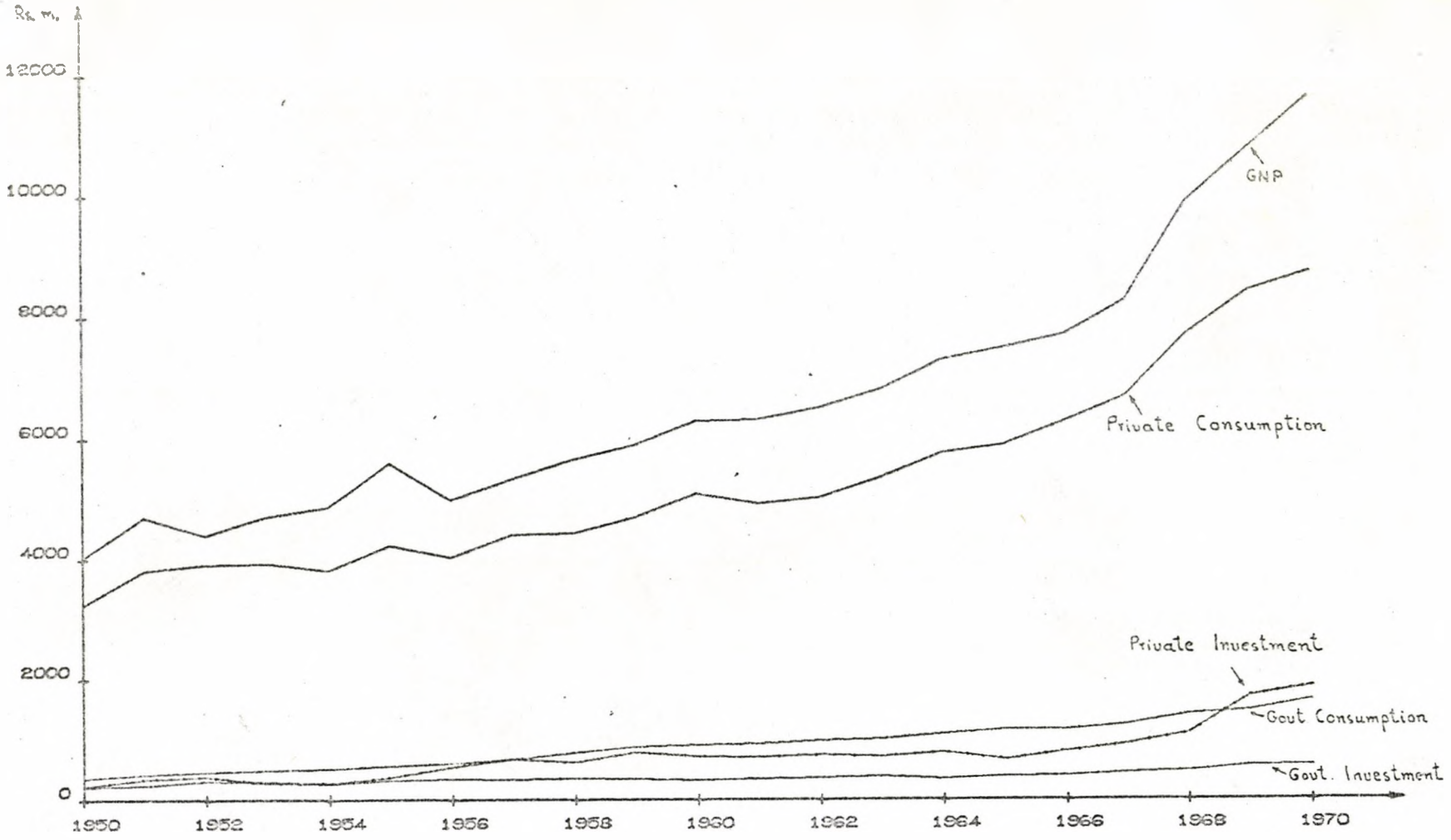
3.I.I. The stage of development.

The total Gross National Product measured in current factor cost prices increased from Rupees 40I9.7 m. in I950, to Rs. 6286.8 m. in I960, to Rs. II6I7.8 m. in I970, an increase of approximately 290 per cent over the examined period. The average growth rate per annum, is 4.6% for I950-60 period and 6.3% for the I96I-70 period.

Taking magnitudes in real terms by deflating with the GNP implicit price deflator, the significance of the above figures is reduced. Total GNP increased from Rs 4027.8 m. in I950, to Rs 6293.I m. in I960, to Rs 9697.7 m. in I970. The average growth rate per year is 4.5% for I950-60 period, and 4.4% for I96I-70 period.

Expressing GNP in per capita terms, this increased from Rs 523 in I950, to Rs 635 in I960, to Rs 928 in I970, that is, an I80 percentage increase over the whole period, obviously because of the population explosion, increasing at an average of 2.4 per cent per year. In real terms the per capita GNP, increased from Rs 524 in I950, to Rs 636 in I960, to Rs 775 in I970. So there were price increases during the second decade of the examined period, while the first decade appears to have been one of remarkable stability of prices. An overall picture in the trends of some aggregates is illustrated in Figure 3.I.

FIGURE 3.1



Values are at current market prices

TABLE 3.1. Gross National Product by sources. Selected years

Sectors	1950		1953		1956		1959		1963		1967		1970	
	Rs. m.	%	Rs. m.	%	Rs. m.	%	Rs. m.	%	Rs. m.	%	Rs. m.	%	Rs. m.	%
Agriculture, Forestry, Hunting & Fishing	1963.7	50.50	2275.0	49.92	2069.0	42.98	2302.4	39.07	2600.2	38.26	2939.9	35.57	3948.7	34.00
Mining & Quarrying	6.2	0.16	4.1	0.09	7.4	0.15	31.3	0.53	30.0	0.44	39.9	0.48	84.1	0.71
Manufacturing	154.6	3.98	216.0	4.74	233.5	4.85	682.1	11.57	783.6	11.53	883.6	10.69	1434.2	12.34
Construction	278.8	7.17	392.2	8.61	485.0	10.07	282.9	4.80	285.4	4.20	380.2	4.60	771.1	6.64
Electricity, Gas, Water	17.6	0.45	24.0	0.53	28.7	0.60	9.5	0.16	11.4	0.17	15.1	0.18	26.3	0.23
Transport & Communications	294.1	7.56	222.6	4.88	270.9	5.63	540.9	9.18	636.6	9.37	831.0	10.06	1175.9	10.12
Wholesale & Retail Trade	325.0	8.36	403.4	8.85	413.0	8.58	800.8	13.59	971.2	14.29	1293.7	15.66	1793.5	15.44
Banking, Insurance, Real Estate	14.0	0.36	18.2	0.40	30.3	0.63	50.9	0.86	68.5	1.00	107.4	1.30	152.2	1.31
Ownership of Dwellings	281.7	7.25	316.6	6.95	359.8	7.47	200.6	3.40	260.3	3.83	332.5	4.02	398.9	3.43
Public Administration, Defence	199.6	5.13	257.8	5.66	426.2	8.85	301.0	5.11	365.1	5.37	402.9	4.88	516.5	4.44
Services	406.9	10.47	464.8	10.20	546.1	11.34	727.6	12.35	836.9	12.31	1091.8	13.21	1458.5	12.55
Net factor income from abroad.	- 54.0	- 1.39	- 37.8	- 0.83	- 55.4	- 1.15	- 36.7	- 0.62	- 52.5	- 0.77	- 53.5	- 0.65	- 142.1	- 1.22
GNP	3888.2	100	4556.9	100	4814.5	100	5893.3	100	6796.7	100	8264.5	100	11617.8	100

Values are at current factor cost prices.

Considering Ceylon's low per capita income and, on the one hand, the high proportion of the population employed in rural domestic agricultural production[(I)] and, on the other hand, the relatively small contribution of this sector to the total National income because of its low level of productivity, it can be said that the economy of Ceylon is a less developed one - hence, the strong desire of the economy to promote economic development.

Table 3.I shows the shares of the various sectors in the economy for selected years of our period. The predominance of agriculture is clear; it accounts for around 50 per cent of the GNP during the first years; its share declines later to 34 per cent in I970. There have not been substantial changes in the structure of the economy, particularly during the first decade, but there were some changes in the second decade, probably because of attempts by the Government to diversify the economy and because of restrictions imposed on imports. A peculiar development is found in manufacturing production where the percentage during the second decade did not undergo any change.

3.I.2. Foreign trade- Structure and its effects on the economy

a) Exports played a dominant role in the generation of income. As is illustrated in Table 3.2, the ratio of exports to GNP was 39 per cent in I950, 40.5 per cent in I95I, then the percentage declined in the following years, approaching I7.5 per cent in I970.
We should point out that these proportions understate the importance of the export sector in the economy, because many industries and occupations, though not producing directly for exports, are largely sustained by export activity.

Imports on the other hand, constitute the major leakage from the income stream. As shown in Table 3.2, throughout the I950's, imports constituted about $\frac{1}{3}$ of GNP; after I960 the proportion declined to around 20 per cent- mainly because of import controls and restrictions imposed during this period.

TABLE 3.2

Year	GNP current factor cost prices Rs. m.	Exports (fob) Rs. m.	%of GNP	Imports (cif) Rs. m.	% of GNP
I950	40I9.7	I563	38.9	II67	29.0
I95I	4702.3	I904	40.5	I559	33.2
I952	4404.3	I502	34.I	I702	38.6
I953	47II.I	I568	33.3	I608	34.I
I954	4862.5	I809	37.2	I397	28.7
I955	5594.I	I940	34.7	I460	26.I
I956	4977.3	I735	34.9	I629	32.7
I957	5333.2	I682	3I.5	I804	33.8
I958	5647.9	I7II	30.3	I7I7	30.4
I959	5893.3	I754	29.8	2005	34.0
I960	6286.8	I832	29.I	I960	3I.2
I96I	63I3.3	I733	27.5	I703	27.0
I962	6502.5	I808	27.8	I660	25.5
I963	6796.7	I73I	25.5	I490	2I.9
I964	7290.5	I876	25.7	I975	27.I
I965	7483.5	I948	26.0	I474	I9.7
I966	7704.5	I700	22.I	2028	26.3
I967	8264.5	I690	20.4	I738	2I.0
I968	9876.0	2035	20.6	2I73	22.0
I969	I0747.7	I9I6	I7.8	2543	23.7
I970	II6I7.8	2033	I7.5	23I3	I9.9

Source: For GNP see Appendix V. For Exports, Imports; Central Bank of Ceylon (26).

b) Looking at the context of exports we see that three major products, namely tea, rubber and coconut products constitute more than eighty five percent of the total value of exports. However, the proportion of tea is relatively high, ranging from 48 % to 66 % of the total value of exports. Therefore, we have essentially a one product export economy.

TABLE 3.3 below gives a detailed illustration.

TABLE 3.3

Year	Exports (fob) Rs m.	Tea		Rubber		Coconut Products	
		Rs m	%	Rs m.	%	Rs m	%
I950	I563	752	48.I	405	26.0	252	I6.I
I95I	I904	800	42.0	582	30.6	323	I7.0
I952	I502	723	48.0	373	24.8	234	I5.6
I953	I568	825	52.6	338	2I.6	247	I5.8
I954	I809	II23	62.I	285	I5.8	2I5	II.9
I955	I940	II94	6I.5	350	I8.0	228	II.8
I956	I735	I044	60.2	293	I6.9	2I6	I2.4
I957	I682	I02I	60.7	300	I7.8	I59	9.5
I958	I7II	II3I	66.I	258	I5.I	I64	9.6
I959	I754	I045	59.6	298	I7.0	244	I3.9
I960	I872	I096	59.8	378	20.6	I84	I0.0
I96I	I733	III4	64.3	260	I5.0	202	II.7
I962	I808	II49	63.6	290	I6.0	227	I2.6
I963	I73I	II40	65.9	257	I4.8	I98	II.4
I964	I876	II4I	60.I	290	I5.5	273	I4.6
I965	I948	I2I0	62.I	304	I5.6	265	I3.6
I966	I700	I026	60.4	337	I9.8	I96	II.5
I967	I690	I059	62.7	283	I6.7	I67	9.9
I968	2035	II6I	57.I	33I	I6.3	33I	I6.3
I969	I9I6	I05I	54.9	43I	22.5	22I	II.5
I970	2033	II20	55.I	440	2I.6	237	II.7

Source: Central Bank of Ceylon (26).

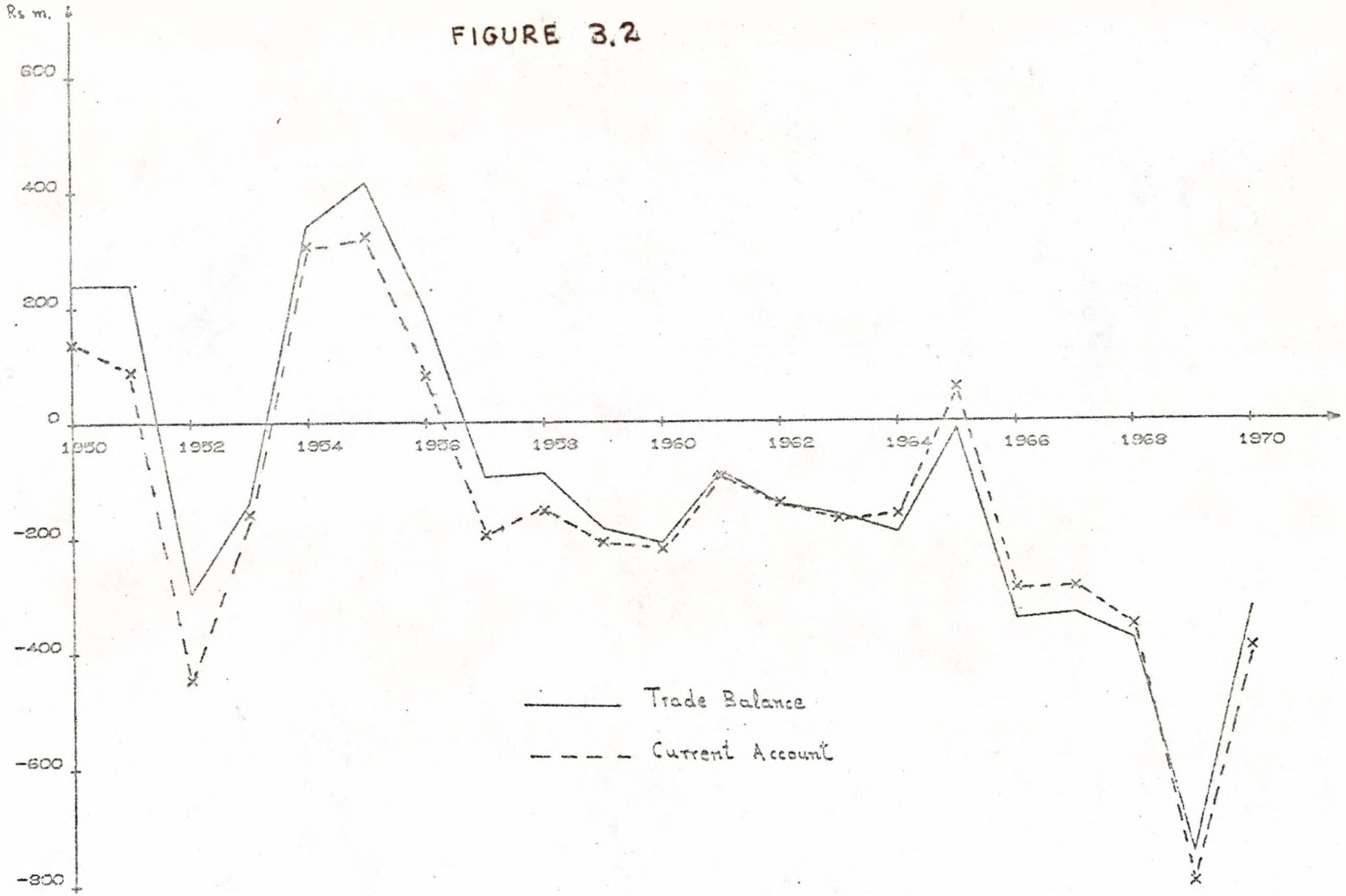
Imports cover a wide range of goods - consumer, intermediate and investment.(2)

c) An important consequence of the dominant role of exports in the generation of income is that fluctuations in exports, because of changes in prices and/or changes in the volume of production, have large direct repercussion on the level of domestic product. Therefore, a major role in the short-term determination of the level of income is played by demand factors from exports rather than from domestic investment.(3)

Fluctuations in export demand have in turn, effects on the level of imports through their effects upon the foreign exchange earnings; though the existence of import controls may reduce this effect.

Closely related to the fluctuations in the trade balance, (Exports minus Imports) are the fluctuations observed in the balance of payments, as figure 3.2. illustrates.
So, when the trade balance had a surplus because of favourable conditions in the export sector such as, in I950-5I (when rubber prices shot up sharply because of the Korean war) and in I954-56 (when the tea prices rose appreciably), there was a corresponding surplus on the current account. After I956, the situation in the balance of payments has continuously deteriorated because of adverse conditions affecting the trade balance. Notice that in all years, changes in the balance of payments are in the same direction to changes in the trade balance.

FIGURE 3.2



See note (4)

3.I.3. The Price Level.

The upshot of the preceding discussion is that the country cannot influence the price of exports, which is determined in the world market. The country cannot influence the price of imports either, since its demand for these items is only a very small fraction of total production. So the changes in the price level of imports largely reflect the conditions prevailing in the producing countries and world demand. During the I96I-70 period, however, domestic factors became increasingly important in price level changes, because of the deterioration in the terms of trade, which necessitated imposition of controls and restrictions on imports. In addition, the desire to promote economic development, together with efforts to substitute imports for domestic production, resulted in increasing budget deficits- financed mainly by borrowings from the Central Bank- which put additional pressure on the price level.(5)

From TABLE 3.4, it can be seen that the cost of living index (all items), showed only a slight increase during the whole first decade of the period, rising by less than five per cent by I960; but after that, the index increased at an accelerating rate reaching in I970 I38.2 (I952=I00).

Care must be taken in examining the source of changes in prices according to whether they arise mainly from goods in the domestic group, the import group or the export group. Consideration must be given to:

(i) The weights used for each group.

(ii) The higher rate of increase in the domestic group is mainly due to the increase in the price of imports after I960 and to the progressively stricter import controls.

(iii) The index itself (all items) does not reflect the real picture, in the sense that it represents the working class in Colombo and includes many items subsidized. In other words, the increases in the price level are in fact higher.(6)

The above described economic structure of the economy had its repercussions on the nature and the development of the monetary, banking and financial structure of the economy, which is the subject of the next section 3.2.

TABLE 3.4

Cost of Living Index Numbers - Colombo Town (1952=100)

Year	All items	Domestic group(a)	Import group (b)	Export group (c)
1956	100.2	100.0	99.0	115.1
1957	102.8	104.9	98.1	126.8
1958	105.0	109.2	97.0	135.0
1959	105.2	108.0	97.1	153.1
1960	103.5	108.9	93.7	138.4
1961	104.8	112.3	94.6	119.1
1962	106.3	113.9	96.7	113.8
1963	108.8	113.4	102.5	117.7
1964	112.2	116.7	106.6	115.3
1965	112.5	116.4	106.4	127.2
1966	112.3	116.8	105.4	127.6
1967	114.8	117.1	111.1	123.9
1968	121.5	123.2	117.3	142.4
1969	130.5	134.3	123.5	148.2
1970	138.2	142.9	129.3	157.3

NOTES.

(a) Comprises items of domestic origin. Weight 60 per cent from 1968. Previous weight 51 per cent.

(b) Comprises imported goods. Weight 35 per cent from 1968. Previous weight 44 per cent.

(c) Comprises domestic goods mainly exported. Weight 5 per cent.

Source: Central Bank of Ceylon (26).

3.2. MONETARY, BANKING AND FINANCIAL STRUCTURE.

3.2.I. Characteristics of money supply.

Looking at the components of money supply, we can see that the bulk of transactions is conducted through the medium of currency. Throughout the period, currency constituted about 35 per cent of the total money supply with a tendency to increase reaching 57.6 per cent in I969 and I970, as TABLE 3.5 illustrates.(7)

TABLE 3.5 Rs. m.

End of period	Currency (i)	Demand Deposits (ii)	Money Supply (iii)	(i) as % of (iii)
I950	325.4	585.4	9I0.8	35.7
I95I	377.4	628.8	I006.2	37.5
I952	356.6	539.2	895.8	39.8
I953	335.3	49I.5	826.8	40.6
I954	34I.8	6I5.8	957.I	35.7
I955	384.5	688.4	I072.9	35.8
I956	40I.I	725.7	II26.8	35.6
I957	434.9	605.2	I040.I	4I.8
I958	529.8	546.9	I076.8	49.2
I959	565.0	6I2.7	II77.7	48.0
I960	595.3	6I3.6	I208.9	49.2
I96I	692.2	596.4	I288.6	53.8
I962	7I2.6	630.0	I342.7	53.I
I963	828.4	677.7	I506.0	55.0
I964	853.0	768.8	I62I.8	52.6
I965	90I.4	8I4.3	I7I5.7	52.5
I966	882.5	776.4	I658.9	53.2
I967	979.9	827.7	I807.6	54.2
I968	I066.7	847.0	I9I3.7	55.7
I969	I083.9	799.2	I883.I	57.6
I970	935.I	I03I.5	I966.6	47.5

Source: Central Bank of Ceylon (26).

The high dependence of the economy on exports and imports has effects on the changes in the money supply through changes in the external assets of Central Bank and of commercial banks.

External assets are one of the main sources of changes in the money supply. So, for example, during the boom periods in exports (in I950-5I and I954-55) a remarkable increase in external assets took place, which is reflected in increases in the money supply. After I956 external assets have been decreasing continuously, due to the adverse terms of trade.

We should note, however, that the direction of change in external assets is not always reflected in changes of the money supply in the same direction, because of the other factors that affect the money supply. So, we can see [8] that the borrowing operations of the Government - either from the Central Bank or from commercial banks or by changes on rupee cash holdings- have been progressively more important factors, with the result that the money supply has tended to expand throughout the period.

Of course, other factors had their effect in the overall change of money supply- quite strong in some years- such as the expansion of credit to the private sector by the commercial banks and the continuous increases of time and savings deposits.[9]

3.2.2. THE BANKING SYSTEM

3.2.2.a. The composition of commercial banks.

The banking facilities are not widespread throughout the country although, during the period under examination, a considerable expansion in the banking system took place.
We do not intend to give a detailed description of the banking system of the country but some general characteristics of it.(10)

The commercial banks are classified into Exchange Banks (British Banks), the Indian and Pakistani Banks and the Ceylonese Banks. At the begining of the period (1950) the number of reporting banks to the Central Bank was:(11)
7 Exchange Banks, 3 Indian and Pakistani Banks and 2 Ceylonese Banks. In 1967, there were 5 Exchange Banks, because of amalgamations and not because of closure of bank offices, 4 Indian and Pakistani Banks and 3 Ceylonese Banks.

There has been considerable expansion in the number of bank offices, especially after 1961 by the indigenous banks,(12) with the establishment of the People's Bank the main purpose of which is to expand credit in areas where no banking facilities exist.
In addition, the Bank of Ceylon expanded its activities in such areas.

TABLE 3.6 gives a picture of the distribution of Bank offices and Deposits of the commercial banks.
Notice that the share in deposits of foreign banks declined.
The share of British banks declined from 48 per cent at the end of 1960 to 20 per cent at the end of 1970. Similarly the share of Indian and Pakistani banks, for the same period, declined from 7 per cent to 4 per cent. This trend is partly due to the restrictions imposed on foreign banks in opening new deposit accounts for the Ceylonese,(13) and partly due to the fact that these banks are concentrated in the Capital Colombo and in a few major towns.

Can one argue that the Banks did not expand into new areas because of the restrictions imposed on them? This argument may be partly true, especially for the 1961-70 period- that is, when the importance of the trade sector was declining- while during the 1950-60 period, the foreign banks followed a "traditional" attitude to serve the trade sector-which experienced two short booms. So, the trade

TABLE 3.6 Distribution of Bank Offices and Deposits[1]

YEAR	Ceylonese Banks			British Banks			Indian & Pakistani Banks			TOTAL		
	No of Offices	Deposits		No of Offices	Deposits		No of Offices	Deposits		No of Offices	Deposits	
		Amount Rs. m	%		Amount Rs. m.	%		Amount Rs. m.	%		Amount Rs m.	%
1960	28	472	45	12	506	48	5	79	7	45	1057	100
1961	31	503	48	12	467	45	5	71	7	54	1041	100
1962	55	683	58	12	428	36	5	70	6	73	1182	100
1963	67	801	61	12	412	32	4	88	7	83	1301	100
1964	72	943	65	12	415	29	4	90	6	88	1447	100
1965	81	1023	66	12	431	28	4	92	6	97	1546	100
1966	89	1003	67	12	419	28	4	80	5	105	1502	100
1967	117	1157	71	12	404	25	4	76	5	133	1637	100
1968	125	1329	73	12	409	23	4	71	4	141	1808	100
1969	140	1405	73	11	437	23	4	74	4	155	1917	100
1970	152	1831	76	9	472	20	4	91	4	165	2394	100

(1) Total Deposits

Source: Central Bank of Ceylon (26).

sector was considered by the commercial banks, a more or less "easy" and "safe" field of transactions, hence, they remained concentrated in the major towns and ports.

The measure of prohibiting the opening of new accounts to Ceylonese by foreign banks, was undertaken to help the Ceylonese banks to expand credit for development purposes and to promote rural credit.

3.2.2.b. The advances provided by Commercial Banks.

As in so many countries, the effect of international trade was to create a dual economy, that is, two broad sectors, the modern sector and the traditional sector which differ radically from each other in pattern of resource use and technology and with few economic interrelations between them.

This dual character of the economy had effects on the direction of the expansion of the banking facilities, given the traditional attitudes of the banks.

I) Banking facilities were expanded to serve mainly the modern sector, especially the foreign trade sector.
So, examining the advances provided by the commercial banks, according to the purpose they serve, we see that the largest proportion is for commercial purposes, the percentage in the total advances having been as high as 73.9 (1956).

However, there has been some diversification in recent years in favour of other purposes such as industry and agriculture, because of measures taken by the Authorities for more expansion of industry and rural credit. Available data, give a consolidated statement of assets and liabilities of all commercial banks, and not separately, according to the distinction made in previous pages. However, from H. Karunatilake's work,(I4) attached tables of the assets of Ceylonese Banks, Indian and Pakistani Banks and Exchange Banks, it is concluded that the observed diversification in advances, is almost exclusively due to the Ceylonese banks and not to the foreign banks.

> " The bulk of loans and advances in the forms of overdrafts (of Exchange banks)...shows their pre-occupation with export and import financing"(I5)

TABLE 3.7 illustrates some points.

TABLE 3.7 Advances[16] classified by Purpose (% of total)

End of period	Commercial	Financial	Agricultural	Industrial	Consumption	Other Loans	TOTAL Rs.m.
1956	73.9	12.4	2.5	5.4	2.2	3.6	369.6
1957	66.6	16.1	3.3	7.5	4.4	2.2	448.9
1958	72.8	12.6	2.5	4.3	5.1	2.1	508.2
1959	71.9	14.4	2.0	4.6	5.9	1.3	527.9
1960	68.9	18.1	1.9	3.6	6.3	1.5	560.9
1961	69.1	16.2	1.9	4.4	6.0	2.4	548.6
1962	66.3	15.2	3.0	4.6	8.7	2.0	566.1
1963	65.4	10.3	3.7	6.3	5.3	9.0	690.4
1964	61.0	12.1	3.8	9.6	6.5	7.0	752.5
1965	58.4	11.9	4.5	9.7	8.5	7.0	762.9
1966	57.2	11.6	4.9	10.6	9.1	6.4	822.2
1967	51.3	10.6	10.5	12.2	9.9	5.4	976.1
1968	49.6	10.8	11.1	18.3	7.5	2.8	1268.0
1969	44.2	9.2	11.7	25.6	6.5	2.9	1513.5
1970	41.7	8.9	13.1	26.9	6.4	2.9	1544.1

Source: Central Bank of Ceylon (26).

The main point to note when looking at the table 3.7, is the small proportion of advances for agricultural purposes, although, as we have stated, the bulk of the population is employed in domestic agriculture.

This shows the quite inadequate supply of rural credit from the banking system. The banks have been reluctant to expand credit in rural areas because, they traditionally lend only against movable property. However, in the rural areas the main asset is land which of course is immovable and which banks are unwilling to accept as collateral because of divided ownership and complex inheritance Laws. In addition, traditional banking practice is against lending for medium and long-term purposes, prefering instead, short-term credit. Agriculture needs short-term credit for working capital but it also needs medium and long-term credit for various improvements.
So, commercial banks, continued to finance foreign trade, which they considered more safe, and hence they remained concentrated in the major towns and ports.

It might be asked at this point, why the banks do not extend credit to the rural sector, since interest rates are high - as we will see later- [I7] which could compensate for the increased risk of agricultural debts. Also, the banks could use the local money-lenders as intermediaries who have personal knowledge of the borrowers and so the risk would be minimized.
In fact, this system of intermediators was used until I955, but it was abandoned because of its drawbacks for customers, banks and the intermediators themselves.

> "...Instances have come to light where a good customer was unable to obtain a loan from the bank because he had refused to pay the Shroff's commission, whereas, the customer whose financial standing was far below that of the former could get accommodation from the bank because he was known to the Shroff and was prepared to pay his commission.
> ...The bank would often lose valuable business and very good clients because they were unwilling to pay the Shroff his commission.
> ...The Shroff himself was required to guarantee loans worth several millions when his own assets did not even amount to

a fraction of that sum, thus making the guarantee disproportionate to the value of his security "(I8)

So, it is rather the above mentioned factors which make the banks reluctant to lend in the rural areas and, possibly, the restrictions imposed in opening new account to Ceylonese by the foreign banks, after I96I.(I9)

II) TABLE 3.8, presents the type of security given against advances. The largest proportion, ranging from 20 to 30 per cent, is against stocks in trade and against documentary bills, though their proportion have been declining. Only a small proportion (around I0 per cent) is against immovable property. The "other items" for which analytical data are not available, except the years I968-70, include mainly Guarantees (I9 per cent), Pro-notes, bonds and usance notes account for around I2 per cent and the rest are other items such as trust receipts, hire purchase agreements, plant and machinery etc.

III) Furthermore, looking at the advances according to their maturity -TABLE 3.9 - we see that they are in favour of short term credit although, again, some diversification is observed especially for long-term credit during the I960's for reasons stated previously.

TABLE 3.8.

Advances[20] by Type of Security (% of total)

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Documentary Bills	30.1	21.0	26.3	26.0	23.3	25.6	23.9	20.5	19.8	16.6	15.1	13.5	14.4	9.7	8.8
Government securities	1.3	0.7	0.8	2.0	2.1	2.1	2.2	0.8	1.2	0.6	0.9	1.5	1.3	1.2	1.5
Shares in joint stock companies	8.5	11.0	8.2	6.3	5.6	5.2	5.5	2.7	2.6	2.4	1.8	1.8	1.6	1.3	1.6
Time & saving deposits including cash value in life policies	1.6	3.2	2.4	2.5	2.8	4.2	4.8	4.5	4.3	6.7	6.6	5.3	4.0	4.9	3.2
Stocks in trade	28.8	30.4	31.1	33.8	33.1	30.7	24.9	29.0	26.9	26.5	23.4	20.5	21.1	20.8	18.7
Immovable property	10.8	12.9	12.2	11.6	9.6	8.1	8.9	10.0	9.5	8.7	11.0	10.5	9.6	11.1	12.7
Unsecured	4.8	5.9	11.1	5.9	7.7	10.2	12.3	13.1	9.8	11.1	9.7	8.8	5.1	3.5	4.
"Other items"	14.1	14.9	7.9	11.9	15.8	13.9	17.5	19.4	25.9	27.4	31.5	38.1	42.9	47.5	49.4

Source: Central Bank of Ceylon (26).

TABLE 3.9

Advances[a] Classified According to Maturity (% of total)

End of period	Short-term	Medium-term	Long-term
I956	42.2	40.5	I7.2
I957	35.5	50.I	I4.3
I958	39.8	4I.8	I8.4
I959	39.6	4I.0	I9.3
I960	4I.9	42.7	I5.4
I96I	33.2	50.5	I6.2
I962	36.3	43.6	20.I
I963	38.6	35.9	25.5
I964	4I.3	34.0	24.7
I965	37.6	35.8	26.5
I966	37.3	37.9	24.8
I967	39.3	36.8	23.8
I968	38.5	34.4	27.I
I969	34.5	37.4	28.I
I970[b]	58.9	28.7	I2.3

Notes:

(a) see note (I6)

(b) In I970, the definitions of short, medium and long terms which were, below 6 months, 6 to 30 months and over 30 months respectively, were changed to below I year, I to 5 years and over 5 years respectively.

Source: Central Bank of Ceylon (26).

IV) One consequence of the lack of credit in the rural areas is that local money lenders, relatives and friends fill the gap, charging high interest rates.

A survey of rural indebtedness in I957 revealed that the credit to the rural sector from the organized market (Banks, Co-operatives, Government departments) was only a small percentage of the total, amounting to 7.8%, while 92.2% of the borrowings came from the non-institutional sources,mainly relatives and friends (44.2%).
In the same survey, it was revealed that the mode (highest relative frequency) of the distribution of the interest rates charged, was around I8 per cent.

A similar survey conducted in I959, shows that the situation has improved, as TABLE 3.I0 illustrates.
The borrowing from the organized market has increased from 7.8% to I8.8% . The margins for more participation of the organized money market, in the total supply of credit are, however, still quite large.

TABLE 3.I0

Source of credit	% of amount currently outstanding	
	I957	I969
Government Departments	2.6	6.9
Co-Operatives	4.I	2.7
Commercial Banks	I.I	5.4
Other Financial Institutions	-	3.8
Total from institutional sources	7.8	I8.8
Relatives and friends	44.2	25.4
Landlords	8.0	0.5
Professional moneylenders	I5.5	9.6
Traders and Commission agents	II.5	0.8
Other sources (as residual)	I3.0	44.9
Total from non-institutional sources	92.2	8I.2

Source: Ceylon (32), Central Bank of Ceylon (29).

3.2.2.c. Commercial Banks' Assets and Liabilities

The commercial banks consider their liquid assets to consist of cash in hand, deposits at the Central Bank, foreign balances, Treasury bills and bills discounted.

TABLE 3.II and Figures 3.3 - 3.4, give an idea of the distribution of assets and liabilities of commercial banks. The ratio of cash to total deposits and the foreign balances to total deposits ratio, both show quite large variability, especially during the first years of the period. Their trend is a declining one.

It should be noted-from table 3.II- that both of these ratios are relatively high during boom periods in exports (1950/51 and 1954/56), obviously reflecting the favourable situation of the balance of payments. Surpluses in the balance of payments lead either to an increase in the banks' holdings of foreign balances or to an increase in their reserves to the extent that these balances are repatriated. Similarly, balance of payments deficits cause a decline in banks' cash reserves and/or fall in their foreign assets.

The holdings of Treasury bills, bills discounted, loans and overdrafts reflect among other things the operations of the Central Bank in the sense that the Central Bank can affect these magnitudes directly or indirectly.

We should also note that the ratio of total liquid assets to total deposits is higher in boom periods. This is just another aspect of the excess liquidity arising from increases in the external assets of the banks.

The ratio of loans and overdrafts to deposits is relatively low during the first years of the period but increases later reaching in 1970 71.4 per cent. Therefore, although in the early period, the impact of the banking system on the private sector is very slight, it becomes progressively larger during the following years. Notice should be given to the fact that in periods of high liquid assets/deposits ratio, i.e., when there is excess liquidity in the banking system, we do not have unusually high expansion of credit to the private sector.

The liquidity position of the banks, therefore, followed conditions in the export sector-at least, during the first years of the period- i.e., high liquidity during boom periods which was not used to expand credit for other purposes, such as rural credit,

TABLE 3.11

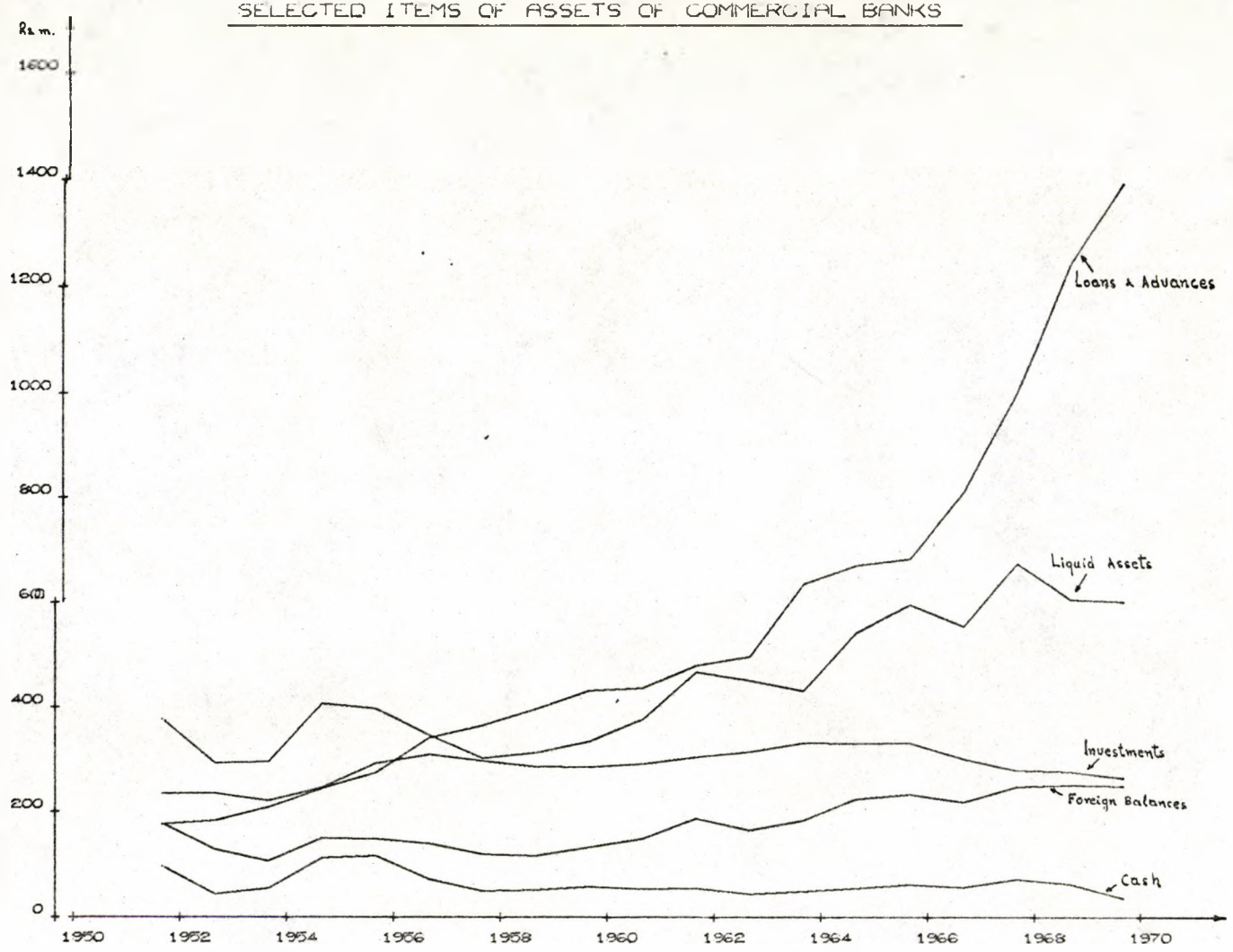
Selected items of Assets and Liabilities of Commercial Banks (average of monthly figures) %

Ratio of:	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Cash to total deposits	34.9	24.6	23.5	18.9	15.4	17.1	15.7	14.4	12.9	12.1	13.2	14.3	15.4	13.1	13.1	15.0	14.7	13.9	14.1	13.4	12.7
Foreign balances to total deposits	23.2	21.3	12.9	6.5	8.0	12.9	12.3	7.5	5.4	5.4	5.8	5.2	4.5	3.5	3.5	3.7	3.9	3.6	4.1	3.4	1.8
Treasury bills to total deposits	6.5	5.3	5.2	8.1	8.7	5.9	4.1	3.5	1.7	2.5	2.8	4.9	7.3	10.2	5.3	6.0	7.8	5.1	5.8	2.7	2.1
Commercial bills discounted to total deposits	6.8	8.4	8.5	9.6	10.6	10.8	9.9	10.4	12.5	12.5	11.5	11.8	11.2	9.1	9.1	11.6	11.1	12.7	14.4	12.9	14.1
Liquid assets to total deposits	85.4	58.6	50.0	43.1	42.7	46.7	42.1	35.8	32.5	32.6	33.4	36.2	38.5	36.0	31.0	36.3	37.6	35.4	38.3	32.4	30.8
Investments to total deposits	28.2	25.7	31.2	34.7	32.1	28.2	30.9	31.9	32.0	29.8	28.5	26.0	25.1	25.0	23.8	22.1	20.9	19.2	15.8	14.8	13.5
Loans and overdrafts to total deposits	17.5	18.1	23.3	26.9	30.2	28.1	29.0	35.2	39.2	41.4	43.1	42.0	39.4	39.6	45.6	44.9	43.2	51.7	57.0	66.6	71.4

Source: Central Bank of Ceylon (26).

FIGURE 3.3.

SELECTED ITEMS OF ASSETS OF COMMERCIAL BANKS



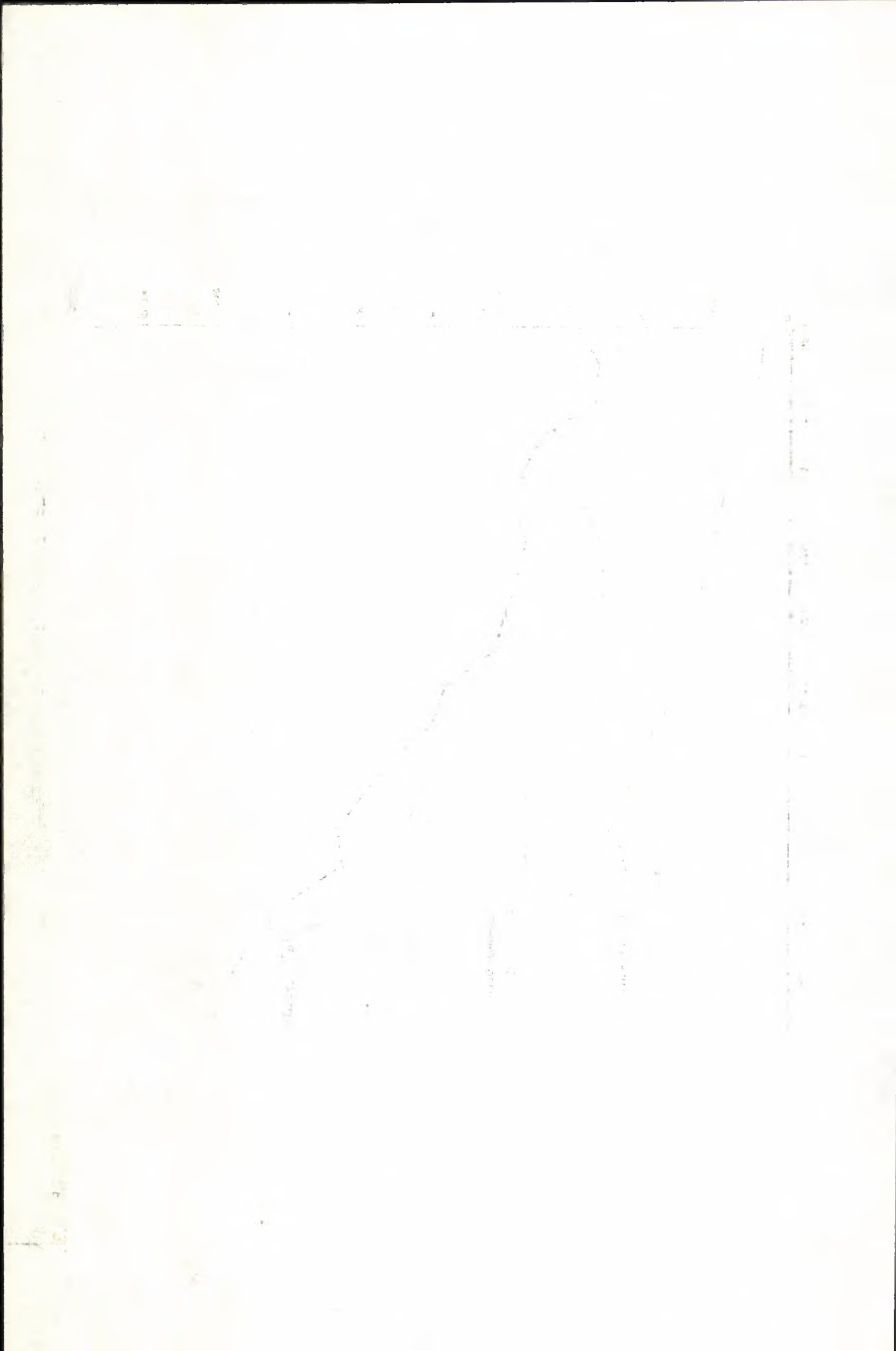
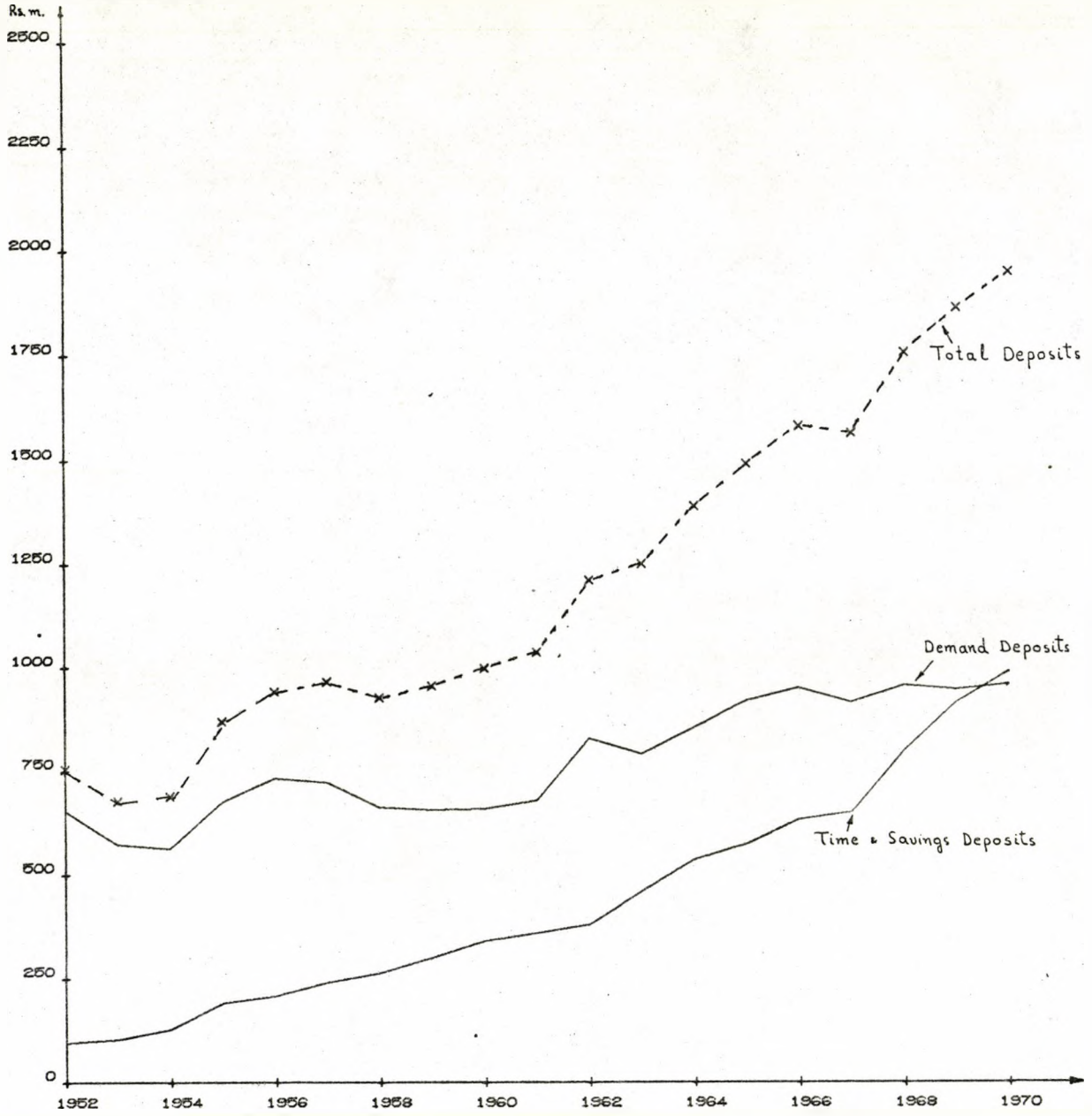


FIGURE 3.4.

SELECTED ITEMS OF LIABILITIES OF COMMERCIAL BANKS



because of various factors analyzed above.

During the second decade, the liquidity position of commercial banks reflected the measures taken by the monetary authorities to restrain bank credit and conserve as far as possible for essential purposes the foreign exchange reserves available to the country.

In TABLE 3.I2 the reserve position of the banks is showed.

TABLE 3.I2

Reserve Position of Commercial Banks(a) Rs. m.

End of period	Reserves required against total deposits	Actual reserves	Excess reserves
I95I	I03.8	I93.4	89.6
I952	90.2	I3I.9	4I.7
I953	57.I	65.8	8.7
I954	7I.3	I05.4	34.I
I955	8I.0	I38.5	57.5
I956	88.7	I50.I	6I.4
I957	8I.4	89.9	8.5
I958	80.4	9I.5	II.I
I959	8I.4	95.4	I4.3
I960	96.7	I40.3	43.6
I96I	95.3	98.4	3.I
I962	I05.5	II5.I	9.6
I963	I3I.I	I33.5	2.4
I964	I68.6	I73.3	4.7
I965	I7I.I	I73.9	2.8
I966	I64.4	I3I.8	-
I967	I89.8	I98.I	8.3
I968	2I0.9	2I3.I	2.2
I969	I9I.4	I92.6	I.2
I970	3I8.8	334.2	I5.4

(a) Reserves consist of cash

Source: Central Bank of Ceylon (26).

A consequence of the excess reserves of the banks was that they did not feel the need to borrow from the Central Bank. Borrowing from the Central Bank is negligible up to I960, but after that year, it has become progressively more significant.

The inter-bank borrowing occupies relatively significant proportions to the total borrowing.

On the other hand, borrowing from abroad, moved in the opposite direction, i.e., high proportion-relative to the total borrowing-in the early years but, generally, diminishing in the followed years.

These trends are illustrated in TABLE 3.I3.

TABLE 3.I3

Borrowing of Commercial Banks Rs. m.

End of period	Inter-bank	Abroad	Central Bank
I950	2.0	7.7	-
I95I	I.0	8.2	-
I952	-	5.7	-
I953	I.6	7.0	3.2
I954	I.2	4.4	-
I955	I0.0	9.8	-
I956	I7.4	7.5	-
I957	20.5	5.8	3.0
I958	25.7	6.2	-
I959	34.6	9.0	-
I960	4.4	5.9	2I.0
I96I	29.I	5.3	20.6
I962	43.5	I.8	-
I963	32.3	I.2	37.9
I964	37.5	0.4	I9.I
I965	43.0	I.6	6.3
I966	47.8	2.3	42.7
I967	4I.6	I.4	I02.0
I968	37.2	8.5	89.2
I969	50.9	II.5	I50.I
I970	65.I	3.6	I48.8

Source: Central Bank of Ceylon (26).

3.2.3. Interest rates

The interest rates charged by the commercial banks on advances, vary according to the period of the loan, to the type of security offered and to the credit standing of the borrowers.

The pattern of interest rates, generally, seems fairly uniform and movements in the Treasury bill rate and the Bank rate have brought movements in the interest rates charged on loans and advances. However, it is more difficult to trace out which rate is linked closer to the pattern of interest rates, as TABLE 3.I4 illustrates.

The treasury bill rate was mainly determined by the extent of Government borrowing, e.g., in I954 with reduced Government borrowing, the treasury bill rate declined from 2.48% in March I954, to 0.7% in Sept. I954. Because of the prevailing tight money situation, the Central Bank was compelled to take up the greater part of any increase in Treasury bill issue throughout the whole period. So, the treasury bill rate was mainly determined by the Central Bank.

We must note here that, since the main transactions in Treasury bills are between the Central Bank and the Treasury, while the Commercial Banks play a very minor role-not to mention the non-bank public- one could hardly say that there is a Treasury bill market proper. In that sense, the treasury bill rate plays the role of an administrative rate, not just a common rate, as conceived in developed financial markets.

As it might be expected, changes in the treasury bill rate were accompanied by changes in the yields of medium and long-term Government securities.

Finally, the interest rate on inter-bank call loans increased from 2% in I960, to 4.5% in I970 because of the increased importance of the call market.

TABLE 3.14

Advances by rate of interest (% of total) end of period.

Rate of interest	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
3.0	0.6	2.8	1.9	2.2	2.2	0.4	0.3	0.2	0.1						
3.5	1.4	1.1	0.7	2.9	2.3	1.2	1.1	2.5	0.3	0.2	0.2	0.1	0.4		
4.0	29.1	2.7	2.9	1.8	1.6	2.0	1.7	0.3	0.5	0.5	0.6	0.2	0.2		
4.5	10.5	37.7	39.8	41.1	30.0	3.7	2.5	1.7	5.4	1.2	0.7	1.3	0.2	1.5	0.8
5.0	17.4	14.1	14.1	21.2	9.6	4.1	6.2	8.4	3.6	3.1	3.3	3.1	1.9	1.5	1.9
5.5	4.0	8.1	7.3	7.4	4.9	1.2	3.4	2.0	2.0	4.4	3.5	3.5	1.4	1.5	0.2
6.0	33.0	26.2	28.0	19.8	26.9	48.5	47.4	44.2	42.6	8.6	8.6	6.5	10.3	14.8	3.5
6.5	1.5	4.4	3.0	1.7	7.5	16.2	6.8	4.5	3.3	18.2	15.5	16.9	8.2	9.3	3.2
7.0	1.0	0.8	0.6	0.7	12.2	18.2	25.7	27.4	29.8	32.7	27.5	28.3	19.6	7.6	16.1
7.5	0.3	1.0	0.5	0.5	1.4	1.0	2.0	0.9	1.0	7.3	14.6	11.5	25.4	21.2	9.8
8.0						2.8	2.2	7.0	10.7	23.1	18.0	18.0	17.7	22.2	11.6
8.5											0.7	1.3	4.3	4.4	17.7
9.0											6.1	6.4	5.8	10.0	19.1
9.5													3.1	0.8	3.6
10.0														1.9	5.9
Treasury Bill rate	0.64	1.22	1.76	2.02	2.60	2.68	2.80	2.80	2.80	3.0	3.0	3.2	3.64	4.16	4.76
Bank rate	2.5	2.5	2.5	2.5	4.0	4.0	4.0	4.0	4.0	5.0	5.0	5.0	5.5	5.5	6.5

Source: Central Bank of Ceylon (26).

3.2.4. Other Financial and Savings Institutions.

Up till now, the analysis was concerned with the commercial banks. There are, however, a few Savings and Credit Institutions such as:

The Post Office Savings Bank

The Ceylon Savings Bank

The Agricultural and Industrial Credit Corporation

The State Mortgage Bank

The Development Finance Corporation

There are, also, some specialized institutions such as:

The Insurance Corporation of Ceylon

The National Housing Fund, and

The Employees' Provident Fund.

However, their contribution to the developed market is still small. TABLE 3.I5 gives the amount of loans granted to the private sector, by the major credit institutions. These loans have at no time constituted more than six per cent of the loans and advances granted by the commercial banks.

The Savings Institutions showed a remarkable increase in their savings deposits throughout the period. These deposits were directed to finance Government expenditure and also, to provide credit in their specialized areas.

The same trend has also appeared in the savings deposits with the commercial banks, as TABLE 3.I6 illustrates.

TABLE 3.15

Loans Granted by:

Rupees thousand.

Period	Agricultural and Industrial Credit Corporation	State Mortgage Bank	Development Finance Corporation of Ceylon	TOTAL	As a percentage of loans granted by comm. Banks
1950-51	9455	2645		12100	5.2
1951-52	10251	3184		13435	5.4
1952-53	8872	4225		13097	5.2
1953-54	5518	4935		10453	3.4
1954-55	5926	5380		11306	3.5
1955-56	6305	5586		11891	2.9
1956-57	4018	12605	560	17183	3.8
1957-58	3590	9403	5275	18268	3.6
1958-59	4538	8628	3206	16372	3.2
1959-60	5111	11797	5342	22250	4.1

TABLE 3.15 (cont'd)

Loans Granted by: Rupees thousand

Period	Agricultural and Industrial Credit Corporation	State Mortgage Bank	Development Finance Corporation of Ceylon	TOTAL	As a percentage of loans granted by comm. banks
1960-61	3202	4284	4293	11779	2.1
1961-62	2347	2670	2884	7901	1.4
1962-63	3449	2900	3481	9830	1.4
1963-64	4777	3653	3175	11605	1.5
1964-65	5311	3596	4775	13682	1.6
1965-66	3941	4501	3725	12167	1.4
1966-67	3527	5022	3625	12174	1.1
1967-68	2739	6005	3042	11786	0.9
1968-69	4108	8315	11547	23970	1.4
1969-70	4855	10903	23926	39684	2.5

Source: Central Bank of Ceylon (26).

TABLE 3.I6

Savings Deposits Rupees million

End of period	Post Office Savings Bank	Ceylon Savings Bank	Commercial Banks	Total
I950	I63.7	58.4	77.I	299.2
I95I	206.9	63.2	9I.I	36I.2
I952	223.2	65.8	I03.4	392.4
I953	223.4	64.I	I02.3	389.8
I954	220.5	63.I	I46.6	430.7
I955	234.4	65.0	I65.4	464.8
I956	257.9	66.8	228.I	552.8
I957	275.3	68.6	246.I	590.0
I958	293.8	70.I	284.6	648.5
I959	320.9	73.2	3I9.4	7I3.5
I960	343.4	75.5	372.2	79I.I
I96I	35I.9	75.3	363.8	79I.0
I962	362.3	75.4	426.4	864.I
I963	375.5	77.2	499.2	95I.9
I964	402.3	8I.6	55I.I	I035.0
I965	427.I	86.6	606.7	II20.4
I966	438.4	9I.2	602.6	II32.2
I967	450.6	93.2	700.8	I244.6
I968	473.3	I00.3	826.2	I399.8
I969	490.5	I02.3	985.6	I578.4
I970	594.4	II3.3	II68.6	I876.3

Source: Central Bank of Ceylon (26).

3.2.5. Financial Markets

There is in Ceylon a call money market, a treasury bill market, and a market in Government securities.[21] Their size, however, is relatively small.

The call money market has been developed continuously, because of the reduction in excess reserves-both domestic and foreign balances held abroad- of commercial banks and because of their borrowing from abroad.

There has been expansion of the treasury bill market due to the increase in the bill issue, e.g., from Rs 78.6 m. in Sept. 1950, to Rs 550 m. in 1960, to Rs 1300 m. in 1965, to Rs 1950 m. in 1970. The Central Bank has been the main subscriber to the treasury bill issues in order to finance Government deficits.[22]

Finally, the market in Government securities appears more broad-based; the participation of non-bank financial institutions and private holders, increased continuously over the period.

So far, we have examined the organized financial market. However, there is, as was pointed out above, an unorganized market as well. Unfortunately, there is little available data for this sector. So, for example, we do not have much information about the interest rates prevailing in the unorganized market. The links between the organized money markets are quite loose. In many cases they are two separate worlds.

Finally, we should note that the unorganized money market is of great importance in LDCs, because it mainly serves the agricultural population, which is the bulk of the total population. Unfortunately, it is the lack of data that forces us to devote so few lines to this important sector.

3.2.6. Summary and some implications.

At this point, a summary to pull the threads together and to point out some implications for the working of the monetary system, is necessary.

The main characteristic of the economy is its strong dependence on the export sector, basically on a few primary products. Therefore, fluctuations in the export sector are reflected in fluctuations in the level of income, with further effects throughout the economy. Notice, that in contrast to many developed economies, the key variable in the determination of income is not domestic investment, but exports. Imports, on the other hand, constitute the major leakage from the income stream.

This high dependence of the economy on the trade sector has implications in many directions, each interacting with the others. So, for example, the situation in the balance of payments is largely determined by the situation in the trade balance which in turn affect the external assets and the money supply.

The price level is determined outside the country in the sense that the country cannot, essentially, affect either the price of exports or the price of imports. By this statement we do not mean that the price level determination is completely outside the control of the authorities, or that there is not any relationship to the money supply changes. As the next chapter will illustrate more clearly, the effect comes through the changes in external assets. As long as the terms of trade are favorable and imports are free of any restrictions, one should not expect a close relationship between money supply changes and changes in the price level. When, however, the terms of trade are deteriorating, the use of external assets for imports cannot go indefinitely. Some sort of control and restriction on imports must be imposed and this will put some pressure on the domestic price level. In addition, other factors may contribute as well. Government revenues are largely dependent on the trade sector. So, a deterioration in the terms of trade plus the desire to promote economic development together with any efforts to substitute imports for domestic production, may result in increasing budget deficits financed by the Central Bank. This kind of deficit financing will

put - at least in the short-run - pressures on the price level, aggravated by any restrictions imposed on imports.

The above described situations, in turn, create problems for the implementation of the various economic objectives, such as price stability, balance of payments equilibrium, economic development etc., the potential degree of conflict among them and the weaknesses of fiscal-monetary policies in LDCs, are brought out too.

The banks' activities were mainly concentrated on serving the trade sector- though after 1960 some expansion for other purposes has taken place, mainly by the Ceylonese banks.
One could trace out a vicious cycle here; because of the trade sector domination, banks concentrated their activities on serving this sector and vice versa.

As a consequence of this attitute, the liquidity position of the banks followed conditions in the export sector.
So, for example, during boom periods liquidity was high, which, however, was not used to expand credit for other purposes as rural credit, development purposes etc. During the second decade, the liquidity position of commercial banks reflected the measures taken by the monetary authorities to restrain bank credit and conserve as far as possible for essential purposes the foreign exchange available to the country.

Some of the implications of the financial structure of the economy and the thiness of money and capital markets in general, for the working of the monetary system can be stated such as:

(i) The transmission mechanism of monetary forces may not operate as in the countries with advanced money and capital markets. The thiness of the capital market and the limited variety of the existing financial institutions mean that individual savers have a relatively limited array of financial assets to invest their savings. A large amount of personal savings is channelled directly to investment without the intervention of financial institutions. The remaining part, in the absence of suitable financial assets, takes the form mainly of bank deposits. Among them of particular significance are time and savings deposits, which have increased considerably. A natural outcome of the increase in bank deposits has been the fast growth of commercial banks and their subsequent relative dominance in money and capital markets.

(ii) Whilst control over the commercial banks - coupled with their limited ability to create bank money-[23] facilitates the task of the authorities to control money supply, on the other hand, the particular financial structure of the economy, prevents the authorities from using conventional measures of control such as open market operations, to smooth out short-run fluctuations in the economy. This seems to be more important in the case where inflationary tendencies arise, for, the Central Bank, deprived of the indirect measures of control, has to intervene directly in the economy by restricting commercial banks' advances or imposing high reserve requirements, or to curtail its own advances to the Government or to the private sector of the economy. So,

(iii) The power of the authorities, particularly with regard to control over the supply of money, seems to be considerably enhanced by the high proportion of currency in the total money supply and their control over the commercial banks. On the other hand, there may be difficulties in controlling the monetary base as such, because of other considerations, such as debt market development and thin capital markets which make use of open market operations difficult etc.

The above points -very lightly touched on in this chapter- will be elaborated in more detail in the next chapter 4, which examines the economic stabilization policies and the problems encountered by the monetary authorities.

NOTES TO CHAPTER 3

(I) "Out of nearly II million people, over three-quarters are classified as rural", CRICK (44) p. 280.

(2) Though after I960, the proportion of consumer goods declined because of the restrictions imposed on them.

(3) Supply considerations resulting from such factors as weather crop pests and diseases are usually, however, at least as important as any demand factors in determining the short-term level of income and welfare, particularly in cases where agriculture is predominant.

(4) The difference between trade balance and current account is that the current account, in addition to the trade balance, includes the services account and transfer payments (Private & Official).

(5) These issues are dealt with more detail in chapter 4.

(6) This point is often stressed in the Annual Reports... (26).

(7) The reduction of the ratio in I970 is due to the measure of demonetization of high denominations in Oct/Nov. I970.
Looking at the previous months in this year, the percentage is as high as in previous years.
When figures are given at the end of the period, obviously, changes occurred within the period are not directly reflected in these figures. Annual Report I970 (26).

(8) See chapter 4, table 4.I where a detailed examination of this section is undertaken.

(9) The definition of money adopted is currency held by the public plus demand deposits held with the commercial banks.

(I0) A detailed analysis of the developments in the field, for over a hundred years is given in GUNASEKERA (9I), and KARUNATILAKE (II9).

(II) KARUNATILAKE (II9) pp. 64-69.

(I2) The Bank of Ceylon was established in I939 and the People's Bank in I96I.

(I3) Finance Act I96I.

(I4) KARUNATILAKE (II9).

(I5) idib. p. 62.
Notice, however, the comments made above that this result may be partly due to the prohibition of foreign banks from expanding their domestic business.

(I6) Advances include loans, overdrafts and bills discounted and exclude cash items in process of collection.

(I7) See p. 35.

(I8) "The Shroff System", in KARUNATILAKE (II9) pp. 30-3I.

(I9) See p. 27.

(20) See note I6.

(2I) A detailed analysis is found in KARUNATILAKE (II9) pp. I82-2I7.

(22) See p. 42.

(23) In the sense that the money multiplier is relatively low because of the high proportion of currency in the total money supply.

CHAPTER 4

ECONOMIC STABILIZATION POLICIES IN CEYLON 1950-1970

In this chapter, we undertake an examination of the various economic policy measures taken by the monetary authorities during the period 1950-70. These policies, include not only monetary policy measures, quantitative and qualitative, but, also, the liquidity effects of fiscal policy, the balance of payments and various other more or less endogenous factors.

This examination -in the context of the characteristics of our economy, presented in the previous chapter- may give some insight into the problems that the monetary authorities face in implementing their policy objectives. Furthermore, some idea of the effectiveness of various tools may come out of this analysis.

Our examined period 1950-70, can be divided in two sub-periods.

(i) During the first period 1950-60, the country is a typical example of a "classical" export economy, that is, exports of a limited range primary products is the main business of the country, while imports are almost free of any control.

(ii) During the second period 1961-70, though the economy retained the characteristic with respect to exports, on the imports side, exchange controls and restrictions were imposed[I] and generally, during this period the role of the Government has been a distinct one.

The various policy measures taken during these two sub-periods were different both in their nature and their extent, as subsequent sections of this chapter will illustrate.

Let us start, however, with a short summary of the development of the Ceylon's economy and then to bring out, one by one, the important features.

4.I. The development of the economy.

The economy experienced two short booms in exports:

(i) During the I950-5I period due to the devaluation of the rupee in I949, to the Korean war and the subsequent stockpiling of raw materials which created a strong demand for Ceylon's products.

(ii) The second boom in exports occured in I954-55 due to a rise in tea prices.

The developments during the boom periods and the following recession periods can be described very briefly as follows:

During the boom periods, there were marked increases in exports due both to increases in prices and quantity of exports.
As a consequence the balance of payments was in considerable surplus accompanied by increases in external assets.

During the recession periods, the opposite movements were observed. That is, substantial decrease in external assets which was due to the falling export income, reinforced by rising imports prices and sustained or swollen by excessive expansion of the money supply to finance the heavy Government budget deficits.
In some years higher imports were reinforced, possibly, by the fact that the country had become accustomed during the boom periods to a high level of expenditure.(2)

The final outcome of the money supply changes was dependent on the joint effect of changes in external assets, the credit by the banking system to the private sector and to the Government, the Government financing from the Central Bank plus changes of its cash balances and finally, the changes in time and savings deposits which are not included in the definition of money supply.
More specifically:

(I) The changes in the external assets had an expansionary effect on money supply changes during the boom periods (I950-5I and I954-56), while the other years their effect was contractionary.(3) The changes in external assets constitute one of the important factors in the changes of money supply throughout the whole period I950-70.

(II) There were increases in commercial bank credit to the private sector in almost all years of the period,[4] which had an expansionary effect on money supply changes. The increases were more important in the last years[5] because of efforts to expand bank credit for development purposes and in rural areas.

(III) The commercial bank credit to the Government shows a pattern of ups and downs until I958 and after that year, there is an expansionary effect on money supply changes (except I966,I968). The overall contribution was not, however, important.

(IV) The main effect on money supply changes was from the Central Bank credit to the Government- and changes in cash balances of the Government- to finance budget deficits.
This credit showed a counter-cyclical behaviour, that is, during recession periods, there was an expansionary effect on money supply changes, while during boom periods the effect was contractionary though, a pro-cyclical effect is observed in I950 when the Government expanded its credit from the Bank.
The credit of the Central Bank to the Government, constitutes the other important factor in the changes of money supply particularly, after I957, this credit remained at quite high levels.

We should notice that the direction of changes of the Central Bank credit to the Government, was opposite to the changes in the external assets. e.g., the substantial decrease of external assets was substantially offset by the expansionary effect of Government's actions to finance its deficits by borrowing from the Central Bank so, the final effect on the money supply changes was relatively small.

Finally, the changes in time and savings deposits exerted a contractionary effect on money supply changes throughout the whole period I950-70 because of the increases in income and the relative lack of other financial assets for savers to put their savings.

The above trends are illustrated in TABLE 4.I.

TABLE 4.1

Rs. m.

Factors affecting money supply[a]	1950		1951		1952		1953		1954		1955		1956	
	E	C	E	C	E	C	E	C	E	C	E	C	E	C
External banking assets (net)	132.1		63.0			363.1		132.5	342.6		218.9		20.4	
Private sector[b]														
Commercial bank credit[c]	40.3		75.9			20.5	18.0		36.0		12.9		93.2	
Time and Savings deposits[d]		27.5		21.7		9.2		5.3		36.2		15.9		31.4
Government sector														
Commercial bank credit	67.1			35.8	67.3			18.8	26.2			26.3	62.7	
Central Bank credit	36.3			7.1	137.9		58.3			221.0		26.0		30.1
Shift of rupee cash to the public	15.0		27.8		69.8		7.0			16.8		46.5		61.0
Adjustments for items in transit		2.0		6.8	7.4		4.3			0.5		1.3	0.1	
Total Expansionary/Contractionary factors	290.8	29.5	166.7	71.4	282.4	392.8	87.6	156.6	404.8	274.5	231.8	116.0	176.4	122.5
Change in money supply	+261.3		+95.3		-110.4		-69.0		+130.3		+115.8		+53.9	
Percentage change	40.2%		10.4%		11%		7.7%		15.7%		12.1%		5%	

TABLE 4.1 (cont'd)

Rs. m.

Factors affecting money supply	1957		1958		1959		1960		1961		1962		1963	
	E	C	E	C	E	C	E	C	E	C	E	C	E	C
External banking assets (net)		209.2		82.2		195.0		170.2		78.6		91.1		53.2
Private sector														
Commercial bank credit	55.3		53.4		9.7		31.5		12.5		42.2		125.0	
Time and Savings deposits		38.4		68.1		23.2		72.5		19.6		50.9		55.4
Government sector														
Commercial bank credit		7.4		39.6	30.2		6.0		21.4		71.3		19.8	
Central Bank credit	64.5		200.1		224.8		226.9		133.7		160.3		135.7	
Shift of rupee cash to the public	49.2			36.4	64.0		8.0		9.4			76.1		8.3
Adjustments for items in transit		0.7	9.4			9.5	1.4		1.0			1.7		0.3
Total Expansionary/Contractionary factors	169.0	255.7	262.9	226.3	328.7	227.7	273.8	242.7	178.0	98.2	273.8	219.8	280.5	117.2
Change in money supply	-86.7		+36.6		+101.0		+31.1		+79.8		+54.0		+163.3	
Percentage change	7.7%		3.5%		9.4%		2.6%		6.6%		4.1%		12.1%	

TABLE 4.1 (cont'd)

Rs. m.

Factors affecting money supply	1964		1965		1966		1967		1968		1969		1970	
	E	C	E	C	E	C	E	C	E	C	E	C	E	C
External banking assets (net)	16.9		79.8			196.3		91.5		115.7		299.6		1.5
Private sector														
Commercial bank credit	82.6		10.8		87.0		105.6		264.1		226.1		147.4	
Time and Savings deposits		57.2		67.1		29.4		132.9		165.5		193.8		166.5
Government sector														
Commercial bank credit	3.6		92.3			62.6	75.1			114.9	13.0		194.1	
Central Bank credit	75.3			15.2	207.5		136.5		306.7		150.6		35.3	
Shift of rupee cash to the public		3.2		10.0		62.9	56.0			69.4	71.9			124.2
Adjustments for items in transit		2.2	3.2			0.1		0.1	0.3		1.7			1.1
Total Expansionary/Contractionary factors	178.4	62.6	186.1	92.3	294.5	351.3	373.2	224.5	571.1	465.5	463.3	493.4	376.8	293.3
Change in money supply	+115.8		+93.8		- 56.8		+ 148.7		+ 105.6		- 30.1		+ 83.5	
Percentage change	7.6%		5.7%		3.3%		8.9%		5.8%		1.5%		4.4%	

Source: Central Bank of Ceylon (26).

NOTES

E: Expansionary factors

C: Contractionary factors

(a) Based on end year data

(b) Includes Government corporations

(c) Banks'investment in private securities, private loans, overdrafts bills (local and import bills). The value of export bills discounted is valued under external banking assets.

(d) Time and savings deposits and other liabilities (net) of commercial banks.

4.I.I. The Government's position.

Let us examine now more closely the above developments by examining the factors underlying these changes.

The economic conditions in the trade sector permeated their effects throughout the economy, on the Government, commercial banks and the public, all being interrelated in a dynamic way.

Examining the Government's side, during recession periods on exports the Government revenues decreased. On the other hand, there was the need for more Government expenditure to take place to prevent a severe slump in the economy. A great proportion of these expenditures could not be financed from market sources because of thin money and capital markets, low per capita income, inefficient administrative system etc. The result was an increased recourse to Central Bank financing using as the chief instrument, treasury bills.(6) During boom periods on exports Government revenues increased, but they provided a temptation to undertake more expenditures so that deficits were incurred even in boom periods such as the I949/50 budget.(7)

Government financing from the Central Bank was becoming a progressively more important factor in changes of the money supply, with the implication that fluctuations in Ceylon's money supply were less dominated by the balance of payments situation.

We must point out here that by emphasizing the excessive monetary expansion from Central Bank borrowing, we do not necessarily adhere to any "monetarist" view;(8) they only point out the underlying factors of changes in money supply and their possible different effects on the economy.

Looking at the fiscal view it may be argued that the Government was justified in running deficits to mobilize resources, since this was done in recession periods. We can, however, criticize too much reliance on this view, since in an open economy with a high propensity to import, the Keynesian theory of fiscal policy may be ineffective since deficit financing may not mobilize domestic resources so much as cause a large leakage of imports which can easily create balance of payments difficulties.

Therefore, in an open economy, the link between the balance of payments and the way the Government finances its deficit is very strong indeed and should be borne in mind when policy prescriptions are given.

The Central Bank classed the expansion of credit to the Government as "essential" to cover the deficits of the Government and expressed its inability to check the expansion of credit to the Government if it was not to jeopardize the ability of the Government to meet its obligations.

4.I.2. Commercial Banks' Position

Looking at the commercial banks, their liquidity position was largely influenced by conditions in the trade sector.(9) So, during boom periods in exports, the banks' liquidity increased and with this increase, they provided more credit to the private sector, which was mainly directed to serve the trade sector.

The Central Bank considered this expansion of credit to the private sector as necessary and therefore, it did not undertake any restrictive measures.

> "If the value of exports contracts credit will also contract. The new money will disappear, if and when the time comes, just as naturally as first appeared"(10)

So, the Central Bank considered credit to the private sector to be rather endogenous and the least harmful to the economy.

4.2. MEASURES TAKEN BY THE MONETARY AUTHORITIES

4.2.I. Measures during the boom periods

With the above mentioned view of the monetary authorities about the banks' credit, it was natural that the measures designed during the boom periods were rather of a precautionary nature, in order to prevent expansion of credit for "non-essential" and particularly speculative purposes. Specifically, in the I950-5I boom, the Central Bank took the following measures:

(i) The Central Bank encouraged commercial banks to keep their foreign balances abroad by the Central Bank's readiness to purchase sterling up to six months forward at the spot rate in any amount and at any time. In this way the monetization of foreign balances which would add to the money supply was avoided.

(ii) To prevent the creation of non-essential credit arising from the fact that reserves increased through the monetization of export receipts-although not equally distributed between the various banks- the Central Bank increased with effect from January I95I, the reserve requirements on demand deposits of commercial banks from I0 per cent to I4 per cent.(II)

(iii) At the end of I950, the Central Bank decided to undertake open market operations to contract credit but it recognized the limited scope for such action because of the smallness of the Bank's portfolio in rupees securities.

In the I954-55 boom the measures taken were less mild. The Central Bank undertook open market operations not for disinflationary purposes but to promote investment from the increased quantity of loanable funds available in the market and on a restricted scale to stabilize the Government securities market.

The Central Bank issued for the first time its own securities (Rs. I0 m.) with the following purposes:

(a) To develop Central Bank paper as a security especially attractive to the non-banking private sector.

(b) To expand the small security market of the country which would permit the Central Bank to carry out open market operations more efficiently.

The Bank rate was reduced from 3% to 2.5% to be in line with

the lower bond rate and treasury bill rate which were decreased because of lower costs of borrowing and reduced Government borrowing.(I2)

On the fiscal front measures were taken to reduce Government expenditures, mainly on some food subsidies, and export duties were increased to reduce the budget deficit and hence the money supply.

4.2.2. Measures during the recession periods

During the recession periods on trade, the liquidity of commercial banks decreased so, the Central Bank reversed its anti-inflationary policy adopted during boom periods.
The measures taken aimed at assisting banks' liquidity position in order not to impair the growth of the trade sector.
The following measures are illustrative of this point.

(i) The Central Bank altered its attitude towards foreign balances of commercial banks kept abroad in order to stimulate banks to repatriate their excess overseas balances and to extend credit to the private sector for the benefit of the domestic production.

(ii) The reserve requirements on demand deposits of commercial banks decreased from I4% to I0% (I953-I959) to prevent decreases in the money supply putting pressures on the commercial banks to reduce their lending to the private sector.

(iii) When the banks' liquidity was at such a low level, as in I958, the Central Bank took measures to ease the "tight" conditions in the market which, if they persisted, would affect directly the financing of import and export trade,(I3) with effects on income and the domestic price level. Hence, the Central Bank permitted commercial banks to discount their holdings of treasury bills and to borrow against Government securities at moderate rates of interest, and later at the end of I958, as the above measures proved inadequate for the banks to extend their credit to the private sector sufficiently, the Central Bank introduced a scheme of lending to the commercial banks against certain types of eligible credit instruments resulting from particular commercial transactions, which excluded imports.

Other measures concerned with the existing obstacles to lending were also taken to facilitate expansion of credit to the private sector, by commercial banks.

Measures were also taken to reduce the expansionary effect of Government financing and to alleviate the balance of payments situation.

The Central Bank increased interest rates because it thought that the policy of maintaining exceptionally low interest rates could discourage savings and investment in Government securities. So, the Central Bank (in I953) withdrew its support of the Government securities market, with the intention of raising the cost of credit to the Government; it was hoped that this increase in the cost of credit would impose a restraint on Government spending and that the moeny needed to finance the excess expenditure over revenue would still be available from the banks at a higher cost. On these lines, the Bank rate increased from 2.5% to 3%; its practical effect was not to affect rediscounting but,

> "mainly to give further guidance to the commercial banks as regards their own policy"(I4)

As later sections will show, these arguments proved invalid as the Government expenditures were insensitive to interest rate considerations.(I5)

The Central Bank undertook open market operations to prevent a rise in interest rates because of the "tight" conditions in the market, and because the market for Government securities was small, the Central Bank dropped its policy of maintaining considerable flexibility of Government securities prices, in order not to impede the development of this market and thus increase the cost of financing the budget deficit.

The above remarks illustrate the difficult task faced in LDCs in following a flexible policy on interest rates because of the above mentioned difficulties.

On the fiscal front, various measures were also adopted, e.g.,

(i) In I952 the Government adopted an eight-point Austerity programme(I6) mainly concerned with import duties and more strict control of the items in the budget estimates.

(ii) In I953 other fiscal measures were introduced to produce additional revenues through taxes increases.

(iii) Reduction in subsidies of rice and food staple.

(iv) In I957 taxes and import duties were imposed on luxury goods, cars and jewelry.

(v) Contribution of foreign aid and non-bank borrowing.

4.3. The imposition of controls and restrictions on imports.

The continuous monetary expansion-precipitated by the decline in the terms of trade- was of special significance, as it led in the first instance to a decline in external assets and exerted strong pressures on the domestic price level, intensified by the imposition of restrictions and controls on imports.

By I960, the imbalance in the external payments position and the loss of external reserves had proceeded so far that vigorous corrective action became inevitable. External assets which stood at Rs II94 m. at the end of I956 had fallen to Rs 457 m. by the end of I960, largely as a result of import payments much in excess of export earnings.

The measures which aimed at a direct reduction of imports took the form of an introduction of quantitative restrictions over a wide range of goods as well as increases in import duties. These measures were intensified in I962 when all items other than five categories of essentials[I7] were subject to individual import licensing.

A monetary expansion took place almost throughout the whole of the I960-70 period, despite the substantial decline in external assets and the increases in time and savings deposits, because of the continued growth of the overall budgetary deficits of the Government financed by the banking system.

In this context, the introduction of import restrictions had important implications for the kind and the extent of the measures taken. Prior to I960, the effect of fiscal expansion on the liquid resources of the commercial banks was substantially offset by the increased outlays on imports and the adverse balance of payments position. With the introduction of import restrictions, the offsetting influence of this factor was reduced and the liquid resources of the banks tended to increase more rapidly.

In this new situation, the improvement in liquidity could result in a strengthening of the base for credit expansion, on the part of the commercial banks, and in this way to aggravate the

inflationary forces in the economy.
Therefore, a policy of restraint on bank credit, pursued selectively, became a necessary part of the overall policy.

4.3.I. Measures taken under these new conditions.

In I960, the following measures were taken:

(i) A 50% cash margin requirement was imposed, against letters of credit for the importation of certain goods.

(ii) Restrictions on the availability of finance for hire-purchase operations.

(iii) The Bank rate increased from 2.5% to 4%, except for financing of imports of cetain essentials, domestic production and exports.

(iv) Reserve requirements against demand deposits, increased from I0% to I2%.

(v) In I96I, the Central Bank rate on advances to commercial banks was generally 4%.

(vi) In addition to the I2% reserve requirements on demand deposits, commercial banks were required to maintain special reserves equal to 38% of any increase in the total of demand deposits over the level prevailing at Ist February I96I;[I8] that is, an effective reserve ratio of 50% was established for all demand deposits above an established margin.

(vii) Loan and overdraft facilities granted to foreign firms other than in the export trade were required by exchange control to be curtailed by one third.

(viii) In I962, the Central Bank directed that commercial bank credit for the purchase of estates, whether foreign owned or not, should not exceed 33⅓% of the purchase price of such estates. This restriction was also applicable to credit for purchase of immovable properties other than estates belonging to non-residents or companies operating outside Ceylon.

The above measures were aimed at influencing the direction and the cost of bank credit to the private sector as well as its overall magnitude. These measures brought adjustments in the portfolio of the banks. The increases in credit now mainly consisted of export and import bills discounted instead of loans and overdrafts. Excess reserves were reduced and resort to the borrowing from the

Central Bank became more frequent.

(ix) In 1965, the Central Bank took action to restrain credit expansion by an increase in the Bank rate from 4% to 5%. The Bank rate increased to 5.5% in 1968 and finally to 6.5% in 1970; the increases in the Bank rate followed increases in the lending and deposit rates of the commercial banks.

(x) From 1965, ceilings on credit expansion by commercial banks were imposed in order to re-orient the pattern of credit in favour of production and against consumption within the overall ceilings.

(xi) In Nov. 1967 a devaluation of the Ceylon rupee by 20 per cent [19] took place, because of the cumulative effects of the almost continuous deterioration in the balance of payments in several past years and because of the devaluation of the pound sterling. Another factor was that India, the major competitor in tea exports, had devalued her currency in 1966 and had simultaneously introduced heavy export duties on tea, which, however, were revised in 1967. At the same time of devaluation certain other measures were adopted to cushion, to some extent, the impact of the devaluation on the cost of living and to siphon off a part of the additional rupee incomes accruing to the export sector.

(xii) In 1968, for the first time, an attempt was made through the exchange rate, to provide incentives to selected growth sectors with export potentialities and to infuse greater dynamism in import competing industries. So, the Foreign Exchange Entitlement Certificate Scheme (FEECS) was introduced with the following objectives:

(a) To promote and diversify imports.

(b) To liberalize imports by allowing the market mechanism to regulate the flow of imports rather than to rely on quotas and stringent controls to regulate the supply of goods in the face of falling foreign exchange reserves. In this context the (FEECS) adopted two exchange rates: one, the "official" exchange rate applicable to essential imports and major exports referred to as "A" category transactions and the other a "floating" rate applicable to all other exports and imports-"B" category transactions. In the last category, a substantial range of imports were brought

under open general license, thus removing the existed requirements regarding import quotas and licenses.

(xiii) Measures were taken to curb the expansionary impact of Government finance. Fiscal measures on the revenue front, through taxes, non-bank borrowing and foreign aid.

These measures were, however, generally, unsuccessful in the final result, since the borrowing from the banking system continued to be large in most of the years. On the revenue side - although there had been a divergence between estimated and final figures,(20) particularly in respect of expectations concerning the yield of new taxes, such as those introduced in I96I/62 - there were over the whole period striking increases in revenue.

The main weakness was on the expenditure side. It was essentially the more rapid rise in Government expenditures that prevented the curtailment of the overall deficit, and worse from the development point of view it was current expenditure rather than capital expenditure which claimed the greater share in these increases.

This period brings out the difficulties that face fiscal policy in LDCs. On the revenue side, there are difficulties in arriving at a realistic estimate of the revenue. There are problems of legislation and administration and political factors as well. So, for example, in I962, proposals to introduce a sales tax on several categories of goods other than foodstuff and a reduction in the weekly ration of subsidized rice, were withdrawn.

There were also formidable difficulties in the way of reduction in current outlays. The requirements for administration, and the provision of social services in the face of rapid population growth and subsidies on food, imposed heavy pressures towards a continuing rise in the total volume of current outlays and relatively poor performance in respect to capital outlays. Though of course many current outlays in poor countries may, by, for example, improving nutritional standards, be very similar to capital outlays in that they increase future productivity.

4.3.2. Some implications

At this stage, it is interesting to look at some of the implications that the restrictions and controls imposed on imports had on: the policy measures adopted; the price level; and the composition of money supply.

4.3.2.a. Nature of the monetary measures.

We have already pointed out that, during the I950-60 period, imports were free of any controls or restrictions.(2I) The banks' activities were mainly concentrated on serving the trade sector thus, their excess liquidity could find outlet throughout imports or balances kept abroad, or even excess domestic reserves.

Therefore, the monetary measures adopted were of a rather precautionary nature and not so severe as to impair banks' portfolios and liquidity. On the other hand, an important role was given to the fiscal policy measures.

During the I96I-70 period, with the introduction of import restrictions, and the continued monetary expansion, vigorous policy measures had to be taken to restraint bank credit.
On the other hand, the difficulties that face fiscal policy in LDCs were brought out.

One can, therefore, trace out a connection between the degree of the openess of the economy, and the nature and the extent of the policy measures adopted by the monetary authorities.

4.3.2.b. Changes in the price level.

Following the war, Ceylon enjoyed price stability up to about I962. This was the result of Ceylon's ability to adapt supplies of goods to changes in demand through the relatively free movement of imports- which constituted a high proportion of total resources available for spending. In these conditions, it was the world prices for imports and exports that were the major influence on the domestic price level, which in the absence of drastic and effective controls over exports and imports, could not vary widely from the trend of inflation in the rest of teh world.

After I960, however, when direct controls and restrictions on imports were imposed, the situation altered basically, since in

this situation the domestic price level would depend on the success with which domestic demand was adapted to the total availability of supplies. So, the excessive monetary expansion, in order to finance Government deficits, in the context of import restrictions created strong pressures on the level of prices. At this point, it may be interesting to see the relationship between changes in the money supply and changes in the price level.

It is usually asserted that, in LDCs, we should expect a strong relationship between prices and money supply, since in these countries, there are unorganized monetary and financial institutions, limited willingness to hold idle cash, many income receivers do not save at all because of the low level of income, a large part of transactions is carried out in currency, habits and practices of payments are less flexible. These factors mean that changes in the money supply react on the price front, taking into consideration the various rigidities from the side of supply of production. It might be argued that in an open economy where imports are free of any controls and direct restrictions, changes in the money supply are not connected with movements in the price level to the extent that the country does not have any dircet effect on its terms of trade.

However, this is only partially true because an excessive expansion of money supply will result in excessive demand for imports which could be sustained by running down the external assets. But sooner or later, particularly if the terms of trade are adverse, controls and direct restrictions will be necessary which will exert pressures on the price level by raising the prices of imported goods and by exerting pressure on domestically produced goods.

Therefore, even in an open economy excessive expansion of money supply should not be neglected if we are interested in achieving price stability in the long-run.(22) It is true that because of other factors such as political pressures, government interferences, short-run benefits and short-run way of examining things, this policy may be difficult to be implemented, as earlier pages indicated.

4.3.2.c. The components of money supply

Looking at the components of money supply, currency and demand deposits held by the public, we see that there has been a relative shift towards holdings of currency on the part of the public against bank demand deposits. So for example, while in 1957 the currency component of the money supply was 41.8 per cent, in March 1970 reached a peak value of 58.9 per cent.(23)

This phenomenon is perhaps an indication of the wider distribution of the rise in money incomes in favour of sections of the community which do not generally resort to the use of the banking facilities. In a less-developed country, as more monetization of the economy takes place, it is reasonable to expect that individuals in the monetized sector will use currency rather than demand deposits in the first instance, due to their unfamiliarity with banking practices and limited banking facilities in many areas.

The increased percentage of currency relative to demand deposits may also be indicative of an increased preference to hold currency because of tax evasion reasons and of restrictions on imports, in order to find illegal ways, such as black market activities, to get the items wanted. An indication that this argument may be valid is the fact that holdings of currency were especially high in notes of the higher denominations of Rs 100 and Rs 50.

We should point out that this tendency towards an increased percentage of the money supply being held in currency has two effects on the strength of monetary policy. On the one hand, it may strengthen the ability to control bank credit since the money multiplier will be relatively smaller.(24) On the other hand, the weakening of the banking habit reduces the scope for effective monetary policy and prevents a faster rate of deposits mobilization which is crucial to the problem of economic growth. Since the Central Bank did not consider the first aspect as beyond its control, it was the second aspect that worried it.

To deal with this problem, in Oct/Nov. 1970 a demonetization took place, by announcing that the existing currency notes of Rs 100

and Rs 50, would cease to be legal tenders from 3rd Nov. 1970. The objective was to bring to the surface the considerable amount of currency notes believed to have been hoarded in the country. Every person in possession of these denominations of currency was allowed to present them to a bank in exchange for new currency of the same denomination up to a stated maximum, and the rest be credited to an account in the bank. It is too early to draw conclusions about the permanent effect of the measure,[25] but it at least brought for the first time a large segment of the public into contact with the banks.

4.4. Comments and Conclusions

From this examination of the economic stabilization policies, followed in Ceylon, some comments and conclusions can be stated.

The problems that the authorities encountered were to some extent different from those in a developed country. A main problem was to mitigate the effects of fluctuations in the export sector which caused disequilibrium in the balance of payments and had effects on the various aggregates of the economy, because of the high dependence of the economy on the trade sector.
Another main problem was to meet the consequences of the liquidity created in the economy because of the Government financing of its deficits through borrowings from the Central Bank.
The goal of economic development had a high priority together with the goal of price stability, so many of the measures designed with this orientation in mind, though in some cases they were, in a way, in conflict.

The money supply was largely affected by fluctuations in the balance of payments through changes in the external banking assets; especially during the 1950-60 period, when it was the predominant factor. During that period, it can be said that the money supply was endogenous; the Central Bank was not able, with a given exchange rate, to prevent the export sector from earning higher incomes.[26]

The credit of the Central Bank to the Government, constitutes the other important factor in the changes of money supply.
It had, generally, an expansionary effect throughout the whole 1950-70 period, except in boom periods; particularly after 1957, this credit remained at quite high levels.

There were difficulties in raising revenues through fiscal measures and in borrowing from the non-banking sector due to the main characteristics of the economy such as dependence on exports, small per capita income, inefficient administrative system, small capital market and not considerable amount of foriegn aid.

But it was mainly the difficulties in reducing expenditures and specifically current expenditures - mainly in order to pursue other objectives, socio-economic or even political ones - which necessitated continuous borrowing from the Central Bank.

Looking at the use of deficit financing as a means of mobilizing domestic resources and of preventing a slump in the economy, such efforts created balance of payments difficulties because of a large leakage of imports. So, this period brings out the difficulties that face fiscal policy in an open less developed economy and the strong link between the balance of payments problem and the way the Government finances its deficits and, in addition, the implication that fiscal and monetary actions are interrelated and, therefore, cannot be examined separately.

As regards credit to the private sector by the commercial banks, there are strong presumptions from the preceding analysis that for the 1950-60 period, it was largely determined by the needs of trade. Therefore, the measures adopted by the Central Bank were of a precautionary nature in order to prevent expansion of credit for "non-essential" and particularly speculative purposes.
There were no real pressures on the liquidity position of the banks, which were able to hold during this period quite high excess reserves.

During the 1961-70 period, because of the restrictions imposed on imports, the situation was different. In order to choke off the liquidity created by the Government deficits, vigorous measures had to be taken to restrict bank credit to the private sector.
So while in the Government sector there were easy conditions, in the banking sector "tight" conditions prevailed.
In addition, a connection is traced out between the degree of the openess of the economy and the kind and extent of the policy measures adopted by the monetary authorities.

The imposition of restrictions and controls on imports, had some additional implications such as:

(i) On the relationship between changes in money supply and changes in the price level - which exists in the long run.

(ii) On the percentage of currency relative to demand deposits held by the public, and the problems associated with it.

Looking at the specific tools used by the monetary authorities, the following comments and conclusions can be stated:

Extensive use of quantitative restrictions and controls on imports has been made since I960, when the level of external assets had reached low levels.

We should point out that the weapon of quantitative restrictions on imports, though inevitable at that time, did not result, however, in a direct curtailment of aggregate demand, since the process of monetary expansion continued through the financing of the Government's budget deficits. Furthermore, physical restrictions on imports as instruments of long-run policy are subject to practical limitations since the scope for further restrictions becomes more narrow as the margin of luxuries and non-essentials is reduced.

In a developing economy, import restrictions tend to introduce more rigidities with possible effects on the future rate of development of the economy. On the other hand, attempts to have a relatively comprehensive import-restrictions scheme meet great difficulties, since it is difficult to foresee and assess accurately the whole complex of requirements for the unimpeded maintainance of economic activity. To add to these difficulties, an effective import control scheme requires that the authorities should control not only the items and raw materials which can be imported but also, and more important, the use of these imported goods to ensure they are directed to the production of goods needed by the economy to promote its objectives. So, for example, we may impose restrictions on the imports of some luxury and non-essential goods but imported raw materials may be directed to the domestic production of these luxury non-essential goods, because of their high profitability. Or the private sector may bear the burden of the restrictions, while the Government sector suffers little restrictions on the imported items.

In this context, the attempts to encourage industrialization proved very hard indeed. Besides the above mentioned difficulties from the foreign exchange side, another important problem has been the relatively small size of the country and the small markets in the economic sense because of the low levels of income. Consequently substitution for imports resulted either in production in small plants of less than optimum size or production below capacity. The result is high cost production protected by high tariffs and therefore lack of competitiveness in world markets.

The instruments of monetary policy were used to some extent but, as we have already pointed out the measures adopted during the 1950-60 period were in nature different from those of the 1961-70 period.

The Bank rate during the first period changed in order to mark changes in the market conditions on interest rates, and not to affect discount borrowing of commercial banks. Borrowings from the Central Bank were nearly non-existent during the 1950-60 period, and only during the last years of our period have they become of some importance. During the 1961-70 period, the Bank rate was used to affect the discount borrowing of commercial banks.
We should point out that besides changes in the Bank rate itself changes in the terms of discounting and lending too, may have the same effect as the changes in the Bank rate,(27) and in this direction it was used to ease commercial banks' tight liquidity conditions and to induce them to direct credit for agricultural and industrial purposes.(28)

Open market operations were used to a limited extent again with the objective of promoting the long-run development of the Government securities market and in influencing rates of interest. Open market operations were not, generally, used to affect the cash reserves of the banks. This is mainly due to an inherent weakness in LDCs, that is, of the existence of a small market for Government securities, therefore, efforts to affect the reserve position of commercial banks is accompanied by serious fluctuations in securities' prices. In this context, efforts by the Central Bank to maintain considerable flexibility of interest rates to affect Government

borrowing were frustrated because of the above mentioned difficulties and the insensitivity of Government expenditure to interest rate considerations.

The reserve requirements tool was used extensively, and after 1961, it was effectively as high as 50 per cent above certain ceilings. It was mainly used to influence the reserve position of the banks.

There is a controversy about the effectiveness of the reserve requirements tool for LDCs. On the one hand, it is considered effective and a good substitute for the open market operations weapon. On the other hand, it is asserted, that its effectiveness is reduced since banks do not keep a stable reserves/deposits ratio. Rererves are quite variable changing with business conditions and, in the case of foreign banks, with the amount they can borrow from their head offices abroad and with the sale by the banks of assets abroad.

Our view is that the variation of reserve requirements technique, used properly, may be quite effective in LDCs. The fact that banks can borrow from their head offices abroad is not certainly without limit. And in addition, appropriate measures may be taken to affect their ability to borrow from abroad.

The real weakness that we should recognize in the above stated instruments is the difficulty of predicting the final effects on the banks when action is taken by the authorities. This unpredictability is probably greater in LDCs.

Finally, we should note that the reserve requirements technique can be used for development purposes by imposing different reserve requirements, according to a specific portfolio of the banks. In Ceylon, it has not been used in this way.

Moral suasion was extensively used in the form of directives to the banks, throughout the period. The Central Bank expressed satisfaction with the co-operation it had received from the commercial banks. One favorable condition for its use was the existence of a small number of banks, and sometimes fears of imposing undesirable solutions, for example, nationalization of banks.[29] Moral suasion technique is quite effective in LDCs.[30]

The exchange rate policy was not used extensively. In 1951, the Central Bank rejected the case for a revaluation, arguing that the boom in prices was only temporary being mainly due to the Korean war and less to the prior devaluation of 1949. It also assessed the general advantages and disadvantages of revaluation.

> "The decision not to revalue on long-run considerations was a decision to forego the immediate benefits of a lower cost of living and a more equitable distribution of income, endeavoring to achieve these ends by other measures, in favour of the long-run gains of stimulating a higher level of production, employment and real income and promoting a fuller development of the country's resources. In a country sorely needing more enterprise, it does not seem wise to take actions that discourage enterprise"(31)

In 1967 a devaluation by 20 per cent of rupee took place and a sort of "multiple" rate was followed from 1968.

Although we are not going to discuss the possible role of exchange rate policies as a means of stabilization policies, one could argue in favour of a more flexible exchange rate policy, at least to cope with cyclical variations of the export sector. The fear of causing damage to capital investment and international trade by adopting more flexible exchange rate, should probably not be exaggerated. Besides, by adhering to a fixed exchange rate, the function of equilibrating the balance of payments, is put on fiscal policy, in addition to the other difficult tasks it is expected to deal with.

Most of the issues raised in this chapter will come up in the remaining part of this work, in particular, the supply of money will receive a detailed examination in chapter 6. Various questions will be investigated such as: To what extent the monetary authorities could exert offsetting action to changes of money supply due to the balance of payments fluctuations or commercial banks' activities? What is the role of commercial banks in the money supply mechanism etc?

Furthermore, the behaviour of the non-bank public, of commercial banks, and the Government, the issues related to them, together with some policy measures, will be examined in chapter 7, trying to give quantitative content by the formulation of an econometric model.

Meanwhile, for an effective implementation of monetary policy, and the transmission mechanism of changes in monetary policy to the real sector, the decision of the public to hold money balances is an important one. For this purpose, an examination of the demand function for money - and the issues around it - is undertaken in the following chapter 5.

NOTES TO CHAPTER 4

(I) Measures taken in August I960.

(2) For example, in I952/53, a recession period, imports not only did not decrease but they actually increased from Rs. I559 m. in I95I, to Rs. I702 m. in I952, to Rs. I608 m. in I953.

(3) Except I964 when there was a small expansionary effect of Rs. I6.9 m.

(4) Except I952, as a result of the general decline in trade and not because of the policy of the Central Bank.

(5) In some other years too, the expansion of credit to the private sector was important, such as in I956 when, because of the Suez crisis, shipping difficulties necessitated some increase in bank credit for the financing of trade stocks.

(6) In terms of the Monetary Law Act, the Central Bank's advances to the Government are limited to I0% of the estimated Government revenue for each year. Moreover, the Act specifically precludes Central Bank subscription to new issues for long and medium term Government securities. The Central Bank's lending to the Government, therefore, is through the medium of advances and of Treasury bills, whilst commercial banks' contributions could take place through the medium of long and medium term securities and of Treasury bills.

(7) The Central Bank criticized the Government for running a deficit in a period when the balance of payments was in surplus instead of running a surplus budget, which could be spent during the next recession in economic activity in order to maintain employment and incomes.

(8) Taking into consideration changes in the velocity of money (GNP/M_I), this decreased in recession periods.

(9) We are talking about the I950-60 period. The I96I-70 period is dealt with below.

(I0) Annual Report I950 (26) p. 4.

(II) Reserve requirements on time deposits remained unchanged at 5 per cent throughout the whole I950-70 period.

(I2) The reserve requirements remained at the I0% level where they were decreased in the I952-53 period.

(I3) The Central Bank has the authority to examine commercial banks' activities by the Department of Bank Supervision. See TENNEKOON (I70) pp. 273-286.

(I4) Annual Report I953 (26) p. II.

(I5) Though a non-intervention policy on interest rates was not maintained, as it is stated below, interest rates, however, increased considerably.

(I6) Annual Report I952 (26) pp. 8-9.

(I7) Foodstuffs, petroleum, fuel, fertilizers and drugs included in the Ceylon's hospitals formulary.

(I8) This special reserve requirement was imposed on all banks. The People's Bank, which commenced business on July I96I, was not brought within the requirement until June I965, because the Central Bank felt that such a restriction should not be applied to the People's Bank in its formative years. The People's Bank was established to extent banking facilities and credit where they were not exist or were of a limited extent. After I965, a special reserve requirement of 28% was imposed.

(I9) Exchange rates: I947-49 I U.S.$ = Rs 3.32
(Rupee devalued in Sept. I949).
I950-67 I U.S.$ = Rs 4.76
(Rupee devalued in Nov. I967).
Since I968 I U.S.$ = Rs 5.95.

(20) For example, in I963/64, the rise in world prices in excess of the price on which the estimates were based, was an important factor underlying the divergence between budgetary expectations and actual results in respect of expansionary financing.

(2I) At least until I967, the Central Bank did not favour quantitative restrictions on imports and exchange controls as such measures would affect the cost of living and the cost

of production. In fact, the Central Bank reduced taxes in I95I, and the exchange and import controls were also relaxed. From I957, the intention of using in the future, selective credit controls, is stated.

(22) We should note that the lack of short-run correlation between changes in money supply and changes in prices, in addition to a lag in the above mentioned factors, may be due to fluctuations in the observed money/income ratio, and to the monetization of the economy by bringing into the market the rural sector.

(23) See chapter 3 table 3.5.

(24) This is only one aspect. Of course, the strength of monetary policy, in this case, also depends on how responsive currency holdings are to banks' inducements in times of credit shortage.

(25) Provisional figures for I97I show that the currency component increased from 47.6% in Dec. I970 to 5I.9% in Dec. I97I.

(26) But the Central Bank could, if it wished, have reduced credit to offset liquidity resulting from the trade surplus.

(27) Strictly speaking, this is partly true, since changes in the Bank rate may have other side effects, e.g., the psychological effect on individuals' and bankers' expectations might be important.

(28) It is doubtful whether the use of Bank rate as a means of influencing the foreign exchange market or of keeping earnings in the country or encouraging their repatriation from abroad can produce significant results in the context of LDCs because of their weak financial centres and of the frequent existence of other unstable conditions -economic, social, political.

(29) See note I3.

(30) SAYERS (I59).

(3I) Annual Report I95I (26) p. I9.

CHAPTER 5

THE DEMAND FOR MONEY

The demand for money studies, occupy a predominant role in monetary theory and policy, and generally in macroeconomics. This is probably because the demand for money is related directly or indirectly to almost all the other topics in the field.

The relevant discussions may be divided into those concerned with the theoretical issues, and into those trying to give an empirical context.

We are not going to review the achieved developments on the subject[I] but, a brief exposition of the main lines of thought and of the main issues outstanding, is undertaken. These together with an analysis of the methods and data used should facilitate the interpretation of our results that will follow.

5.I. A Brief Review of the Literature

5.I.I. The classical approach[2] to the demand for money- examined as a theory of velocity of circulation- treated velocity as determined by payments institutions and "technological" factors, that were considered more or less stable in the short-run.
Since the Classicals considered an unemployment situation as only a temporary phenomenon, and anyway, not an inherent element of the economy, any change in the quantity of money would result in changes of the price level to a certain proportion.
We should recognize, however, the fact that the Cambridge approach,[3] laid emphasis on the choice-making behaviour of individuals.
As Hansen[4] puts it, in the equation M=kPY, it is k that holds the stage, the question set is why people want to hold money.
In investigating this question, they suggest that besides income, other factors such as the rate of interest might also be important as a determinant of the demand for money.

5.I.2. Keynes, looked at the demand for money, as determined by three analytically separate motives, that is:[5]

(i) The transactions demand, as a function of income, reflected "the need for cash for the current transactions of personal and business exchanges"

(ii) The precautionary demand corresponded to "the desire for

security as to the future cash equivalent of a certain proportion of total resources" that is, it was considered as depending by and large on the level of income, and

(iii) The speculative demand as "the object of securing profit by knowing better than the market what the future will bring forth" which was defined as a function of the rate of interest, depending on a market view of the "normal rate of interest" which is considered fairly constant since it becomes established in the market over a long-term period,(6) so that, variations in the absolute level of interest rate are also variations in the spread between the absolute level and the expected level of interest rate. He believed, however, that there are financial assets which are close substitutes of money, that is, the demand for money is considered as highly interest elastic; this, together with the danger of a liquidity trap after a certain point, led Keynesians(7) to put little faith in the use of monetary policy. Therefore, fiscal policy emerged as a more reliable instrument.

We should note that both Classicals and Keynes treated the demand for money as merely a special case of the general theory of demand, something needing separate analysis.

However, in 1935 Hicks(8) made a plea on the grounds of logical consistency for the integration of money and value theory. This can be done if the propositions of both theories are derived by applying the same analytical techniques to the same demand functions of the same markets enabling us to show that both theories are special cases of the general theory of price and enabling single and direct treatment of otherwise complicated problems.(9)

In the 1950's this way of thinking received a clear and influential statement by the Chicago quantity theorists inspired by M. Friedman.

On the other hand, developments in the Keynes'approach have taken place.

5.I.3. New Quantity Theory.

Money is considered as a fund of generalized purchasing power that yields a composite service flow. The demand for money may then be analyzed as a problem in the theory of economic choice, and the quantity of money demanded may be expressed as a function of arguments analogous to those of conventional demand analysis: opportunity costs and wealth. In Friedman' formulation:(IO)

$$\frac{M}{P} = f(r_b,\ r_e,\ \frac{IdP}{Pdt},\ W,\ \frac{Y}{P};\ u\ )$$

where:

r_b: rate on bonds

r_e: rate on equities

$\frac{IdP}{Pdt}$: expected rate of change in price level

W : Wealth

Y : Income

u : preferences.

Wealth is treated as a present value of an income stream i.e., W=Y/r so the basic principle of capital theory is applied in monetary theory.(II) The velocity of circulation is expressed as a function containing the same variables specified above.

In the empirical applications, usually, one interest rate is used as a proxy for the opportunity cost of holding money, and for the wealth concept (including human and non-human) the permanent income hypothesis is adopted, defined as a distributed lag model of past incomes with declining weights.

The above approach of the new quantity theory of money, says nothing about the form of the function. Only the variables that enter the function are specified. Everything is left to the empirical evidence. Nothing is said about the elasticities of the entered variables. So, it does not seem to provide a complete explanation of the demand for money. The real problem is why elasticities change (if they do change) over time and why they differ (if they do differ) among different countries.

From the empirical findings, this school asserts a stable demand function in a limited number of variables, the factors affecting the supply of money do not affect the demand for money, and the rejection of the liquidity trap hypothesis.

Some[I2] have attacked this "money-like-fridge" type of formulation, that is, of making the demand for money analysis the same as any other good, and therefore omitting from the analysis the essence of the difference between a monetary and a barter economy which is precisely that in a barter economy goods exchange for other goods whereas in a monetary economy money plays a unique role distinct from that of goods, because godds have to be exchanged for money and money for goods.

5.I.4. Developments on the lines of Keynes'motives

Another major group of formulations of the demand for money are the developments on the lines of Keynes'motives for holding money.

5.I.4.a. In the transactions demand approach, money is considered as a kind of working capital, an inventory,serving that function in the process of production and consumption, and that just as there is maximizing behaviour with respect to inventories of goods, so there is maximizing behaviour with respect to the inventory of money. On this basis is first, the model by Baumol,[I3] who under certain simplified assumptions, and specifically, the existence of a steady stream of payments and receipts (T), a cost of transfering from bonds to money(b), and a rate of interest on bonds(r), he found that the individual in order to succeed minimization of his costs, should arrange his demand for average cash holding according to the formula:

$$\frac{C}{2} = \sqrt{\frac{bT}{2r}}$$

Which implies elasticities 0.5 -0.5 for income and interest rate respectively.

On the same lines is the model by Tobin[I4] where maximization of interest earnings net of transactions costs is achieved.

The Baumol's model has been extended by Feige-Parkin[I5] by incorporating transactions costs between money and commodities and trying to maximize the net profit from inventory management. A similar line is taken by Saving.[I6]

5.I.4.b. In the developments of the precautionary motive, the various models are not concerned with the optimum portfolio selection over a distanct period, but with the demand for money for transactions in a world of uncertainty.

Generally, the expected profit $(\hat{P})$ is maximized (or expected loss is minimized) defined as interest income on non-cash assets, on the following lines:

$$E(P)= \hat{P}= r(\bar{W} -M)-c\hat{L} \qquad (I)$$

where:

r= rate of profit

$\bar{W}$= given amount of assets

M= amount of cash

c= cost per £ of liquidating assets to money

$\hat{L}$= expected amount of assets to be liquidated

In order to maximize equation (I) we need to have the probability distribution about cash requirements.

Suppose Z= cash requirements, f(Z)= probability distribution of cash requirements and $a<Z<b$, a=min. amount of cash needed

b=max. amount of cash needed

We can define a mapping function for L so,

if L=0, $a<Z<M$ i.e., we need no liquidation

if L=(Z-M) $M \leq Z < b$ i.e., we have to liquidate something and then,

$$E(L)=\hat{L}=\int_{M}^{b}(Z-M)f(Z)dZ.$$

Substituting in (I) we get:

$$\hat{P}=r(W-M)-c\int_{M}^{b}(Z-M)f(Z)dZ \quad \text{which is maximized.}$$

In the literature, various assumptions are made about the form of the distribution f(Z) e.g.,

$f(Z)\sim N(M,\sigma^2)$ Normal distribution, or

$f(Z)\sim$ triangular distribution[I7] or

$f(Z)\sim \frac{I}{2\gamma}, -\gamma<Z<\gamma$, rectangular distribution[I8] or

$f(Z)\sim$ is left as unspecified.

5.I.4.c. Developments in the speculative demand

The speculative motive arises from an attempt to take account of price (or interest rate) expectations and typically maximizes a function involving the expected return and variance of return on asset holdings. So, the individual holds a diversified portfolio, a mixture of assets and developments in this derection have produced the portfolio balance theory.

We should point out that the diversification of assets is not because of uncertainty about the timing and the scale of cash requirements-as in the precautionary motive- but the uncertainty is about the yields on the assets.

The developments in this area are chiefly due to Tobin.((I9)

5.I.5. Some inferences and comments.

What inferences can be drawn from these models regarding the characteristics of the demand for money and, in particular, the role of income and interest rates?

a) With reference to the transactions motive models, the income variable is predominant, though some interest sensitivity of the demand for money is recognized (Cambridge, Baumol-Tobin models) Another important point is whether money holdings are related to income or to total transactions (as in Baumol-Tobin models). Conclusions from one relationship are valid for the other only if we know the trend of the ratio of total transactions to income. Though there is not any direct evidence on this trend, a plausible assumption would be an increasing trend, because of the increasing number of stages of production and distribution. Therefore, low income elasticity in terms of the transactions models will give higher income elasticity when income variable is used instead.

Furthermore, more of the discussion runs with reference to the non-financial firms. Though considerable attention has been paid recently to the demand for money by firms,(20) the different behaviour of these two-sections may involve modifications in the value of elasticities. The demand for money by households may be guided by habits and institutional arrangements to a greater extent than the demand for money by firms.

Aggregation over the entire private sector may therefore produce

higher income elasticity and lower interest elasticity than the transactions models predict. Besides, a disaggregation of the demand function may have different results for the stability of the function over time.

As one moves from the simple models to more complicated ones, there is less certainty about the likely magnitude of the income and interest rate elasticities. So, in the transactions models when uncertainty concerning the timing of payments to be made and to be received is introduced, it becomes necessary to deal explicitly with the cost and inconvenience of mobilizing cash at short notice. Such costs tend sometimes to move in line with interest rates by which the opportunity cost of holding cash is expressed.(2I) This means that the inducement to economise on money balances of an increase of the opportunity costs may be offset by the higher costs of cutting the balances too finely. Therefore, the interest rate elasticity may tend to be very low.

b) For the precautionary-speculative models, it is probably more difficult to indicate the order of magnitude to be expected for income and interest rate elasticities.

As regards interest rate elasticity, the determining factor is not simply the expected return of holding alternative assets but more important the firmness with which these expectations are held (i.e., the nature of the probability distribution). Besides, the existence of a large array of financial assets and not simply bonds, tends to lower the sinsitivity of money holdings to variations in the bond rate.

With reference to the magnitude of the income elasticity, additional assumptions are stated. So, according to one view, (Arrow-Tobin theory) individuals display increasing relative risk aversion, an assumption which implies income elasticity greater than unity. Notice, however, that the risk aversion hypothesis is at difficulties, when individuals experience substantial changes in the price level, because the riskless quality of money is reduced or disappears.

Finally, Friedman attempts to rationalize a greater than unity income elasticity by refering to money balances as analogous to a stock of durable luxury consumer goods.(22)

c) The previous comments, are in terms of a particular country. Extension by considering the economic situation of the various countries, may produce further modifications. So, for example, in comparisons between developed and LDCs, it is usually asserted that in the latter, the interest elasticity **is very low** because of the limited role of interest rates in the economic life, limited development of money and capital markets, large non-monetized sector etc.

The income elasticity is believed to be - in LDCs- higher than unity because individuals, faced with an increasing surplus of income and with a limited array of financial assets, may hold an increasing proportion of their income in the form of money balances.

d) Some additional points should be made here, concerning specifically the Keynesian developments.

(i) Keynes' analysis on the demand for money, was on aggregate level. He did not work on a microeconomic level.
On the contrary, Keynesian developments worked on a microeconomic level and then aggregated their results.
We should note that this transition from the micro-level to the macro-level, is not without problems. One of these, is the direction of causation in formulating demand for money functions.
In the micro-level analysis, the causation is from income to money i.e., $M=f(Y)$. At the aggregate level, however, the private sector is not able to determine the level of money balances in existence at any given point of time. This is determined by the monetary authorities. The private sector can only try to rid itself of any excess of balances by spending more on commodities or buying more financial assets or if there is a shortage, to build up larger balances by spending or buying less. These attempts bring adjustments in the various variables such as prices, interest rates, real output, employment. So, this process would lead to the formulation of relationships where changes in the money stock is the explanatory variable in the analysis of changes in income and in other variables. Only if the adjustments in all these variables were likely to be completed within a period, would it be legitimate to estimate an aggregate demand function for money.

(ii) Each approach in the Keynesian developments, tries to give a theory of the whole demand for money and not a part of it. In this respect, since their formulations are incomplete, their predictive power might be weak. For instance, the transactions models do not consider any uncertainty or the existence of any risk. The speculative models too, exclude the posibility of using money for transactions purposes during the given period.

(iii) One might argue that addition of these approaches could reduce the stated deficiency. However, such a thing would be inconsistent since each approach is formulated with different assumptions. A theory of the demand for money must set the assumptions from the beginning and then to formulate the appropriate model. Statistically, any separation of the motives is possible only under rather arbitrary assumptions.

(iv) Some assert that, the stated formulations are not necessarily incompatible with the approach that looks at the demand for money as a theory of demand, generally. The superiority of the one approach or the other can be judged on the grounds of the predictive power of the theory that emerges in each case.(23)

5.2. SOME BASIC ISSUES

In any attempt to find a demand for money function, one faces some basic issues, namely:

(i) The definition of money.

(ii) The variables that enter the demand function.

(iii) The identification problem.

We discuss these problems in due course.

5.2.I. The definition of money.

There is no generally accepted definition of what money is. On the contrary, there is great controversy.
Historically, the roots are in the Currency-Banking Schools' arguments of the mid-nineteenth century in England. The substance of the arguments was about the significance of various forms of credit but it took the form of a dispute over the definition of money.
The Currency School defined money as coin and bank notes, and they called bank deposits and bills of exchange "credit".
The Banking School defined money as coin alone and regarded bank notes like deposits and bills, as form of credit.

The difficulty of identification of what is money has derived from the two-fold nature of money, as a medium of exchange and as a store of value. The problems result from the recognition of the substituability between money and a wide range of alternative assets provided by government debt and the liabilities of various financial institutions.

Sayers supports that "there is no single asset or group of assets that uniquely possesses a uniform monetary quality that is totally absent from all the others".(24) -A proposition that the various lines of thought,described below, challenge, in the sense that a line of distinction for a definition of money can be found.

So, recent controversy has produced three main schools of thought. In the first school, are those who continue to find the distinguishing characteristic of money in its general acceptability, in its function as a medium of exchange. In this school, we can, however, find different lines of thought according to various qualifications that are made.

Clower asserts that "money will be defined theoretically in terms of explicitly postulated restrictions on trading alternatives that assign a special role to certain commodities as payment media in organized markets"(25) In this criterion, he defines money as currency, demand deposits and trade credit.

Newlyn(26) holds that money is a unique asset distinguishable both from commodities and from other financial assets. He argues that the unique character of money is seen not in its store of

value function, but in its role as a medium of exchange and defines money according to the criterion of "neutrality", in the sense of having zero effect in the market for loans.

Morgan[27] admits "that the acceptability as a means of payment is a necessary but not a sufficient condition for an asset to qualify as money", and proceeds to develop a set of conditions that are both necessary and sufficient. By examining the ways in which markets react to excess demand (or excess supply), he reaches the conclusion that: (i) If an asset is to justify as money, it is necessary that it should be fixed in value in terms of the unit of account.

(ii) Its supply should be exogenous in the sense that the amount issued by any one issuer is not affected by the transactions of any transactor that is not itself an issuer of an asset qualifying as money.

Pesek and Saving[28] approach the problem in the course of an examination of the role of wealth in economic theory. They distinguish between "money" and "debt", money consisting of items used as a medium of exchange (necessary condition) which are regarded as an asset to their holders but a liability to no one , so they should be included to the net wealth of the community (sufficient condition) while "debt" are considered the items that are assets to some and liabilities to others. According to this wealth criterion, Pesek and Saving consider as "money", the currency and demand deposits and "debt" the time deposits and liabilities of other financial institutions.

In the second school of thought are the Chicago quantity theorists (Friedman), who advocate a broader definition of money and include time deposits. This school generally proposes a broader functional role of money as consisting not solely as a medium of exchange, but also, and more basically, as a temporary abode of purchasing power. That is, it stresses the asset function of money. The most frequent justification is based on evidence-historical, empirical- in the context of U.S. data.[29]
Friedman proceeds further, arguing that the a priori approach to definition of money, that is, from the characteristics of money- medium of exchange function or asset function of money- to determine which assets satisfy this characteristic and classify them as money, tends towards a rather narrow definition of money.

Instead, he proposes the inverse direction, that is, the definition of money should be decided on grounds of usefulness in organising our knowledge of economic relationships. In other words, to examine how the various monetary assets are related to one another and the other economic variables, to examine we can say, the degree of their homogeneity.[30] Obviously, we could have for the same country even, and the same time, different definition according to the purpose we have in mind for the particular definition of money.

The third school, Gurley-Shaw,[31] in their work on financial intermediaries argued, that non-bank financial intermediaries offer liabilities which are close substitutes for money, narrowly defined. Hence, the quantity of money relevant for monetary theory and policy, should include the liabilities of non-bank financial intermediaries.

Some writers[32] refer a fourth school associated with the Radcliffe Committee's concept of the general liquidity of the economy. However, this concept is difficult to define.

To conclude, a priori, there is no firm answer to the problem of the definition of money. We should stress here, that the problem is not just a theoretical one, but it is a problem of practical importance as it is related to the monetary policy to influence the level of economic activity by manipulating the money supply.

The referred controversy gave birth to a lot of empirical research. As far as the third school, the results showed that the liabilities of other institutions do not appear to have been such close substitutes for the liabilities of commercial banks, although the results are inconclusive to some extent.
So, the controversy has been narrowed between the first and second schools whether we should exclude or include the time deposits from the definition of money.

Unfortunately, the results attained, with different definitions, do not consistently favour one definition or another, though this fact is itself probably an argument in favour of the simpler, narrow definition.

5.2.2. Variables considered in the demand function.

There have been extensive discussions about which variables should be included in the demand function for money, namely:
Is wealth or income the relevant variable? Wealth is a more fundamental determinant of economic behaviour, as it is the source of income. However, problems arise which items should be included in the definition of wealth. e.g., should we include human wealth or not? How should we treat the assets and liabilities of the Government?

In some models, the concept of permanent income is used, defined as a distributed lag model of past incomes with declining weights. Problems of interpretation, however, arise.
Some, as Friedman, consider it as a proxy for the wealth variable (including human one). Others, take it as an optimal forecast of the measured variable. In the empirical work, the permanent variables are simple expected values. All that is meant is that people notice and adjust to current events with a lag.

We should note, that the permanent income approach, has some limitations, which can be mentioned briefly:

(i) The use of permanent income requires constancy in the rate of interest if it is to reflect accurately the movements in total wealth.

(ii) The empirical estimation of permanent income involves an hypothesis about people's formation of expectations about their expected future income. The general permanent income hypothesis may be correct but this does not necessarily mean that the formation of expectations theory is right.

(iii) Permanent income is a theoretical concept which is net, i.e., it includes an allowance for the depreciation of the human capital. It also includes no element of transitory income.
In practice, it is not feasible to construct an empirical measure of permanent income which conforms exactly to these requirements.

As an opportunity cost for holding money, an interest rate variable is usually used. There is a question, however, which rate is more relevant for the demand function, that is, is it a short term rate or a long-term rate?

There is no a priori any justification in favour of one or the other. Some writers, like Brunner and Meltzer, argue that the demand for money should be treated within the broad theory of portfolio selection and suggest that this demand depends on the yield on equities as well as on bonds.

Others, (Heller, Laidler) argue that the short-term interest rate is more relevant, since it measures the opportunity cost of holding money as the rate of return on what they consider to be money's closest substitutes.

Others too, as Gurley and Shaw, stress the liquidity of money and argue that the closest substitutes for money are assets with similar characteristics such as the liabilities of financial intermediaries, so it is these rates which are most relevant to the demand for money function.

5.2.3. The identification problem.

Since data for the demand for money are not observable, series of the money supply are used.

Besides, some variables such as interest rates, are used in both functions. There is, therefore, an identification problem that is, whether we really estimate the demand function or the supply function or even a combination of supply and demand functions.(33)

Two arguments are usually stated for justification of the single equation approach:

(i) Appeal to empirical evidence from simultaneous equation models which generally confirm the single equation results.(34)

(ii) Consideration of the stability of the function; if the money supply varies independently of changes in the demand function, at least in the short run, while the demand function is stable, then what we can trace out empirically is the demand function, while if the demand function is unstable, we are unlikely to find any clear relationship at all.

5.3. Empirical investigations

5.3.I. A summary of others' findings.

Besides the theoretical developments, considerable attention has been directed recently towards the empirical verification of the demand for money function. However, the empirical evidence has been mainly for developed economies such as U.S, U.K and Canada.
For other countries, especially for LDCs, only a limited amount of research has been carried out and only limited number of hypotheses tested.

Despite the great activity in the area, the debate on the demand function for money still remains one of the most controvercial issues. It would be very difficult to state the empirical findings on the issue, as they are related to the definition of variables used, the form of the function, period of estimation, country etc. and so, they are quite extensive.

Generally, the main variables used are an interest rate, (short-term or long-term) income, wealth, permanent income- in various definitions, e.g., nominal, real, per capita- and price level (or changes in the price level).

The interest rate is generally accepted as being an important determinant of the demand for money.
The value of interest elasticity ranges from -0.I to around to -I (lower value with the short-term rate). As the definition of money is broadened, interest elasticity is decreased.
For LDCs, lower interest elasticity is asserted.
It is not yet possible to state confidently which particular interest rate measure is the relevant one for the demand function.
This question is intimately connected with the problem of the correct definition of money which is a still disputed subject.
There is no empirical basis for the liquidity trap hypothesis.

The value of income elasticity-wealth, permanent income- ranges from I to around 2, being relatively larger with the broader definition of money.
Which definition of income variable is superior, is not definite yet, as it is connected with the adopted definition of money, interest

rate, stability of the function and the specific sountry.
So, for example, it is usually asserted that current income is more appropriate for LDCs, while for developed ones, some measure of wealth gave better results.

It is accepted that the demand for nominal balances is proportional to the price level, which implies that the price level elasticity is unity.

Stability of the function is generally asserted.

Finally, the most usual adopted definition of money is the conventional one M_I i.e., currency plus demand deposits held by the public with the commercial banks.

5.3.2. Demand functions for money in Ceylon.

In our tests, as a short-term interest rate the three months treasury bill rate (r_{tb}) is taken, and as a long-term rate, the rate on government bonds 15-20 years (r_b).

The money income variables, (GNP or permanent income) are taken in real terms. This is done by deflating the nominal values using the implicit GNP price deflator.

Two definitions of money are considered. M_I defined as currency plus demand deposits held by the non-bank private sector with commercial banks, and M_2 defined as M_I plus time and savings deposits of the private sector held with commercial banks.

Linear and log-linear forms were fitted. The log-linear forms gave slightly higher $\bar{R}^2$ and higher D.W. statistic.
In the log-linear form the estimated coefficients are themselves the elasticities of the corresponding variables so, in our estimations the log-linear forms are adopted.

Some of the estimates obtained, are presented in the following pages (in parentheses, t values. Significance refers to the 5% level. The critical value is around 2.I).

5.3.2.a. Long-run estimates

TABLE 5.I presents the simple formulations with arguments the GNP variable and interest rates -equations I-4.
In equations 5-8 the price variable is added.
All variables appear with the correct sign except the interest rate variable which in some equations (3,6) comes with a positive sign. In these equations, however, the rate is very insignificant. The positive sign is therefore of no crucial importance as it could be equally a negative sign.
GNP and price variables are highly significant.
When GNP and interest rate variables are used in the demand function- equations I to 4- the income elasticity is around I for M_I definition, and around I.4 for M_2 definition (for both interest rates).
The interest elasticity is very low, -0.0I for r_{tb}, -0.I for r_b.

We have already noted, that the money and income variables are expressed in real terms. This assumes that the demand for nominal balances is proportional to the price level. It is assumed,in other words that the demand for money is homogeneous of degree one with respect to prices. So,our function can be specified as:

$$\frac{M}{P} = a\left(\frac{GNP}{P}\right)^{bI} r^{b2} \quad (35) \qquad (I)$$

However, if the homogeneity assumption is not correct, then the demand function for money should take the form:

$$\frac{M}{P} = a\left(\frac{GNP}{P}\right)^{bI} r^{b2} P^{(b3-I)} \qquad (2)$$

Estimating equation (2) in log form, the homogeneity assumption would imply coefficient for P variable not significantly different from zero. Otherwise the above assumption would not be correct; in that case, the price variable contributes to the explanation of the demand for money function as a separate variable and should be included explicitly in the function, otherwise omission of it may lead to instability of the function or poorness of fit.

From equations 5-8, it can be seen that the condition of homogeneity is not confirmed; the estimated coefficient of price level variable is significantly different from zero and statistically significant. Besides the income and interest rate coefficients are quite different from the other estimations (equs. I-4). Specifically, the treasury bill rate appears significant for both definitions of money (equs. 5,7) while the bond rate is insignificant. The income elasticity is found greater for both definitions, I.57 for M_I and bill rate, I.9 for M_2 for the same rate. For the bond rate the income elasticity is lower, I.I2 for M_I I.52 for M_2.

Furthermore, the statistical performance of the function is improved. We get higher $\bar{R}^2$ and the D.W. statistic is towards the value of rejecting the hypothesis of autocorrelation.

It appears, therefore, that the homogeneity assumption with respect to the price level variable is not confirmed by our data. Though the homogeneity assumption, which implies no money illusion, is normally taken for granted there is no a priori reason why it should necessarily be true.

TABLE 5.1.

Demand Functions for Money (in real terms - log-linear forms)

Equ.	Definition	constant	GNP	r_{Tb}	r_b	P	$\bar{R}^2$	D.W.
1	M_1	-1.8617 (1.266)	1.0280 (5.976)	-0.0177 (0.288)			0.8788	0.834
2	M_1	-2.2244 (1.935)	1.0853 (7.269)		-0.1131 (0.796)		0.8824	0.877
3	M_2	-4.9568 (3.570)	1.4077 (8.670)	0.0157 (0.272)			0.9409	0.936
4	M_2	-5.4683 (5.083)	1.4846 (10.626)		-0.1295 (0.974)		0.9436	1.036
5	M_1	-6.4893 (5.120)	1.5688 (9.753)	-0.1455 (2.981)		-1.6168 (4.815)	0.9457	1.591
6	M_1	-2.7099 (2.991)	1.1242 (8.932)		0.0087 (0.069)	-1.0806 (2.935)	0.9174	1.393
7	M_2	-9.0669 (6.493)	1.6880 (11.565)	-0.1292 (2.608)		-1.4360 (4.213)	0.9694	1.552
8	M_2	-5.8855 (6.191)	1.5181 (12.4059)		-0.0249 (0.203)	-0.9285 (2.594)	0.9572	1.426

5.3.2.b. Formulation of partial adjustment-income expectations models.

The previous formulations on the demand for money are of rather static nature, representing long-run specifications.

However, for policy implications, it would be more interesting to know the short-term demand function and the dynamic properties of the function. For these, we try the partial adjustment and income expectations models.(36)

Partial adjustment model.

The demand function for money is defined as:

$$M_t^* = a + bY_t + cR_t + u_t \qquad (a)$$

where, M_t^* is the desired level of money balances.

The adjustment function is:

$$M_t - M_{t-I} = k_I \left(M_t^* - M_{t-I} \right) \qquad (b)$$

That is, individuals do not adjust immediately to their desired level, but with a coefficient of adjustment k_I, $0 < k_I \leq I$ because of various reasons as ignorance, costs of change, inertia etc.

By combining equations (a) and (b) we get:

$$M_t = M_{t-I} + k_I\left((a + bY_t + cR_t + u_t) - M_{t-I}\right)$$

$$= M_{t-I} + k_I a + k_I bY_t + k_I cR_t + k_I u_t - k_I M_{t-I}$$

$$= k_I a + k_I bY_t + k_I cR_t + (I-k_I)M_{t-I} + k_I u_t$$

or

$$M_t = B_o + B_I Y_t + B_2 R_t + B_3 M_{t-I} + U \qquad (I)$$

where,

$B_o = k_I a$, $B_I = k_I b$

$B_2 = k_I c$, $B_3 = (I - k_I)$

Income expectations model.

The demand function for money is defined as:

$$M_t = a + bY_t^e + cR_t + u_t \qquad (a)$$

where Y_t^e is expected income defined as:

$$Y_t^e = k_2(Y_t + (I-k_2)Y_{t-I} + (I-k_2)Y_{t-2} + \dots) \qquad (b)$$

$$0 < k_2 \leq I$$

Now applying Koyck's scheme, equation (b) can be written:

$$Y_t^e = Y_{t-I}^e + k_2(Y_t - Y_{t-I}^e) \qquad \text{or}$$

$$Y_t^e = k_2Y_t + (I-k_2)Y_{t-I}^e \qquad (b_I)$$

Combining equations (a) and (b_I) we get:

$$M_t = a + bk_2Y_t + b(I-k_2)Y_{t-I}^e + cR_t + u_t \qquad (c)$$

Taking $M_{t-I} = a + bY_{t-I}^e + cR_{t-I} + u_{t-I}$, multiplying by $(I-k_2)$ and substituting into (c) equation we have:

$$M_t = a + bk_2Y_t + b(I-k_2)Y_{t-I}^e + cR_t + u_t + (I-k_2)M_{t-I} - a(I-k_2) -$$

$$-(I-k_2)bY_{t-I}^e - (I-k_2)cR_{t-I} - (I-k_2)u_{t-I} \qquad \text{or}$$

$$M_t = k_2a + k_2bY_t + cR_t - (I-k_2)cR_{t-I} + (I-k_2)M_{t-I} + (u_t - (I-k_2)u_{t-I})$$

or

$$M_t = B_o + B_IY_t + B_2R_t + B_3R_{t-I} + B_4M_{t-I} + W \qquad (2)$$

where,

$$B_o = k_2a,\ B_I = k_2b,\ B_2 = c,$$

$$B_3 = -(I-k_2)c\ ,\ B_4 = (I-k_2)$$

Comparing equations (I) and (2) - partial adjustment, income expectations models- we see that they differ in the interest rate variable and in the disturbance term.

If the rate of interest is insignificant, both models are identical and cannot be distinguished. (Strictly speaking, even in this case they differ in the disturbance term provided that in the partial adjustment model, there is no autocorrelation)

Note that the two models, though they yield the same predictions in this case, are based on very different theoretical assumptions.

So the more general case is formulated by combining both, partial adjustment and income expectations models.

$$M_t = a + bY_t^e + cR_t + u_t \qquad (a)$$

$$M_t - M_{t-I} = k_I(M_t - M_{t-I}) \qquad (b)$$

$$Y_t^e = k_2 Y_t + (I-k_2)Y_{t-I}^e \qquad (c)$$

Manipulating (a) (b) (c) equations we get the expression:

$$M_t = k_I k_2 a + k_I k_2 b Y_t + k_I c R_t - k_I(I-k_2)cR_{t-I} + (2-k_I-k_2)M_{t-I} -$$

$$-(I-k_I)(I-k_2)M_{t-2} + k_I u_t - (I-k_2)k_I u_{t-I} \qquad \text{or}$$

$$M_t = B_o + B_I Y_t + B_2 R_t + B_3 R_{t-I} + B_4 M_{t-I} + B_5 M_{t-2} + V \qquad (3)$$

where,

$$B_o = k_I k_2 a$$
$$B_I = k_I k_2 b$$
$$B_2 = k_I c$$
$$B_3 = -k_I(I-k_2)c$$
$$B_4 = (2-k_I-k_2)$$
$$B_5 = -(I-k_I)(I-k_2)$$
$$V = k_I u_t - (I-k_2)k_I u_{t-I}$$

Equation (3) cannot be estimated by OLS procedures if we want to have a unique solution, since there are six equations and five parameters (a, b, c, k_I, k_2). A non-linear method must be used.

In the following pages we present estimates of (I) and (2) models.

5.3.2.c. Estimates of the partial adjustment-income expectations models.

TABLE 5.2.a. reports the obtained estimates for the partial adjustment model (equation I) in real terms, while TABLE 5.2.b. gives the estimated elasticities of the variables together with the coefficients of adjustment.

TABLE 5.3.a reports estimates for the income expectations model (equation 2) in real terms, while TABLE 5.3.b gives the estimated elasticities of the variables together with the coefficients of income expectations.

All variables appear with the correct sign .
When GNP and interest rates only, are used in the specification of the functions, the estimates between the two models do not differ. This is because the interest rate variable is insignificant (or nearly significant). In both models, the coefficients of adjustment and the coefficients of income expectations are quite low.
0.2I with M_I and the bill rate, with the broader definition is reduced to 0.I6.
With the bond rate a higher coefficient is found (0.36, 0.32).
The magnitude of income elasticity is quite high being around I.7 for M_I and the bill rate while it is over two (2.4) for the broader definition of money.
The above are illustrated in TABLES 5.2.a -5.3.b equations I-4.

When the price level variable is included in the specification (equations 5-8) the estimated coefficients of adjustment and coefficients of expectations are relatively higher- from 0.36 to 0.77. Their trends, however, and the estimated elasticities are similar to the previous equations described above, though the treasury bill rate appears now to be significant.

TABLE 5.2.a

Partial Adjustment Model (In real terms - Log-linear forms)

Equ.	Definition	Constant	GNP	r	P	M_{-1}	$\bar{R}^2$	D.W.
1	$M_1 : r_{tb}$	-1.5595 (1.495)	0.3639 (1.865)	-0.0940 (2.012)		0.7849 (4.353)	0.9393	0.915
2	$M_1 : r_b$	-0.4709 (0.455)	0.3639 (1.528)	-0.0840 (0.749)		0.6385 (3.480)	0.9273	1.151
3	$M_2 : r_{tb}$	-2.1353 (1.999)	0.3937 (1.722)	-0.0961 (2.341)		0.8368 (5.010)	0.9747	0.868
4	$M_2 : r_b$	-1.5911 (1.230)	0.4788 (1.697)	-0.0890 (0.884)		0.6679 (3.842)	0.9680	1.160
5	$M_1 : r_{tb}$	-4.7132 (3.021)	1.0230 (3.250)	-0.1420 (3.142)	-1.0531 (2.492)	0.4223 (1.968)	0.9536	1.375
6	$M_1 : r_b$	-1.1027 (0.830)	0.5630 (1.596)	-0.0453 (0.366)	-0.4090 (0.773)	0.4754 (1.692)	0.9255	1.298
7	$M_2 : r_{tb}$	-5.0324 (2.615)	0.9448 (2.482)	-0.1269 (2.989)	-0.7059 (1.767)	0.5769 (2.676)	0.9775	1.117
8	$M_2 : r_b$	-1.8284 (0.946)	0.5338 (1.226)	-0.0819 (0.732)	-0.0818 (0.170)	0.6333 (2.336)	0.9661	1.189

TABLE 5.3.a

Income Expectations model (In real terms - Log linear forms)

Equ.	Definition	constant	GNP	r	r_{-1}	P	P_{-1}	M_{-1}	$\bar{R}^2$	D.W.
1	$M_1 : r_{tb}$	-1.4709 (1.159)	0.3506 (1.556)	-0.0964 (1.871)	0.0060 (0.131)			0.7887 (4.196)	0.9356	0.935
2	$M_1 : r_b$	-0.2229 (0.215)	0.3201 (1.350)	-0.2186 (1.415)	0.2267 (1.245)			0.6418 (3.554)	0.9295	1.117
3	$M_2 : r_{tb}$	-2.0780 (1.629)	0.3855 (1.525)	-0.0974 (2.164)	0.0035 (0.089)			0.8386 (4.839)	0.9731	0.872
4	$M_2 : r_b$	-1.2862 (0.993)	0.4196 (1.491)	-0.2099 (1.519)	0.2048 (1.254)			0.6832 (3.986)	0.9691	1.138
5	$M_1 : r_{tb}$	-6.7024 (3.163)	1.4126 (3.429)	-0.1365 (2.989)	-0.0567 (1.223)	-1.5836 (2.741)	0.2465 (0.591)	0.2265 (0.903)	0.9541	1.701
6	$M_1 : r_b$	-1.0283 (0.772)	0.6325 (1.713)	-0.1814 (1.114)	0.2833 (1.454)	-0.8618 (1.164)	0.4270 (0.766)	0.3540 (1.142)	0.9266	1.314
7	$M_2 : r_{tb}$	-6.6459 (2.538)	1.2433 (2.505)	-0.1238 (2.772)	-0.0331 (0.753)	-1.0691 (1.849)	0.2068 (0.494)	0.4428 (1.693)	0.9760	1.275
8	$M_2 : r_b$	-1.8456 (0.891)	0.5676 (1.180)	-0.2002 (1.316)	0.2267 (1.265)	-0.3258 (0.463)	0.2447 (0.463)	0.5773 (1.857)	0.9653	1.141

TABLE 5.2.b.

Partial Adjustment Model

Equ.	Definition	Estimated elasticities of: GNP	r	P	Coefficient of adjustment
I	$M_I : r_{tb}$	I.692	-0.437		0.2I5I
2	$M_I : r_b$	I.007	-0.232		0.36I5
3	$M_2 : r_{tb}$	2.4I2	-0.589		0.I632
4	M2 : r_b	I.442	-0.268		0.332I
5	$M_I : r_{tb}$	I.77I	-0.246	-I.823	0.5777
6	$M_I : r_b$	I.073	-0.086	-0.780	0.5246
7	$M_2 : r_{tb}$	2.233	-0.300	-I.668	0.423I
8	$M_2 : r_b$	I.456	-0.223	-0.223	0.3667

TABLE 5.3.b.

Income Expectations Model

Equ.	Definition	Estimated elasticities of: GNP	$r^{(a)}$	$P^{(b)}$	Coefficient of expectations
I	$M_I : r_{tb}$	I.659	-0.456		0.2II3
2	$M_I : r_b$	0.894	-o.6I0		0.3582
3	$M_2 : r_{tb}$	2.388	-0.603		0.I6I4
4	$M_2 : r_b$	I.324	-0.663		0.3I68
5	$M_I : r_{tb}$	I.826	-0.I76	-2.047	0.7735
6	$M_I : r_b$	0.979	-0.28I	-I.334	0.6460
7	$M_2 : r_{tb}$	2.23I	-0.222	-I.9I9	0.5572
8	$M_2 : r_b$	I.343	-0.474	-0.770	0.4227

(a) Not based on coefficient of r_{-I}

(b) Not based on coefficient of P_{-I}

For the estimation of the partial adjustment- income expectations model (equation 3), a constrained non-linear estimation technique must be used in order to get unique estimates of the parameters. Unfortunately, we could not use this technique because of non-availability of the corresponding package programme.
Instead, an iterative method was adopted. The procedure was as follows:

From the formula defining the expected income:

$$Y_t^e = kY_t + k(I-k)Y_{t-I} + k(I-k)^2Y_{t-2} + \dots \quad ,$$

various series of Y_t^e were constructed by giving values to k.[37]
(A step by 0.05, starting from 0.I5 to 0.95)
Similar series were constructed for the price variable[38] and the desired money balances as well, by using the adjustment function. Then equations were fitted in the various combinations of k's.

The above approach, in comparison to the forms derived by applying the Koyck scheme, have the advantage that we can observe the evolution of the elasticities and the significance of the entered variables as the values of the coefficients of adjustment change; besides, the multicollinearity problem is less severe because of the absence of lagged values of the variables. It involves, however, a lot of computational work. Some of the obtained results are stated in the following pages, only for three values of k's, which however, are indicative of the trend of the estimated values and the significance of the entered variables.

First, some results using only expected income series are stated.

TABLE 5.4.a. reports equations by using expected income and interest rates.

For M_I : r_{tb}, we can see that the low coefficient of expectations (ie. low k_{GNP}) gives relatively higher $\bar{R}^2$, D.W and higher income and interest rate elasticities (equations I-3).

The same conclusion is retained for the broader definition of money (equations 7-8).

The interest rate variable is significant with a low coefficient of expectations but it gets insignificant as this coeficient increases. The above conclusions are retained when the bond rate is used instead of bill rate. The bond rate, however, is insignificant in all formulations , and produces lower income elasticities.

When the price variable is included in our formulations- TABLE 5.4.b.- the differences then, are not so sharp, as above, whatever value of the coefficient is considered.
As it can be seen, from equations I-3, the $\bar{R}^2$ is almost the same, D.W. is a bit higher for low k_{GNP}, the income elasticity is almost the same for M_I : r_{tb} I.50, for M_I : r_b I.I5, for M_2 : r_{tb} I.90, for M_2 : r_b I.50.

Also, the elasticity and the significance of the interest rate variable, (for the same definition of money and rate) do not change. In all formulations, the bill rate appears significant while the bond rate is insignificant.

The elasticity and the significance of the price variable, are getting larger, as the coefficient of expectations increases.

Tests carried out by using both expected income and expected prices gave similar results. It seems, therefore, that when individuals consider past incomes as being important (low coefficient of expectations) they do not consider price variable too much, while, when they look at the present income, they consider price variable.

TABLE 5.4a

Permanent Income Hypothesis (In real terms - Log. linear forms)

Equ.	Definition	coefficient K_{GNP}	constant	GNP	r	$\bar{R}^2$	D.W.
1	$M_1 : r_{tb}$	K= 0.15	-5.1478 (3.985)	1.4645 (9.348)	-0.1025 (2.126)	0.9382	1.379
2	$M_1 : r_{tb}$	K= 0.45	-3.5352 (2.535)	1.2308 (7.505)	-0.0654 (1.187)	0.9124	0.831
3	$M_1 : r_{tb}$	K= 0.85	-2.2386 (1.555)	1.0730 (6.368)	-0.0297 (0.500)	0.8888	0.750
4	$M_1 : r_b$	K= 0.15	-3.0174 (3.149)	1.2118 (9.549)	-0.0504 (0.483)	0.9237	1.283
5	$M_1 : r_b$	K= 0.45	-2.7401 (2.651)	1.1500 (8.583)	-0.1011 (0.840)	0.9091	0.892
6	$M_1 : r_b$	K= 0.85	-2.4015 (2.165)	1.1080 (7.694)	-0.1217 (0.896)	0.8921	0.797

TABLE 5.4.a.(cont'd)

Permanent Income Hypothesis (In real terms - Log linear forms)

Equ.	Definition	coefficient K_{GNP}	constant	GNP	r	$\bar{R}^2$	D.W.
7	$M_2 : r_{tb}$	K=0.15	-8.7112 (7.805)	1.9150 (14.148)	-0.1066 (2.559)	0.9747	1.804
8	$M_2 : r_{tb}$	K=0.85	-5.4199 (4.113)	1.4632 (9.486)	-0.0302 (0.556)	0.9490	0.723
9	$M_2 : r_b$	K=0.15	-6.2289 (7.165)	1.6146 (14.025)	-0.0147 (0.155)	0.9656	1.571
10	$M_2 : r_b$	K=0.85	-6.0357 (6.713)	1.5552 (13.345)	-0.0996 (0.950)	0.9623	0.993

TABLE 5.4.b.

Permanent Income Hypothesis (In real terms - Log linear forms)

Equ.	Definition	coefficient K_{GNP}	constant	GNP	r	P	$\bar{R}^2$	D.W.
1	$M_1 : r_{tb}$	K=0.15	-5.9080 (4.267)	1.5566 (9.271)	-0.1184 (2.436)	-0.3693 (1.344)	0.9409	1.761
2	$M_1 : r_{tb}$	K=0.45	-5.9847 (4.271)	1.5187 (9.217)	-0.1275 (2.561)	-0.9406 (3.066)	0.9403	1.572
3	$M_1 : r_{tb}$	K=0.85	-6.4721 (4.901)	1.5682 (10.149)	-0.1454 (3.096)	-1.4946 (4.739)	0.9493	1.536
4	$M_1 : r_b$	K=0.15	-2.9674 (3.014)	1.2010 (9.133)	-0.0177 (0.141)	-0.1790 (0.491)	0.9203	1.420
5	$M_1 : r_b$	K=0.45	-2.7839 (2.822)	1.1419 (8.928)	-0.0084 (0.066)	-0.6106 (1.666)	0.9173	1.314
6	$M_1 : r_b$	K=0.85	-2.7690 (2.883)	1.1337 (9.156)	-0.0026 (0.021)	-0.9841 (2.736)	0.9207	1.306

TABLE 5.4. b. (cont'd)

Permanent Income Hypothesis (In real terms - Log-linear forms)

Equ.	Definition	coefficient K_{GNP}	constant	GNP	r	P	$\bar{R}^2$	D.W
7	$M_2 : r_{tb}$	K=0.15	-8.6185 (6.856)	1.9038 (12.491)	-0.1047 (2.371)	0.0450 (0.181)	0.9733	1.763
8	$M_2 : r_{tb}$	K=0.85	-9.0917 (7.060)	1.8927 (12.560)	-0.1305 (2.851)	-1.2963 (4.214)	0.9736	1.389
9	$M_2 : r_b$	K=0.15	-6.3111 (7.184)	1.6323 (13.908)	-0.0683 (0.609)	0.2939 (0.903)	0.9652	1.372
10	$M_2 : r_b$	K=0.85	-5.9758 (6.587)	1.5322 (13.099)	-0.0412 (0.351)	-0.7984 (2.350)	0.9612	1.250

Finally, our iterative method was applied in testing the partial adjustment-income expectations model.
TABLE 5.5 presents some of our resulting equations.

In all formulations, it seems that a high coefficient of adjustment (as high as 0.96) gives statistically better results. In other words, it is found that there is a quick adjustment towards the desired level of money balances. Taking into consideration the coefficient of income expectations (and price expectations) it seems that we get statistically better combinations with low coefficients of these variables. To conclude:
Our results indicate that there is a quick adjustment of actual balances towards the desired level of money balances, while there is a low coefficient of income expectations (and price expectations too).

We should notice that in the estimation of the partial adjustment model alone, the coefficient of adjustment was found to be quite low (even 0.16, tables 5.2), while combination with expected variables leads to different conclusions.(39)
Therefore, the problem of adjustments in the demand for money function deserves much more careful examination.

The above conclusions, need some interpretation, in the context of the Ceylon's economy.
Adekunle(40) asserts that in LDCs, we should expect the elasticities of expectations to be consistently larger than in developed countries, because of difference in the length of the economic horizon of the individuals- more static expectations in LDCs, for reasons related to the characteristics of these economies. That is in LDCs individuals in formulating their expected income, attach great weight to their current income and give little weight to their past incomes.

One could argue, however, for the opposite case, namely, in LDCs we may expect quite low coefficient of income expectations, which means that- in terms of the formula, $Y^e_t = k(Y_t + (I-k)Y_{t-I} + \dots)$, individuals in formulating their expected income they do consider significantly its past values.

Their whole attitude is heavily based on the experience of the past, and they know that the final outcome on their income depends heavily on external factors outside their control such as, weather conditions, prices of their products abroad, other major events etc.
One might also add that individuals in LDCs, being on average closer to subsistence may be less willing to change established survival behaviour in response to a change in, say, income. Some change in a factor affecting their life may have to be very well established before people will generally incorporate it in their plans.(4I)

In simpler terms, it seems more plausible, that individuals adjust their notion of what is normal or permanent, according to the currently observed income changes very slowly, mainly for the reason that income fluctuations have been more pronounced during the examined period.

It might be interesting to note that low coefficient of income expectations (0.I2), high coefficient of adjustment (0.87) is reported by Laidler-Parkin(42) for the U.K economy which is an export, though developed, economy which may have similar characteristics with respect to fluctuations in income, with our economy.
In this respect, it might be suggested that, irrespective of the arguments advanced above, which view about the form of expectations in developed-LDCs is correct, the use of the formula:

$Y^e_t = k(Y_t + (I-k)Y_{t-I} + (I-k)^2 Y_{t-2} + \ldots\ )$, may not be adequate to explain the formation of expectations in developed LDCs, as such, but it rather simply reflects the degree of fluctuations in income.(43)

TABLE 5.5.

Partial Adjustment - Income Expectations Model (In real terms - Log linear forms)

Equ.	Definition	K_M	K_{GNP}	constant	GNP	r	$\bar{R}^2$	D.W.
1	$M_1 : r_{tb}$	0.15	0.15	-23.0263 (3.376)	3.6670 (4.434)	-0.8649 (3.399)	0.4747	1.484
2	$M_1 : r_{tb}$	0.45	0.15	-8.3260 (3.671)	1.8605 (6.765)	-0.2628 (3.105)	0.8211	1.685
3	$M_1 : r_{tb}$	0.85	0.15	-5.5950 (4.069)	1.5204 (9.119)	-0.1264 (2.464)	0.9294	1.480
4	$M_1 : r_{tb}$	0.15	0.45	-19.6438 (3.111)	3.1590 (4.254)	-0.7954 (3.187)	0.4519	1.196
5	$M_1 : r_{tb}$	0.45	0.45	-6.4567 (2.921)	1.5847 (6.097)	-0.2220 (2.542)	0.7932	1.135
6	$M_1 : r_{tb}$	0.85	0.45	-3.9494 (2.702)	1.2811 (7.453)	-0.0889 (1.539)	0.9029	0.867
7	$M_1 : r_{tb}$	0.15	0.85	-17.7074 (3.099)	2.9170 (4.362)	-0.7548 (3.204)	0.4657	0.934
8	$M_1 : r_{tb}$	0.45	0.85	-5.2090 (2.522)	1.4310 (5.918)	-0.1915 (2.248)	0.7848	0.802
9	$M_1 : r_{tb}$	0.85	0.85	-2.6684 (1.800)	1.1250 (6.484)	0.0542 (0.887)	0.8810	0.713

5.3.3 The stability of the demand function.

The stability of the function, in the sense whether the structure of the function has changed over the examined period, is tested by the use of dummy variables.

A general model is formulated which permits us to test not only if there is a shift of the function but also if there are shifts in the coefficients of the entered variables.

Generally, the model and the test procedure are as follows:(44)
Suppose our demand function is of the form:

$$M = a + bY + cR + u$$

The hypothesis tested is that the parameters of the function are different in the two sub-periods i.e.,

$$M = a_I + b_{II}Y + b_{2I}R + u \qquad I^{st} \text{ period } (1950\text{-}1960)$$

$$M = a_2 + b_{I2}Y + b_{22}R + u \qquad 2^{nd} \text{ period } (1961\text{-}1970)$$

Of course, one way to test whether there are differences in the estimated parameters between the two sub-periods would be, to fit functions for these periods and then to apply the usual t-test procedures. However, since our periods are short ones, such a procedure is not efficient. Instead the use of dummy variables permits us to pool the data from the whole period. We define dummies:

D_I < 0 in period I; 1 in period 2 $\qquad$ D_2 < 1 in period I; 0 in period 2

Our single equation would be:

$$M = a_I D_I + a_2 D_2 + b_{II} D_I Y + b_{I2} D_2 Y + b_{2I} D_I R + b_{22} D_2 R + u \quad (I)$$

In this model, however, there is no explicit intercept and attempt to run a program that produces an intercept would break down because the $(X'X)$ matrix is singular.(45)
Since however, $D_I + D_2 = I$ we can eliminate one dummy variable taking $D_I = I - D_2$ and substituting in (I) equation, we get:

$$M = a_I(I-D_2) + a_2 D_2 + b_{II}(I-D_2)Y + b_{I2}D_2 Y + b_{2I}(I-D_2)R + b_{22}D_2 R + U$$

$$= a_I - a_I D_2 + a_2 D_2 + b_{II}Y - b_{II}D_2 Y + b_{I2}D_2 Y + b_{2I}R - b_{2I}D_2 R +$$

$$+ b_{22}D_2 R + u$$

$$M = a_I + (a_2-a_I)D_2 + b_{II}Y + (b_{I2}-b_{II})D_2Y + b_{2I}R + (b_{22}-b_{2I})D_2R + u$$

or,

$$M = a_I + d_{I2}D_2 + b_{II}Y + c_{I2}D_2Y + b_{2I}R + c_{I3}D_2R \qquad (2)$$

where

$$d_{I2} = a_2-a_I$$

$$c_{I2} = b_{I2}- b_{II}$$

$$c_{I3} = b_{22} - b_{2I}$$

Equation (2) can be estimated and takes into consideration not only shifts of the function (i.e., change of intercept) but also any change in the slopes. For this, an F test procedure is applied.

I^st step. We test the hypothesis that all parameters are the same in both periods i.e., N.H. $d_{I2} = c_{I2} = c_{I3} = 0$.

From (2) we estimate a residual sum of squares (RSS) which is called unrestrictive (S), as no restrictions were imposed on equation (2) to estimate this RSS.

Then, we estimate a function that does satisfies the tested hypothesis i.e., we estimate the function:

$$M = a'_I + b'_{II}Y + b'_{2I}R \qquad (3)$$

and we get a RSS which is called a restrictive one (S^*) and we apply the formula:

$$F = \frac{(S^*- S)/g}{S/(n-p)}$$

g= number of restrictions

n= number of observations

p= number of estimated parameters in equation (2).

We test with $F_{g,(n-p),a}$ as a critical value.

If we accept the tested hypothesis we stop the test procedure.

If we reject it, then we proceed to see where is the shift. So, next,

2nd step, we can test the hypothesis that all slope coefficients jointly for Y, R are the same between the two periods i.e., N.H. $c_{I2} = c_{I3} = 0$

Again we have an unrestrictive RSS from (2) - S - and a restrictive RSS - S^* - by fitting the equation

$$M = a'_I + d'_{I2}D_2 + b'_{II}Y + b'_{2I}R \qquad (4)$$

and we test with the above F test.

If we accept the hypothesis we stop. i.e., we accept that there is a shift in the function (in intercept) but not in the slopes of the entered variables.

If we reject the hypothesis we proceed to further tests to find in which of the variable(s) there is a change in the slopes, using the same procedure described above.

We should notice that the Ist step is exactly what is usually called as Chow test. As it may be seen, our formulation is more general and permits us not only to test if there has been a change in the structure of the equation but also to specify where this change (if any) has occurred.

The described model can easily be extended in cases of having more variables and more dummy variables as well.(46)

Application of the above described procedures is illustrated in TABLE 5.6.

TABLE 5.6.a

$$\text{Log}(M/P) = \text{log}a + b_I \text{log}(GNP/P) + b_2 \text{log}r$$

Definition	Residual Sum of Squares (RSS)	No of coeff.	F value computed $F = \frac{(S^* - S)/g}{S/(n-p)}$	Critical F value 5%	Critical F value I%
$M_I : r_{tb}$	$S^* = 0.I444888$				
	$S = 0.0622620$	$g = 3$			
	$S/(n-p) = 0.004I508$	$n-p = I5$	6.635	3.29	5.42
$M_I : r_{tb}$	$S^* = 0.0978548$				
	$S = 0.0622620$	$g = 2$			
	$S/(n-p) = 0.0045080$	$n-p = I5$	3.948	3.68	6.36
$M_I : r_b$	$S^* = 0.I406I20$				
	$S = 0.0688I25$	$g = 3$			
	$S/(n-p) = 0.0045875$	$n-p = I5$	5.2I7	3.29	5.42
$M_I : r_b$	$S^* = 0.07578I3$				
	$S = 0.0688I25$	$g = 2$			
	$S/(n-p) = 0.0458750$	$n-p = I5$	0.760	3.68	6.36
$M_2 : r_{tb}$	$S^* = 0.I290830$				
	$S = 0.063I323$	$g = 3$			
	$S/(n-p) = 0.0042088$	$n-p = I5$	5.223	3.29	5.42
$M_2 : r_{tb}$	$S^* = 0.09I4226$				
	$S = 0.063I323$	$g = 2$			
	$S/(n-p) = 0.0042088$	$n-p = I5$	3.36I	3.68	6.36
$M_2 : r_b$	$S^* = 0.I23I260$				
	$S = 0.057I353$	$g = 3$			
	$S/(n-p) = 0.0038090$	$n-p = I5$	5.775	3.29	5.42
$M_2 : r_b$	$S^* = 0.0682547$				
	$S = 0.057I353$	$g = 2$			
	$S/(n-p) = 0.0038090$	$n-p = I5$	I.469	3.68	6.36

TABLE 5.6.b.

$$Log(M/P) = loga + b_1 log(GNP/P) + b_2 logr + b_3 logP$$

Definition	Residual Sum of Squares (RSS)	No of coeff.	F value computed $F = \frac{(S^* - S)/g}{S/(n-p)}$	Critical F value 5%	Critical F value 1%
$M_1 : r_{tb}$	$S^* = 0.0613022$				
	$S = 0.0509121$	$g = 4$			
	$S/(n-p) = 0.0039163$	$n-p = 13$	0.139	3.18	5.21
$M_1 : r_{tb}$	$S^* = 0.0535035$				
	$S = 0.0509121$	$g = 3$			
	$S/(n-p) = 0.0039163$	$n-p = 13$	0.221	3.41	5.74
$M_1 : r_b$	$S^* = 0.0933131$				
	$S = 0.0331429$	$g = 4$			
	$S/(n-p) = 0.0025495$	$n-p = 13$	5.899	3.18	5.21
$M_1 : r_b$	$S^* = 0.0697325$				
	$S = 0.0331429$	$g = 3$			
	$S/(n-p) = 0.0025495$	$n-p = 13$	4.784	3.41	5.74
$M_2 : r_{tb}$	$S^* = 0.0631469$				
	$S = 0.0550602$	$g = 4$			
	$S/(n-p) = 0.0042354$	$n-p = 13$	0.477	3.18	5.21
$M_2 : r_{tb}$	$S^* = 0.0567334$				
	$S = 0.0550602$	$g = 3$			
	$S/(n-p) = 0.0042354$	$n-p = 13$	0.132	3.41	5.74
$M_2 : r_b$	$S^* = 0.0882073$				
	$S = 0.0308472$	$g = 4$			
	$S/(n-p) = 0.0023728$	$n-p = 13$	6.043	3.18	5.21
$M_2 : r_b$	$S^* = 0.0652487$				
	$S = 0.0384722$	$g = 3$			
	$S/(n-p) = 0.0023728$	$n-p = 13$	3.761	3.41	5.74

The conclusions of the stability test are stated briefly: When interest rate and income variables are entered as arguments in the demand function, an unstable function is found for both interest rates and definitions of money.

Definition M_I with the bill rate, seems more unstable than with the bond rate; in the former case there is both shift in intercept of the function and in the income and interest rate coefficients, while with the bond rate there is only shift in the intercept of the function at the I% level (TABLE 5.6.a)

When price variable is introduced in the demand function (TABLE 5.6.b) specifications using the treasury bill rate are found very stable for both definitions of money, while the bond rate gives unstable relationships.

Therefore, we cannot give a firm answer on the stability issue. It differs according the specification adopted, the definition of money and the selected interest rate variable.

We must note that on the stability of the demand function depends to some extent the proper definition of money and the identifiability of the function. As next chapter will illustrate, there are strong indications that money supply was affected by important factors that did not affect the demand for real balances- at least in the short-run These factors include variables such as the country's foreign exchange reserves, Central Bank credit and commercial bank reserve ratios. So, only the existence of a stable demand for money function would identify it.

5.3.4. Conclusions

From the investigation of the demand dunction for money in Ceylon, the main conclusions can be summarized:

(i) For the long-run function, with current income and interest rates as independent variables, the income elasticity with both interest rates is around I, while for the broader definition of money income elasticity is around I.50.

Interest rate variables appear insignificant.

When the price level variable is introduced, the income elasticities become larger, I.6 for $M_I : r_{tb}$, I.9 for $M_2: r_{tb}$.

For the bond rate, the income elasticities appear generally lower. The bill rate appears significant in this case, with elasticity about -0.02, while the bond rate in no case is found significant with elasticity about -0.I. Therefore, the interest elasticities are quite low.

(ii) The price level variable is contributing itself to the explanation of the holding of real balances. So, the homogeneity assumption of nominal balances with respect to the price level is not verified by our data.

(iii) From the examination of the dynamic, partial adjustment-income expectations models, the conclusions are hazy; which form of equation is adopted, and which variables are defined as expected ones, make important differences to our results. So,

use of income and interest rate variables, give a relatively low coefficient of adjustment and coefficient of expectations (0.I6- 0.35). While introduction of price variable gives higher values (0.35-0.75). However, when the partial adjustment- income expectations models are combined in an iterative approach, the general conclusion is that there is a high coefficient of adjustment of actual balances towards the desired ones, while there are low coefficients of expectations for income and price variables.

In addition, the inadequacy of the distributed lag formula,

$Y_t^e = k(Y_t + (I-k)Y_{t-I} + (I-k)^2 Y_{t-2} + \ldots \quad)$ in explaining the form of expectations in developed-LDCs, is also suggested.

So, the answer to the question whether wealth or income variable is more appropriate remains to some extent uncertain.

(iv) No firm conclusion is found on the stability of the function issue and, therefore, on the proper definition of money and the identification problem.

5.3.5. Limitations of the study.

(i) The investigation on the demand function showed that there are no clear-cut answers to crucial questions such as the significance of the interest rate variable, the magnitudes of the interest rate and income elasticities, the stability of the function, the definition of money and the lags involved in the dynamic models.
These issues have, however, serious implications in formulating and conducting monetary policy. So it would be dangerous, in view of the existing uncertainty to take these results without any reservation.

(ii) Another limitation of the approach is the problem of aggregation. Our demand for money functions were of an aggregate nature, concerned with the whole economy. So, the elasticities computed are an average for the whole population. As any average magnitude, any large differences in the elasticities of the various groups are concealed. It would be useful for policy reasons, to have information on the elasticities of the variables in different sectors of the economy e.g., of the households, of the export companies etc. Unfortunately, non-availability of data does not permit us to make such a disaggregation.

(iii) The problem of causation, already touched in the text, whether it runs from money to income or vice versa, cannot be answered adequately within the single equation models of the demand for money, no matter how subtle the methods used.
We must consider the mechanism of supplying money as well. i.e., the behaviour of commercial banks and the manipulation of the instruments of the monetary authorities.
Furthermore, the importance whether to regress income on money or vice versa, is reduced when detailed models are formulated.
A first step towards the development of a model, is the study of the money supply mechanism, which is the subject of the next chapter.

NOTES TO CHAPTER 5

(I) The developments in the subject may be found in: LAIDLER (I26), JOHNSON (I08), CROOME and JOHNSON (45), CLAYTON et. al. (39), GOODHART (84).

(2) FISHER (66).

(3) PIGOU (I52).

(4) HANSEN (97) p. 50.

(5) KEYNES (I22) p. I70.

(6) However, if investors change their opinion of what is the normal rate in an unpredictable, or erratic way, the demand schedule becomes unstable.

(7) We should be careful in using the words "Keynes" and "Keynesians" as they are not identical, as it has been analyzed by LEIJONHUFVUD (I28).

(8) HICKS (I00).

(9) PATINKIN (I49) p. xxiv.

(I0) FRIEDMAN (67).

(II) JOHNSON (I08) p. 350.

(I2) R. Clower, in CLAYTON et. al. (39) p. I5f.

(I3) BAUMOL (I3).

(I4) TOBIN (I73).

(I5) FEIGE and PARKIN (6I).

(I6) SAVING (I58).

(I7) PORTER (I55).

(I8) MORRISON (I39), GRAY and PARKIN (87).

(I9) TOBIN (I74), PARKIN (I47).

(20) MELTZER (I34), PRICE (I56).

(2I) For example, rates charged on overdrafts and advances usually move in step with rates offered to depositors.

(22) The question, of course, is why money is considered as luxury. One could suggest because of the protection against risk, and thus to connect the risk aversion theory with Friedman's view.

(23) LAIDLER (I26) p. 42.

(24) SAYERS (I60) p. 7I6.

(25) See note I2.

(26) NEWLYN (I42), (I44).

(27) MORGAN (I37).

(28) PESEK and SAVING (I5I).

(29) FRIEDMAN and SCHWARTZ (79) p.92.

(30) idib. pp. 90-9I.

(3I) GURLEY and SHAW (92).

(32) JOHNSON (I08) p. 35I.

(33) Furthermore, to get best unbiased estimates, one of the conditions is that there must be a one way causation, from the independent to the dependent variable with no direct feedback. Thus in the single equation models, the interest rate and the other explanatory variables must be assumed to influence the money stock but the money stock must not in turn influence these variables.

(34) BRUNNER and MELTZER (20), TEIGEN (I68).

(35) We should note at this point, that if the demand function is in nominal terms for M, GNP, the equation would be:

$$M = a(P.GNP)^{b_I} r^{b_2}$$

b_I in this case, is some average of the price level and income elasticities. Consequently if the price level elasticity is really unity but the true income elasticity is not equal to one, b_I will be biased towards that value and will not be a good estimate of the true income elasticity.

(36) The formulations are based on: FEIGE (60); and LAIDLER and PARKIN (I27).

(37) A ten years lag was considered. For years backwards where no data were available (I943-49), they were obtained by extrapolation of the currency held by the public series.

(38) For the price variable extrapolation of the export price index was used.

(39) Similar conclusions were found by LAIDLER and PARKIN (I27), by estimating equation 3. Unfortunately, we could not use this technique because of non-availability of the corresponding package programme, in order to have an exact comparison with our data.

(40) ADEKUNLE (I).

(4I) In Friedman's terms, one might say that there is a large transitory component of income which people in LDCs have learned to ignore.

(42) See note 36.

(43) See p. 95 point (ii).

(44) This section is heavily based on lecture notes taken at the University of Manchester.

(45) JOHNSTON (II2) p. I78.

(46) idib. pp. 204-205.

CHAPTER 6

THE SUPPLY OF MONEY

Until recent years, the theory of the supply of money has been given little attention, being swamped in the Keynesian onslaught and the debates on the new demand oriented quantity theory.

This is to some extent understandable - as demand questions involve decision making by all economic units in the society - while in the final analysis and despite some rather important "slippage", qualifications the money supply is (or can be) determined by the monetary authorities.

> "...indeed it would be surprising if the conclusion were otherwise"(I)

But before drawing vertical M lines (or even with immense sophistication M lines with positive slopes with respect to "r") we must consider what we are saying. For policy purposes, if nothing else, it is crucial to have some understanding of how the money supply responds to various stimuli- quantitatively and qualitatively.

In recent years money supply theory has been directed to this direction but there is controversy on many unsettled issues and much room for future work to be done, as the following pages will try to show.

6.I. The Proximate "Determinants" of the Money Supply.

6.I.I. A simple textbook treatment. Traditionally, there is the long-standing textbook treatment of multiple deposit expansion, where the banking system expands deposits to a certain multiple of reserve base(2) i.e., $D = \frac{I}{r} R_b$ where D= deposits, R_b= banks' reserves, r= banks' cash ratio

The formula is extended to incorporate various leakages from the banking system. So, assuming that the public keeps cash to a certain proportion to their deposits, the above formula becomes:

$$D = \frac{I}{k+r} B$$

where $k = \frac{C_p}{D}$, Currency ratio

C_p= Currency held by public

B= Monetary base.

Defining $M^s = C_p + D$ we derive the formula:

$$M^s = \frac{I + k}{k + r} B \qquad \text{or } M^s = mB \qquad m = \text{Money multiplier.}$$

We can extend the above formula by considering additional leakages, such as different ratios for demand and time deposits, external trade, etc., and thus to derive the appropriate multiplier formulas.(3)

We should note that the various formulas derived are true by definition at all times; if they are to be used to attempt to control money supply, certain behavioural hypotheses must be introduced. According to the traditional view, the various ratios that appear in the multiplier are taken as constant, or their evolution over time is considered stable and known, so in the formula $M^s = mB$, the monetary authorities by changing B could predict changes in money supply.

But as Johnson put it "these ratios are in fact behaviour relationships rather than exogenous variables".(4) As soon as we accept this realistic view, we depart from the mechanical traditional approach described above and the whole thing becomes more complicated. There is still a relationship between money stock and the monetary base through a multiplier, but now changes in the money stock should be interpreted as reflecting the behaviour of the banking system, the non-bank public and the monetary authorities. An important implication of this is that the money supply cannot be considered with certainty as exogenous. Instead, the implication is to treat the money supply, or at least part of it, as endogenous.

Before proceeding into further analysis of the money supply we should state another approach to the subject. This approach, developed along the traditional view, sees the money stock as set not by supply conditions but as determined by demand conditions. In this view the money supply is determined by developments in the real sector and not the other way around (i.e., money supply is taken as demand determined).

In the following pages the theory of the supply of money and the relevant issues will be briefly stated. The analysis will be based on the relationship between the money supply and the monetary base through a multiplier, the latter being derived from various ratios. This is a particularly useful approach since it facilitates exposition and the organization of our data. At a later stage, the analysis will go deeper and empirical evidence will be brought out.

6.I.2. The Monetary Base.

The money supply is determined by the action and the interaction of monetary authorities (Govenment- Central Bank), banking system and the non-bank public. Thus changes in the money supply reflect decisions by these groups. Most investigations on the money supply take as the starting point in expressing these relationships the formula: $M^s = mB$

M^s= money stock

m = money multiplier

B = monetary base

The monetary base can be looked either from the point of "uses" or from the point of "sources".(5) The "uses of the base" presentation reflects the demand for the base by the various sectors of the economy. So, B may be defined as:

$B = C_p + R_b$

C_p= currency held by the nonbank public

R_b= total reserves held by commercial banks

i.e., the banks and the public determine the allocation between reserves and currency.

The "sources of the base", presentation gives insight to the factors that affect the base whether it is due to government activities, central bank operations or foreign trade flows. For the U.S., for example, the monetary base -"sources presentation"- satisfies the following identity:

$B = A + F + U + TC - d - o - f - c$

A= discount & advances of Federal Reserve Banks

F= Federal Reserve Banks' portfolio of Govt. securities

U= gold stock

TC= Total treasury currency outstanding

d= Treasury deposits at Federal Reserve banks

f= foreign deposits at Federal Reserve banks

c= Treasury cash

o= F.R. Banks' other deposits plus other accounts

The monetary base as defined above, it is sometimes called "high powered money" or "source base".

There are some different definitions of the monetary base as well, such as:

Net source base (B^a) - or "adjusted base" or "exogenous base" defined as $B^a = B - A$

A = reserves borrowed from the Central Bank

$B = C_p + R_b$ as defined previously.

Reserves held by the banks can be distinguished in required reserves (RR) by Law against deposits, and excess reserves (RE) any reserves above the required ones, kept in the form of deposits with the Central Bank plus any till cash set apart as reserves.(6) i.e.,

$$R_b = RR + RE$$

If from the excess reserves we substract reserves borrowed from the Central Bank we obtain free reserves (R_f)- which is formally defined as net borrowed reserves when bank borrowings exceed excess reserves, i.e., $R_f = RE - A$, combining the relationships we have:

$$B^a = C_p + RR + R_f$$

There is disagreement, however, about which definition of the base is the most appropriate. So, for example, Andersen-Jordan(7) adopt B (i.e., they include borrowed reserves) while Leeuw-Kalchbrenner(8) adhere to the definition of net source base (B^a). Their debate is based on the question whether movements in borrowed reserves produce offsetting movements in some other component of the base, e.g., unborrowed reserves.

Others exclude borrowed reserves on the grounds that the effect of borrowed reserves on bank credit and on deposit expansion is different than the effect of unborrowed reserves.

However, it is counter-argued, the multiple expansion of deposits by the banking system does not depend on the source of the additional reserves aquired by the banking system. Reserves borrowed by any bank when diffused throughout the banking system cannot be distinguished by any other bank from unborrowed reserves. Besides, statistical criteria might help us, to choose that definition of monetary base which gives us the maximum degree of stability in bank behaviour. This, however, can be dealt in the context of a model of the banking sector.

Furthermore, we should examine which definition the monetary authorities have adopted in designing their policies; for example, does the Central Bank design its strategy primarily to control the base or it is aiming at counteracting changes in bank borrowing?

In our examined case of Ceylon, as an earlier chapter showed,(9) borrowed reserves were almost absent during the first years of our period, and only in very recent years have they gained some importance. So, in our case, it does not make too much difference which definition we adopt.

However, it is still helpful to look at the issues involved in choosing the most appropriate definition of the base for LDCs and here, we think that inclusion of borrowed reserves in the base is more relevant. In these countries, borrowing from the Central Bank is not of the kind experienced in developed banking systems, i.e., of a temporary nature and with the purpose of bringing pressure on the banks' ability to lend. On the contrary, banks have easy access to Central Bank borrowing and usually at a non-penal rate. This might suggest that in many LDCs the Central Bank does not want to control the quantity of high powered money and is willing to let the banks have as much high powered money as they want.

This is true to the extent that borrowings from the Central Bank are at the initiative of the commercial banks, but the Central Bank can refuse to accommodate such borrowing or to provide it only at a penal rate. Thus if the Central Bank wants to control the money supply, it can.

The fact that commercial banks in Ceylon have not borrowed from the Central Bank in the past is not due to difficulties of borrowing from there, but to other reasons, such as the reliance of banks on their head offices, the existence of ample excess reserves which fluctuate with economic activity and factors that have been analysed in chapter 3.(10)

Another question is whether the monetary base is "exogenous", in the sense: (i) Of being a variable subject to control by policy makers; and (ii) Of being a variable which does not respond to current endogenous variables.

This question can be adequately dealt by examining the "sources of base". We will come to this issue later, where we are going to

examine how the base is affected because of Central Bank's operations, Government's policy, movements in trade etc.
Here, we just say that the monetay base, today, is considered as being under the control of the monetary authorities.
This does not mean that the Central Bank determines the surplus or the deficit in the balance of payments or the Government's cash policy. It only means that the Central Bank can, if it wants to, control the monetary base by taking offsetting actions.

Finally, there is another view according to which the base can be considered as endogenous if the policy-makers fix the base not exogenously but in reference to the values of the targets they desire to hit. Such a proposition requires specification of the objectives and the behaviour of the monetary authorities.

6.I.3. The money multiplier.

The multiplier provides the connection between the money stock and the monetary base ($m = M^S/B$).
The multiplier is composed of several ratios the magnitudes of which are determined by the desisions of banks and the non-bank public.
The exact form of the multiplier differs:[II]

(i) According to the definition of money supply adopted (e.g., M_1, M_2)

(ii) The definition of the monetary base and

(iii) The specification of the various components. (Reserves, deposits)

Friedman-Schwartz,[I2] adopting the broader definition of money supply ($M_2 = C_p + D$, $D = DD_p + T_p$)
and monetary base defined as: $B = C_p + R$ define m as:

$$m = \frac{I + \frac{C_p}{D}}{\frac{C_p}{D} + \frac{R}{D}}$$

Then, using this framework, they examined the monetary experience of the U.S from I867 to I960 looking at successive historical episodes. By examining which of the parameters, currency ratio, reserve ratio, monetary base (high powered money) was predominant in determining movements of the money stock, they concluded that over the long-run the base was the dominant determinant, while over the cycles the changes in the ratios, especially the currency ratio, accounted for a significant part of the movements in the money stock.

Cagan,[I3] adopting the same definitions of money and base defined the multiplier in a slightly different form:

$$m = \frac{I}{\frac{C_p}{M} + \frac{R}{D} - \frac{C_p}{M}\frac{R}{D}}$$

He examined in more detail the movements in the three "determinants"- currency ratio, reserve ratio, base and also the underlying factors influencing movements in money. He arrived to similar conclusions of those of Friedman- Schwartz.[I4] [I5]

In fact, there is a lot of discussion whether the base or the multiplier is more important as the main source of change in the money supply. So, according to the "monetarist" view variation of the base is the dominant determinant of money stock change and the multiplier is considered to be fairly stable and therefore relatively insignificant as a source of money stock change. Since the monetary base is seen as reflecting mainly the behaviour of the monetary authorities, it is concluded, that they can have, at the end, control of the money supply.

According to the non-monetarist view -"new view"[I6]- sharp short-term changes in the money stock often reflect the influence of changing economic conditions that operate through the multiplier,i.e., fluctuations of the money stock are claimed to result primarily from the behaviour of commercial banks and the public.

They argue that even small changes in the multiplier may have a large impact on the money supply; and therefore, it is difficult for the monetary authorities to have control of the money supply.[I7]

We attempt an estimation of the relative contributions of the multiplier and the base to the changes in the money supply over the period I950-70. Also, the contributions of constituent ratios of the multiplier to changes in the multiplier are presented.

The presentation of the data, however, is preceded by an exposition of the various concepts and procedures used.

We adopt the narrow definition of money (M_I), the monetary base B, and ratios which permit us to see the effect on the multiplier of decisions taken by the public and the commercial banks.

These ratios include:[I8]

a) Currency ratio (k), which is a measure of the public's preference between currency and demand deposits. So, when the public shifts to the holdings of more currency, banks lose reserves which in turn causes a multiple contraction of deposits and bank credit which more than offsets the increase in the currency component of M_I. The value of the multiplier declines since the unchanged quantity of the base now supports a smaller stock of money.

b) Time deposit ratio (t) which reflects the public's preference for time deposits relative to demand deposits.
Since time deposits held with commercial banks are excluded from our definition of money, a transfer from demand to time deposits decreases M_I and a result the multiplier decreases because, although the base is unchanged, it now supports a smaller quantity of money.

c) Government deposit ratio (g), which measures shifts between government held demand deposits and demand deposits held by the public. Since government demand deposits are excluded from the definition of M_I but they require the holdings of reserves by banks, increases in such deposits reduce M_I, which is reflected in a smaller multiplier.

d) Required reserve ratio (r^r). Changes in the required reserve ratios are also a source of variation of the multiplier .
A higher r^r reduces the multiplier, since a given level of reserves can now support a smaller quantity of deposits. Other things remaining, of course, the same, especially demand for excess reserves.

e) Excess reserve ratio (r^e). Changes in bank holdings of excess reserves bring changes in the multiplier in the same way as changes in required reserve ratio except that in this case the decision is voluntarily taken by the banks.

Combining the above ratios and relationships we derive the formula: (19)

$$M_I = \frac{I + k}{k+(r^r+r^e)\ (I+t+g\ )}\ B \qquad (I)$$

i.e., our multiplier is:

$$m = \frac{I + k}{k+(r^r+r^e)\ (I+t+g\ )} \qquad (2)$$

By taking partial derivatives of m with respect to the various ratios we can verify the above statements about their corresponding movements.(20)

6.I.4. Empirical investigation of the monetary base - money multiplier relationship.

TABLE 6.I shows the yearly average values[2I] of the base, the multiplier and the various ratios that enter in our multiplier. The accompanied diagram 6.I illustrates some trends.
As can be seen, the value of the multiplier is below 2. In fact the mean value over the whole period is I.73. This value is quite low in contrast to the experience of developed economies where a value around 2.5-3 is usually found. This difference is mainly due to the fact that in developed economies, the proportion of currency held by the public, in the total money supply, is much smaller than it is in LDCs.

The multiplier was increasing up to I957 and then declined continuously. The currency ratio increased but the variability within the period is quite large. The time deposit ratio increased continuously. No perceptible trend is observed in the required ratio and the government deposit ratio, while the excess reserve ratio shows a rapid decline.
These changes and the relationships among the variables are more conveniently examined by considering their percentage changes. These are presented in TABLES 6.2 - 6.3.

In table 6.2 our formula $M_I = mB$ has been applied by considering percentage changes of M_I as being, approximately, equal to the percentage changes of the base and the multiplier.
Looking over the whole period at the mean values, we observe a decline in the multiplier by -0.II per cent while the base was increased by 6.47 per cent. Therefore, the multiplier and the base changing in opposite directions resulted in an increase of the money stock by a mean value of 6.28 per cent.

These results may lead to the conclusion that over the period, changes in the base were the dominant determinant of the changes occurred in the money stock, while the multiplier changes played only a minor role. In other words, we would incline to support the "monetarist" point of view.

However, a more careful consideration of the various changes in the multiplier between the various years, shows that these

changes were quite large and, therefore, the mean value -0.II is misleading in the sense that it does not represent the average trend of changes. This becomes apparent when we calculate the standard deviation and the coefficient of variation; the latter for the multiplier is quite high with a value 45.27.

The above considerations could provide support for the "non-monetarist view" that variability of the multiplier may create difficulties for monetary control in the short-run.

We should note that the variability of the multiplier might be greater when we consider shorter time periods, e.g., on a monthly basis.

Regression analysis gave these results:

(In parentheses t values)

	R^2	D.W
$\Delta M^S = -2.7I02 + 480.647\Delta m + I.56I4\Delta B$ (0.4I6) (8.272) (I5.275)	0.93I6	I.9I2
$\Delta M^S/M^S = -0.0023 + I.06I5(\Delta m/m) + I.0244(\Delta B/B)$ (2.62I) (I3.865) (I2.275)	0.999I	I.678

Both, changes in the multiplier (or percentage change) and changes in the base (or percentage change) are significant in the corresponding changes of the money supply, though changes in the base appear more significant.

TABLE 6.I

Values of the ratios - multiplier- base

Year	(k)	(t)	(g)	(r^r)	(r^e)	(m)	Base
I950	0.57I	0.I37	0.234	0.I06	0.I09	I.8I5	4I0.9
I95I	0.555	0.I2I	0.I53	0.I34	0.084	I.866	542.2
I952	0.628	0.I54	0.II6	0.I32	0.073	I.833	5I3.5
I953	0.703	0.I98	0.I00	0.I20	0.039	I.872	457.5
I954	0.639	0.229	0.067	0.092	0.032	2.050	420.2
I955	0.574	0.253	0.097	0.092	0.053	2.045	48I.5
I956	0.594	0.266	0.I04	0.09I	0.04I	2.055	5I8.I
I957	0.652	0.324	0.II8	0.09I	0.027	2.0I2	530.2
I958	0.836	0.4I8	0.I70	0.088	0.0II	I.846	562.0
I959	0.953	0.494	0.I58	0.086	0.005	I.770	625.4
I960	0.972	0.546	0.098	0.090	0.0I3	I.729	684.2
I96I	I.080	0.590	0.I38	0.I02	0.004	I.648	75I.6
I962	I.078	0.558	0.253	0.093	0.023	I.6I4	85I.8
I963	I.I80	0.654	0.I94	0.098	0.006	I.587	9I0.8
I964	I.I77	0.707	0.207	0.I08	0.002	I.569	985.0
I965	I.I6I	0.705	0.2II	0.II9	0.005	I.545	I067.6
I966	I.073	0.736	0.I74	0.II8	0.00I	I.593	I058.5
I967	I.I36	0.78I	0.I30	0.III	0.00I	I.585	I093.I
I968	I.238	0.946	0.I60	0.II7	0.00I	I.505	I230.4
I969	I.304	I.095	0.I55	0.I08	0.00I	I.487	I273.5
I970	I.226	I.I42	0.I62	0.II2	0.003	I.493	I3I8.6
mean ($\bar{x}$)	0.909	0.509	0.I60	0.I06	0.030	I.73I	
st. dev. (s)	0.260	0.306	0.059	0.0I5	0.038	0.I90	
coeff. of var. ($s/\bar{x}$)	0.286	0.60I	0.369	0.I42	I.267	0.II0	

Calculations based on time-series presented in Appendix V.

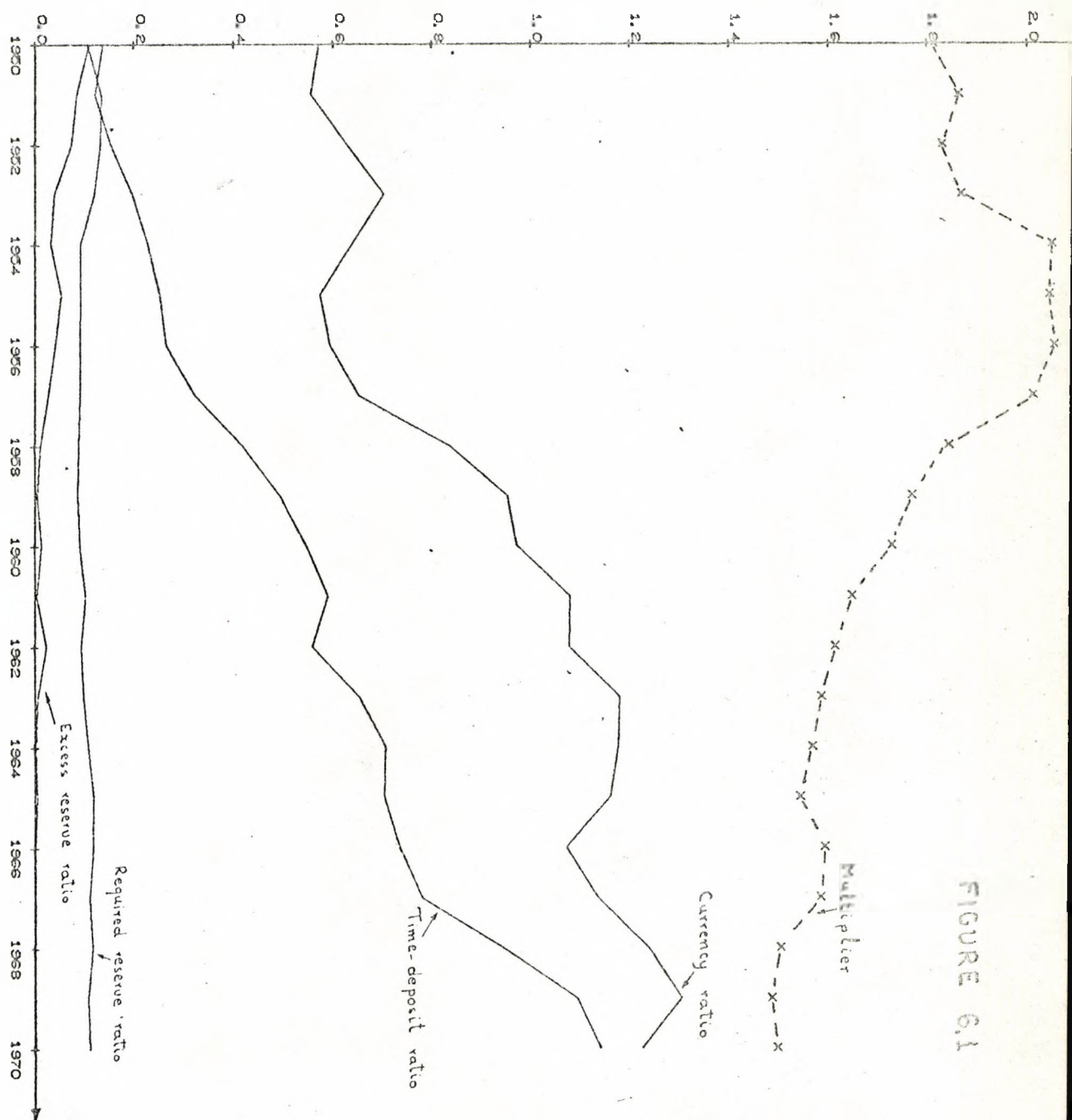

0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
Excess reserve ratio
Required reserve ratio
Time-deposit ratio
Currency ratio
Multiplier

FIGURE 6.1

TABLE 6.2

Contribution of monetary base and money multiplier to changes of money supply (in per cent)[a]

Year	Money stock	Multiplier	Base
I950	25.54	I5.85	8.36
I95I	35.70	2.84	3I.95
I952	- 6.97	-I.77	- 5.29
I953	- 9.03	2.II	-I0.9I
I954	0.6I	9.54	- 8.I5
I955	I4.28	-0.27	I4.59
I956	8.I4	0.50	7.60
I957	0.I7	-2.I2	2.34
I958	- 2.73	-8.23	6.00
I959	6.7I	-4.II	II.28
I960	6.87	-2.3I	9.40
I96I	4.67	-4.72	9.85
I962	II.00	-2.06	I3.33
I963	5.I5	-I.66	6.93
I964	6.92	-I.I4	8.I5
I965	6.77	-I.49	8.39
I966	2.20	3.08	- 0.85
I967	2.73	-0.52	3.27
I968	6.89	-5.04	I2.56
I969	2.27	-I.I9	3.50
I970	3.96	0.40	3.54
mean $(\bar{x})$	6.28	-0.II	6.47
stand. dev.(s)	9.62	4.99	8.75
coeff. of variat. $(s/\bar{x})$	I.53	45.27	I.35

(a) The sum of the contributions may differ from the rate of change of the money stock because of rounding and approximation errors. Calculations based on time-series presented in Appendix V.

The investigation stated above, of trying to explain changes in the money stock by changes in the multiplier and the base is only a first approximation, although a useful one.
It would be more useful, however, to specify the factors behind these changes.
We have already formulated a specific expression for the multiplier composed of several ratios which in fact reflect portfolio decisions taken by the banks and the public.

So, as a second step in our analysis, we try to explain changes of the multiplier by the changes which occurred in the various ratios defined, i.e., currency ratio (k), time deposit ratio(t), government deposit ratio (g), required reserve ratio (r^r), and excess reserve ratio (r^e).
TABLE 6.3 presents the results of such an investigation.(22)
It is evident that the changes in the currency ratio and the excess reserve ratio had the greatest impact on changes of the multiplier. The currency ratio first and then the time deposit ratio were increased (table 6.I), therefore caused a downward pressure on the multiplier, while the excess reserve ratio and to a less degree, the required reserve ratio and the government deposit ratio, exerted an upward pressure on the changes of the multiplier. However, these two sets of ratios, by exerting almost equal pressures on the changes of the multiplier, but in opposite directions, we were left with a small overall result in the change of the multiplier.

We must note that the above stated changes are only in an accounting framework and they do not imply, in any way, causal effects from changes of one ratio to changes to the other ratios.

TABLE 6.3

Contributions of the ratios to changes in the money multiplier (in per cent)[a]

Year	m	k	t	g	r^r	r^e
I950	I5.85	5.34	0.I5	2.26	4.I9	4.36
I95I	2.84	0.9I	0.42	2.I4	-4.30	3.74
I952	-I.77	-3.75	-0.77	0.88	0.28	I.67
I953	2.II	-3.84	-0.76	0.25	I.72	4.79
I954	9.54	4.I0	-0.49	0.52	4.57	I.I7
I955	-0.27	4.33	-0.45	-0.57	0.05	-3.78
I956	0.50	-I.32	-0.22	-0.I2	0.03	2.I6
I957	-2.I2	-3.54	-0.83	-0.20	0.I4	2.52
I958	-8.23	-8.5I	-0.95	-0.52	0.35	2.49
I959	-4.II	-4.59	-0.62	0.II	0.37	0.93
I960	-2.3I	-0.69	-0.47	0.54	-0.5I	-I.I6
I96I	-4.72	-3.37	-0.37	-0.34	-I.68	I.24
I962	-2.06	0.05	0.29	-I.04	I.27	-2.69
I963	-I.66	-2.76	-0.73	0.45	-0.75	2.24
I964	-I.I4	0.08	-0.42	-0.II	-I.38	0.66
I965	-I.49	0.40	0.02	-0.04	-I.49	-0.4I
I966	3.08	2.5I	-0.28	0.34	0.I2	0.53
I967	-0.52	-I.7I	-0.37	0.36	I.08	0.I3
I968	-5.04	-2.30	-I.32	-0.24	-0.89	-0.I6
I969	-I.I9	-I.40	-I.04	0.03	I.36	-0.0I
I970	0.40	I.72	-0.37	-0.05	-0.6I	-0.3I
mean $(\bar{x})$	-0.II	-0.87	-0.46	0.22	0.I9	0.96
stand. dev. (s)	4.99	3.27	0.43	0.77	I.87	2.06
coeff. of var. $(s/\bar{x})$	45.27	3.76	0.94	3.50	9.84	2.I5

(a) See note table 6.2
Calculations based on time-series presented in Appendix V.

6.I.5. Limitations of the analysis.

At this point we should stress some limitations of our analysis:

(i) The previous formulations are simply convenient methods of accounting for ex-post changes in money stock.

(ii) No way of causation is implied by the analysis. Some writers e.g., Cagan, call the various components "proximate determinants" of changes of money stock, although the analysis is based on the same identities. This determination, however, is derived by looking at the historical evidence.

(iii) The monetary base and the money multiplier ratio were treated as separate. In reality however, they are not independent of each other; changes in one of the determinants may induce changes in the others.
Interrelationships also exist among the various ratios which constitute the multiplier.

These interrelationships become immediately apparent, when we take into account the fact that the various components are not simply accounting definitions but instead they are behavioural equations. The important implication of such approach- which is undertaken at a later stage [23] is the derivation of a money supply function as a part of a more general model. Various forms of money supply functions can be derived, depending upon the exact specification of the various behavioural relations.
On these lines various models have been constructed.[24]

Meanwhile, we turn back to examine the "sources" of changes of the monetary base and the related problems with it.

6.2 "Sources" of the Base presentation

6.2.I Definition- Components of the Base.

In the previous sections we defined the monetary base (B) as the net monetary liabilities of the monetary authorities which are held either by the public as currency (C_p) or as reserves against deposits held by the commercial banks (R_b), i.e., $B = C_p + R_b$.

This definition reflects the "uses" of the base, i.e., how the base (or changes in the base) is distributed between commercial banks and the non-bank public.

Although this classification of the base is a useful one, it does not say however, what factors produced the observed changes in the base. This can be examined, if we look at the base from the point of "sources" presentation.

We begin with a balance sheet of the Central Bank, taking as example I970 figures (end of period data).(a)

Balance Sheet of the Central Bank

Assets		Liabilities	
Foreign reserves	I94.0	Currency issue	I090.4
Government paper	I882.8	Deposits of commercial banks	224.6
Advances to the Govt.	243.4	Government deposits	77.9
Discount borrowings	I48.8	Deposits of International	
Other assets and accounts	863.6	Organizations	526.6
		Other deposits	I8.4
		Other liabilities & accounts	I394.7
	3332.6		3332.6

Since the Central Bank acts as an agent of the Government, the above balance sheet can also be considered as an accounting statement that lists the sources and the uses of funds that are potentially available to be used as reserves of commercial banks.
So, we have, in a slightly different presentation:

(a) Source: Annual Report (26) I970.

	Sources		
I.	Foreign Reserves (FR)[a]		I94.0
2.	Government Paper (GS)[b]		I882.8
3.	Advances to the Government (GA)[c]		243.4
4.	Discount Borrowings (DB)		I48.8
			2469.0
	Uses		
I.	Currency held by the Public (C_p)		935.I
2.	Currency held by the Government (C_g)		9.6
3.	Banks' Reserves (R_b)		
	(i) Cash held by banks[d]	I09.6	
	(ii) Deposits held with Centr. Bank	224.6	334.2
4.	Government Deposits (GD)		77.9
5.	Deposits of International Organizations (FD)		526.6
6.	Other Deposits (O)		I8.4
7.	Other Accounts (net) (U)		567.2
			2469.0

From the above statement, the following identity can be derived:

$$FR + GS + GA + DB - (C_g + GD + FD + O + U) \equiv C_p + R_b$$

Sources − Alternative uses ≡ Base

Notes:

(a) Foreign reserves of the Central Bank held in the form of cash and balances abroad including treasury bills, foreign bills discounted, Ceylon Government war loan, special drawing rights.

(b) Includes treasury bills, Government securities, Government guaranteed securities, import bills.

(c) Provisional advances.

(d) Not including vault cash.

Source: Annual Report (26) I970.

Let us now, examine the significance of the various components of the source base.

The foreign reserves at the Central Bank constitute the main element up to I960-6I. In fact until I958 (except I953) this amount was greater than the base itself. After I96I, the importance of foreign reserves as a component of the base declined.

The net government position - defined as the stock of government paper at the Central Bank plus advances to the Government by the Central Bank minus Government deposits at the Central Bank - followed the opposite trend of that of foreign reserves described above, i.e., little contribution in the first years, or even negative (that is, the Central Bank became a net debtor to the Government) and significant contribution after I959 being continuously greater than the base itself, after I96I.

The discount borrowings were, very small almost non-existent until I959 but their magnitude gains some importance only in the last three years of our period.

The above trends are illustrated in TABLE 6.4 and in diagram 6.2. So, looking at the whole period, foreign reserves and the net Government position constitute the main sources of the base.

6.2.2. Factors behind the changes in the various components of the base.

Since we have defined the sources of the base, obviously, changes in these sources will be reflected in changes of the base. So, the immediate question is to examine what factors bring changes in the various components of the source base.
Such an investigation in turn, would bring up the crucial distinction between the components of the base which can be controlled by the monetary authorities and those components which are outside their control in a given period of time.

a) To consider the role of foreign reserves at the Central Bank, a brief overview of the balance of payments, would be useful. The balance of payments consists of the current account items, mainly of exports and imports of goods and services, which give us a balance on current account.
There are also capital movements- autonomous and accommodated.

TABLE 6.4

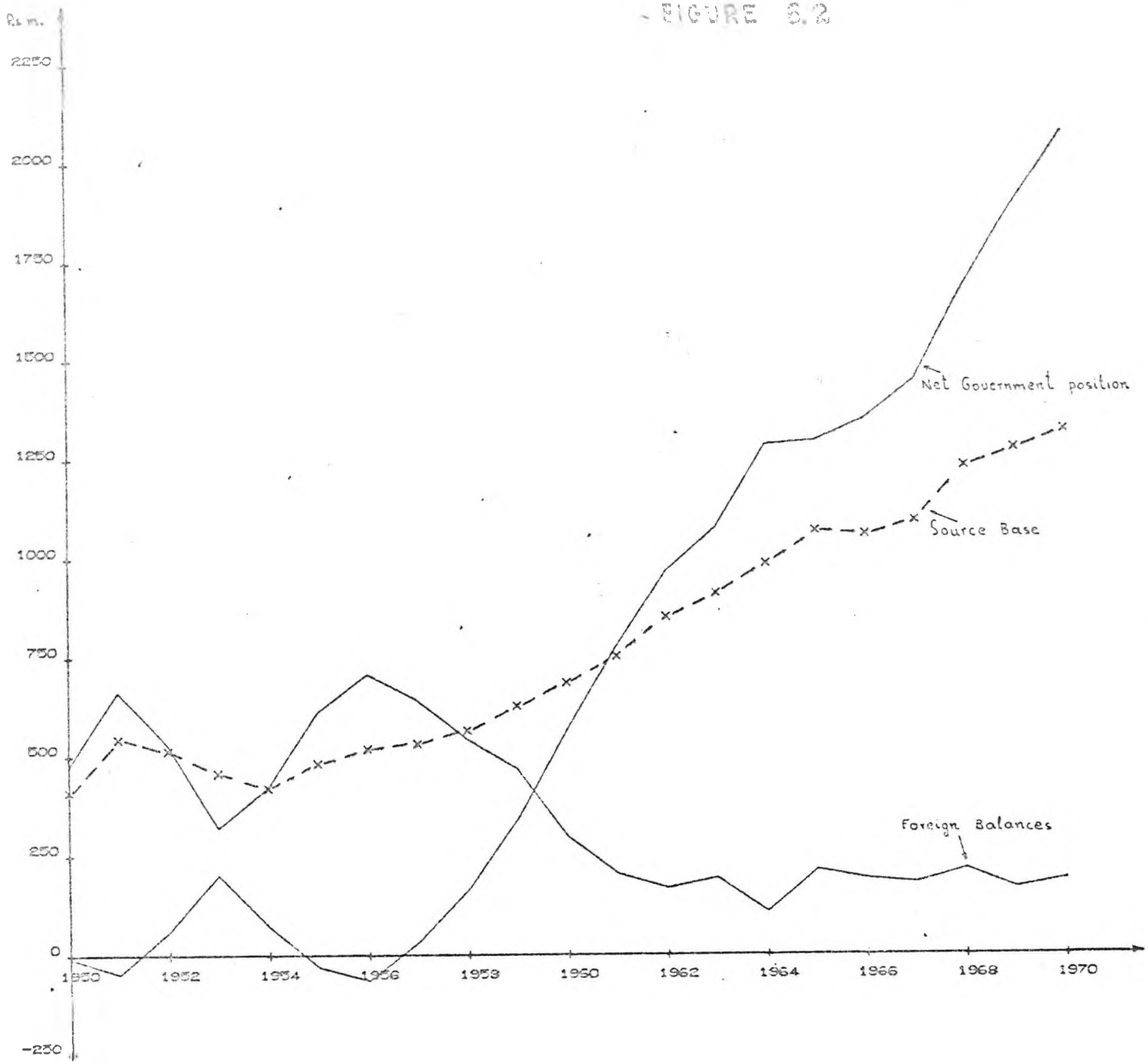
Some components of the source base[a]

Year	Foreign reserves	Govt. paper	Advances to Govt.	Govt. deposits	Net Govt. position	Discount borr'ngs	Base
	FR	GS	GA	GD	GS+GA-GD	DB	B
I950	472.I	4.5	-	I2.4	- 7.9	-	4I0.9
I95I	66I.6	3.2	-	49.5	- 46.3	-	542.2
I952	527.0	35.3	38.5	I4.3	59.5	-	5I3.5
I953	320.4	I28.9	74.9	0.8	203.0	I.0	457.5
I954	420.7	58.7	I7.7	3.9	72.5	0.3	420.2
I955	609.0	20.5	-	50.2	- 29.7	-	48I.5
I956	705.I	I9.I	-	82.6	- 63.5	0.4	5I8.I
I957	638.9	33.8	24.2	25.3	32.7	0.3	530.2
I958	540.I	II4.6	53.7	4.9	I63.4	8.6	562.0
I959	466.3	234.9	II2.6	6.9	340.6	5.8	625.4
I960	295.9	43I.5	I33.4	4.2	560.7	I3.0	684.2
I96I	203.7	629.4	I47.3	I.8	774.9	I8.9	75I.6
I962	I67.4	8I8.8	I46.5	I.8	963.5	5.9	85I.8
I963	I92.I	92I.I	I56.6	2.I	I075.6	9.5	9I0.8
I964	I07.5	II33.4	I52.3	I.6	I284.I	25.4	985.0
I965	2I2.I	II49.9	I44.9	2.6	I292.2	30.0	I067.6
I966	I89.9	I2I3.7	I60.7	26.3	I348.I	22.3	I058.5
I967	I80.4	I3I5.3	I82.5	52.5	I445.3	48.7	I093.I
I968	2I3.3	I579.5	I93.0	88.I	I684.4	93.3	I230.4
I969	I66.I	I720.8	2I9.I	5I.7	I888.2	II5.6	I273.5
I970	I88.9	I864.8	230.9	2I.8	2073.9	209.4	I3I8.6

(a) Annual averages of monthly data.

Source: See Appendix V.

FIGURE 6.2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Net Government position
Source Base
Foreign Balances

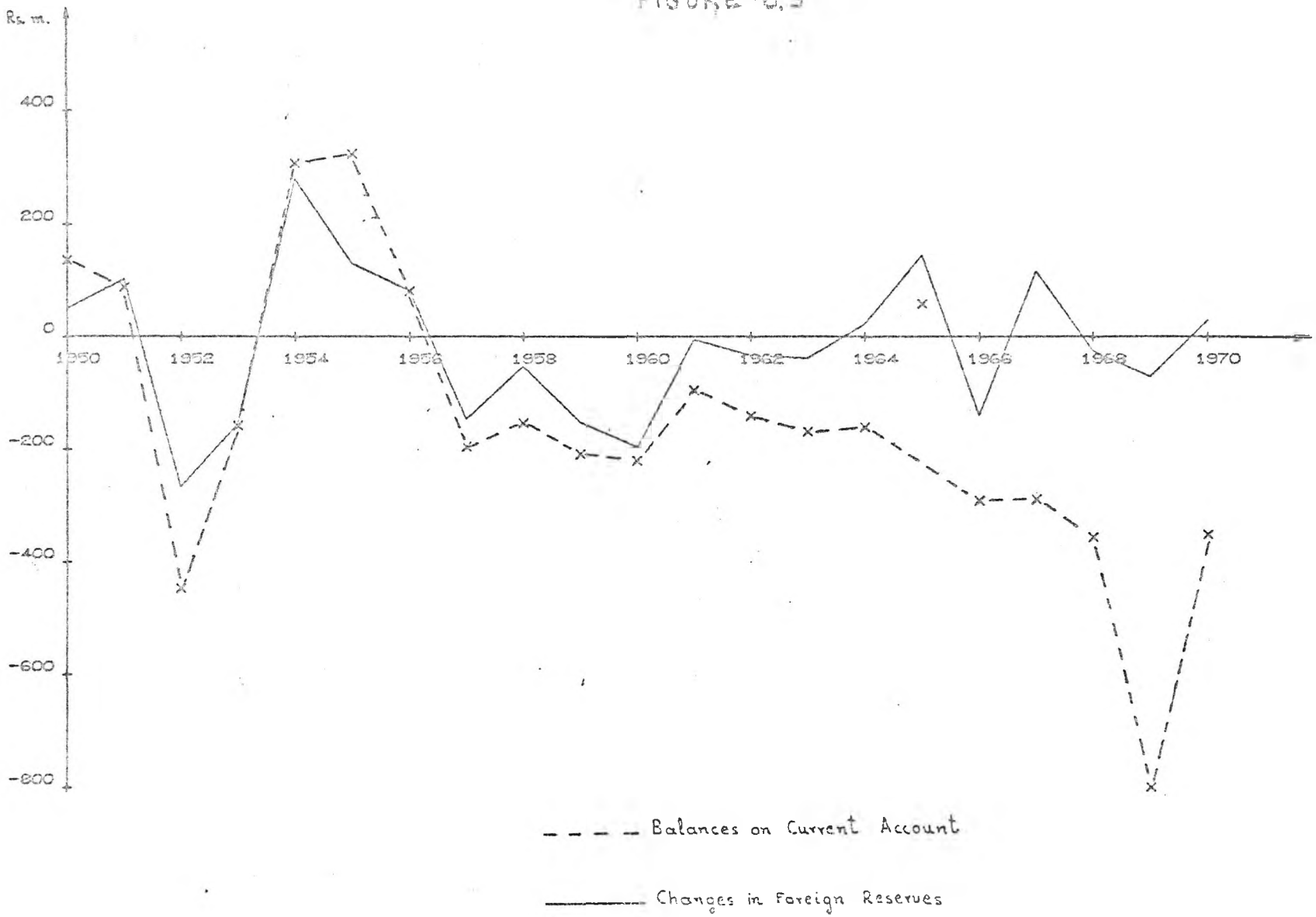
We have already stressed the importance of exports and imports- in the context of a less developed country of the nature of Ceylon- which constitute large proportion of the total GNP and affect directly and indirectly all of economic activity. Exports can be considered as an exogenous variable. Imports can be affected by adopting various measures though in the short-run, particularly in the case where a decrease in the amount of imports is desirable, there are strong limitations in doing so because of the high proportion of imports in the total GNP.(25)

The capital movements were not important, since in LDCs- like Ceylon- are not strong financial centres and so, capital movements are not sensitive to interest rates, exchange rates etc.
In addition, there are other non-economic factors which hinder easy movement of capital, e.g., political instability and uncertainty, for the case of direct investment, lack of other basic infrastructure etc. The amount of aid is something that would deserve particular attention in LDCs. In our economy, however, the aid offered did not influence the balance of payments to any significant degreee.
It may, of course, be the case that the Central Bank can affect indirectly foreign reserves held by the commercial banks, e.g., by adopting various measures on exchange rates policy. But, generally, the external assets in commercial banks' portfolios were mainly composed of export bills and working balances.

Overall, therefore, taking into consideration the above remarks, we should expect a close relationship in the movements on the balance of current account and changes in the foreign reserves held by the Central Bank. Indeed, this is what happened as figure 6.3 illustrates. The movements are quite close, at least up to I966. The observed divergence after that year is due to the fact that foreign reserves were in a very low level, and therefore, financing was covered by increasing external liabilities. Also capital movements gain some importance.

To conclude, our first component of the source base- foreign reserves held by the Central Bank- is to a large extent outside the control of the Central Bank, within the framework of a short-run analysis.(26)

FIGURE 6.3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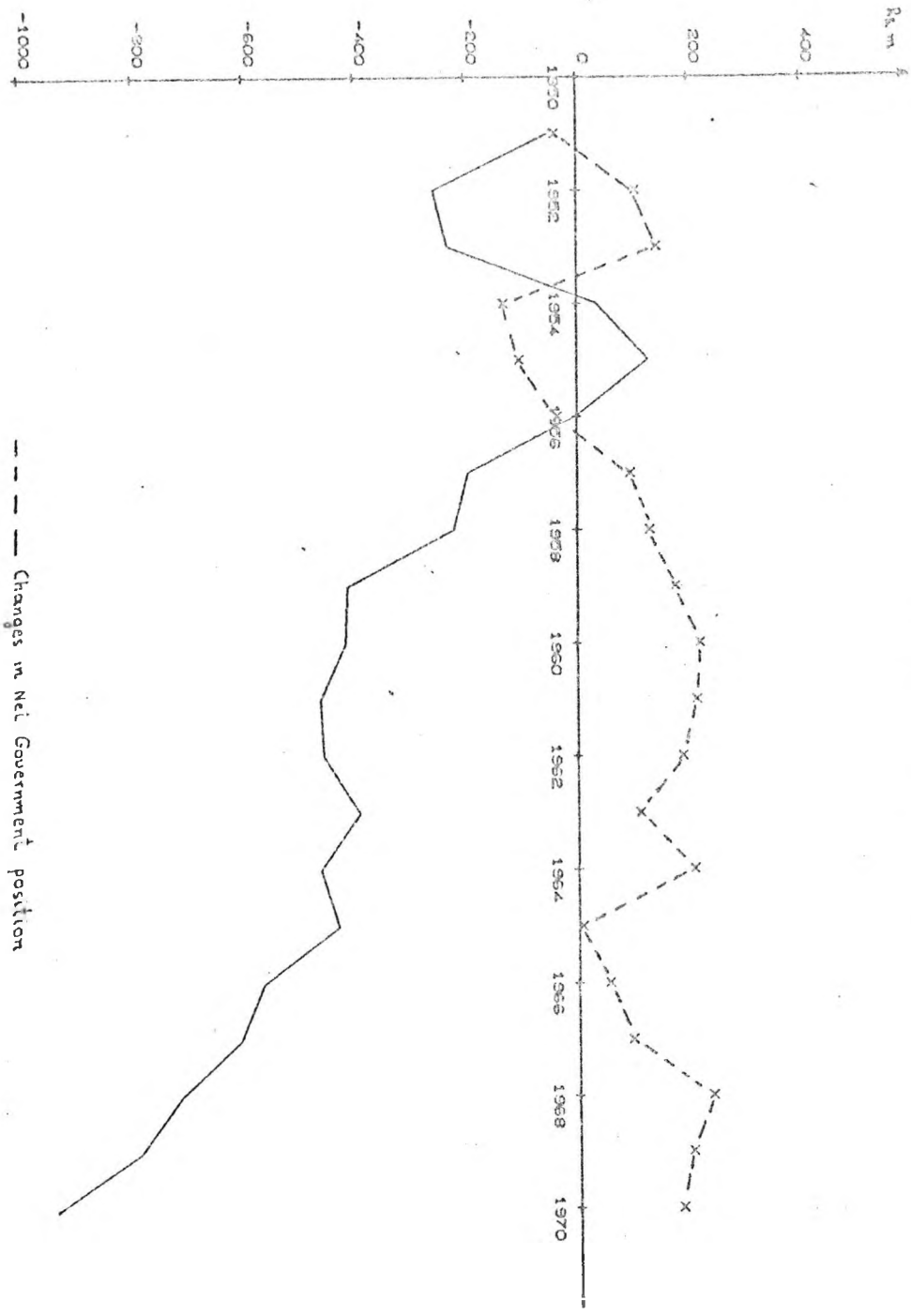
Balances on Current Account
Changes in Foreign Reserves

b) Let us now, examine the Net Government position, defined as GS+GA-GD. As table 6.4 illustrated, the main element is Government paper.[27] One could think that this component of the base, is controllable by the Central Bank. Indeed, this is usually stated, when arguments are made in the context of developed economies mainly of U.S. However, to appreciate movements in the net Government position and to examine whether the above arguments are in our case valid, we must look at the operations of the Government in the context fo a less developed economy.

In a less developed country, the Government usually undertakes a leading role in the promotion of economic development. On the other hand, the revenues to finance such expenditures are not usually high- because of small per capita incomes, administrative deficiencies etc.- so, the Government's budget usually ends with a deficit. Since financing of the deficit from market sources usually becomes difficult, or anyway, is not adequate- because of such factors as low per capita incomes and small underdeveloped financial markets - the Government has no other alternative to finance its deficits but, through the Central Bank (excluding foreign borrowing and aid considerations). In other words, there is a dependence of monetary policy on budgetary considerations,[28] since that part of the deficit that is not covered by banks and the public will be covered by issuing base money.

We should expect, therefore, changes in the net Government position to reflect the situation in the deficits (or surplus) of the Government, in of course, the opposite direction. This is illustrated in diagram 6.4 where the net cash surplus (or deficit) and the changes in the net Government position are depicted; the disparity observed in some years, particularly after I966, is due to the fact that the other factors, such as foreign borrowing and aid, and financing from market sources, contributed considerably to the financing of the increasing budget deficits.

We should note here that the Central Bank could not refuse provision of funds to the Government even if its policy is contrary to what the Government thinks, in order not to jeopardize the interests of the Government. Actually, in the case of Ceylon, there is an explicit clause in the Monetary Law which states that: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Changes in Net Government position
Net cash surplus or deficit

FIGURE 6.4

> "In the event of any difference of opinion between the Minister of Finance and the Monetary Board as to whether the monetary policy of the Board is directed to the greatest advantage of the people of Ceylon, the Minister of Finance and the Board shall endeavour to reach agreement.
> If the Minister of Finance and the Board are unable to reach agreement, the Minister of Finance may inform the Board that the Government accepts responsibility for the adoption by the Board of a policy in accordance with the opinion of the Government and direct that such a policy be adopted by the Board. Where a direction is given by the Minister of Finance the Board shall carry out that direction."(29)

So, it seems that the other main component of the base, the net Government position, is not under the control of the Central Bank. We must note, however, that although the Central Bank cannot alone determine the net government position, the Government of course is not indifferent to what is happening to the money supply. So, even if it badly wants finance, it must consider the inflationary consequences of borrowing from the Central Bank. Hence, in that sense, the net government position is still determined by the monetary authorities, i.e., Central Bank and the Government, even if the Central Bank is overuled and the Government accepts the consequences of more deficit financing.

The exact situation depends on the stage of the development of the economy and the values given to the various objectives pursued by the monetary authorities.

The above discussion points out the necessity of close co-operation between the Central Bank and the Government in conducting their policies.(30)

c) Examining the movements in the main components of the base, foreign reserves and net government position (table 6.4), we see that they moved in opposite directions. So, for example, in the I952-54 recession and in I956-60 period, large losses of foreign reserves were compensated by the behaviour of the net government position at the Central Bank. Not unexpectedly, the changes in the net government position are found to be opposite to movements of

the business cycle. In fact, we might expect that the recourse of the Government to the Central Bank would rise proportionately more in the downswings, as Government expenditures rise relatively to revenues coming from taxation and net sales of bonds, especially in the context of a less developed economy, where a large proportion of revenues is dependent on export proceeds and where there are few developed financial markets to finance the Government deficit.

Regressing changes in the base, excluding foreign reserves, with respect to changes in foreign reserves, we get:

		R^2	D.W.
(B - FR) = 46.9520 - 0.8I55FR			
	(4.554) (8.349)	0.7858	I.245

(t values in parentheses)

These offsetting movements of foreign reserves and the net government position, had a dampening effect on changes in the monetary base. To what extent these offsetting movements were of the right magnitude, can to some extent be judged, by considering the objectives the monetary authorities pursued.

d) The conclusions of the source base examination may be summarized briefly:

The main components of the base cannot be controlled by the Central Bank alone; foreign reserves are largely determined by the balance of payments situation, while the net government position at the Central Bank, is largely affected by budgetary considerations. As we already pointed out, however, the budget is not determined independently of considerations of inflation, deficit financing etc. Therefore, the monetary base can be determined by the monetary authorities, i.e., Central Bank and the Government.

To what extent the monetary authorities, jointly can pursue an effective monetary policy, depends to a large extent on the objectives pursued by them together with the degree of their co-operation.

6.3. Behavioural relationships of the ratios.

In our formula: $M_I = \frac{I + k}{k+(r^r+r^e)\ (I+t+g)} B$

we have already made the point that the various ratios are unlikely to be constants. Rather they are functionally related to behaviour of the public, of the commercial banks, and of the monetary authorities.

In this section, first we advance very briefly, theoretical arguments about the possible entered variables in specifying the ratios, and then we proceed to their estimation and the problems encountered in this procedure. Finally, a money supply function is examined and the various elasticities are derived, together with the implications of the whole exercise.

6.3.I. Theoretical Formulations.

6.3.I.a. The currency ratio[3I] ($k = C_p/DD_p$)

The currency ratio reflects the public's preference between currency and demand deposits, held with commercial banks.
Some factors that influence the currency ratio can be stated:

(i) Obviously, some measure of wealth, or income or a combination of them, influences the currency ratio as imposing a sort of constraint on it. In our case the GNP concept was used to represent such a constraint. Now, over time, the way in which changes in the currency ratio are related to changes in GNP, is highly dependent on the stage of development of the economy.

In the context of a less developed country, on the one hand, as the economy develops and banking facilities spread over wider areas, the public becomes better acquainted with the banks and therefore we might expect more use of demand deposits than of currency and so, the trend of the currency ratio will be declining. On the other hand, there is a large section of the economy non-monetized. As monetization takes place it is more plausible that currency will be used in the first instance rather than demand deposits. This second factor, would give an increasing trend of the currency ratio.

We should also note, that GNP besides being a constraint may also reflect in part monetization of the economy, since under such process a greater part of output is likely to be brought into the accounting procedure.

(ii) A second set of factors that influence the currency ratio would be the costs and benefits of keeping a certain amount in the form of currency or in the form of demand deposits. Currency represents the upmost form of liquidity especially in LDCs because of the factors stated above, i.e., absence of widespread banking facilities, little aquaintance of the public with the banks etc. Also, in LDCs, there is a considerable demand for currency for precautionary purposes. If interest is paid on demand deposits, then holding currency costs the interest foregone. But even if there is no interest paid (or even if there are bank charges) holding demand deposits may give more convenience and less risk, at least for some kinds of transactions. It seems therefore to us that in trying to explain currency holdings one should in principle go on to build a model of the transactions demand for money,[32] considering explicitly the costs involved in choosing between currency and demand deposits. It is not clear what would be the outcome of such an exercise, but probably, the demand for currency/deposit ratio, would be independent of the interest rate, especially in the context of LDCs because of the reasons stated above - i.e., strong demand for currency for liquidity and precautionary purposes etc.[33]

(iii) The public's tax liabilities or more precisely the marginal income tax rate may also influence the currency ratio. The idea behind this is that if the marginal tax rate is high, people try to conceal transactions by using currency rather than checkable deposits to handle them.

(iv) Controls and restrictions on imports may constitute another source of demand for currency. The idea is that such controls and restrictions encourage black market activities and generally illegal ways of getting the wanted items. But these activities can be carried out by use of currency rather than by using demand deposits for reasons of safety, speed etc.

This factor may be important in our case since, as previous chapters showed, there is a high dependence of the economy on imports, and after I960 there were heavy controls and restrictions on imports. Furthermore, the increase in demand for currency over this period, especially of notes of high denomination, may be considered as an indication of such an influence.

Other factors may briefly be stated:

(v) Population changes.

(vi) Distribution of income.

(vii) Other, unspecified factors.

To summarize, the currency ratio may be considered as a function of the following general form:

$$k = f(W, Y, \text{distr. } Y, T_m, r_m, N, d_I, d_2, \ldots) \qquad (I)$$

W = Wealth

Y = Income

T_m = Taxes on imports

r_m = market interest rate

N = Population

$d_I, d_2, \ldots$ = Other unspecified factors.

6.3.I.b. Excess reserve ratio (r^e ratio)

Derivation: $R_b = RR + RE$ $\qquad \frac{R_b}{TD} = \frac{RR}{TD} + \frac{RE}{TD}$ or

$$r = r^r + r^e \qquad \text{i.e.,} \qquad r^e = r - r^r$$

R_b = Reserves held by banks

RR = Reserves required

RE = Reserves excess

TD = Total deposits

$= DD_p + DD_g + T$

The excess reserve ratio may be considered as a function of:

(i) Some market interest rates to represent the alternative cost of holding funds in the form of reserve balances.

It is a problem to define which interest rate represents best this opportunity cost as it depends on many factors such as:

- The particular mix of demand and time deposits.
- How closely banks match the maturities of their liabilities with those of their earning assets.
- Particular policy followed by the monetary authorities, e.g., if they follow a policy of pegging the short-term interest rate, then banks can keep most of their excess reserves in the form of bills.

A priori, we may expect that the immediate alternative to excess reserves would be short-term bills such as Treasury bills, rather than long-term securities, therefore, we might expect that a short-term interest rate would be more relevant as representative of the opportunity cost of holding excess reserves.

(ii) What would be the cost of a required reserve deficiency? An individual bank can counter a deficiency in its reserves in many ways. e.g., by liquidating securities and call loans or by borrowing from the interbank market and from the Central Bank. For the banking system as a whole, only the borrowing from the Central Bank can add to the total reserves,(34) the other alternatives simply shift reserves among the banks. The cost of borrowing from the Central Bank may be represented by the discount rate.(35)

(iii) Furthermore, any particular policy of the Central Bank may be included by considering an appropriate index, e.g.,

- Periods of controls and restrictions on the discount mechanism.
- Periods of pegged interest rate policy
- Periods of exercising moral suasion and encouraging banks to keep excess reserves abroad.
- Any particular policy adopted in the foreign exchange market for the above purpose.

Interest rates on foreign markets- or the difference of interest rates on domestic and foreign markets- may also exert an influence on banks' decisions about their balances abroad.

(iv) Other factors which act as constraints in the relationship may be considered such as:

- Volume of demand deposit liabilities of the banks.
- The demand for loans and advances by the public.
- The rate at which the Central Bank changes the supply of unborrowed reserves (or reserve requirements)

In summary, we can state the excess reserve ratio as a function of: $r^e = f(r_m, r_d, FB, R^u, B, RR, CL, d_I, d_2, \ldots)$

r_m = market interest rate
r_d = discount rate
FB = balances kept abroad
R^u = unborrowed reserves
B = changes in monetary base
RR = required reserves
CL = demand for loans and advances
d_I, d_2... = other factors

6.3.I.c. Time deposit ratio ($t = T_p/DD_p$)

The t ratio provides a measure of the public's relative preference between time deposits and demand deposits.
It may be considered as a function of:

(i) Wealth or income or some combination of them, acting as constraints on the relatioship.

(ii) Market interest rates paid on assets other than time deposits. Other things being equal, as these interest rates rise we would expect the t ratio to decrease and vice versa.

(iii) Interest rates paid on time deposits. Other things being equal, an increase of these rates, would induce the holding of more time deposits, therefore , the t ratio will rise .

(iv) Other factors such as:

- Difficulties of withdrawing time deposits.
- Special facilities offered to the holders of demand deposits (e.g., free advice on economic matters)
- Any particular policy of the monetary authorities such as ceilings imposed on time deposits rates.(36)

So, we may write the t ratio as a function of:

$t = f(W, Y, r_m, r_t, d_I, d_2, \ldots)$

W = wealth Y = income
r_m = market interest rate r_t = rate on time deposits
d_I, d_2,... = other factors

6.3.I.d. Government deposit ratio ($g = DD_G/DD_p$)

The g ratio reflects shifts between Government demand deposits and demand deposits held by the public.
The g ratio is partly determined by the Government, through changes in DD_G and partly by the public through changes in DD_p e.g., when individuals pay taxes or buy government securities, DD_p decrease and DD_G increase, so g ratio increases. The g ratio has not shown any systematic pattern over time, and since it is partly determined by the Government it may be considered as a policy variable.

6.3.I.e. Required reserve ratio ($r^r = RR/(DD_p+DD_G+T_p)$)

An explicit formula for the required reserve ratio may be derived as follows:(37)

$$RR = r^{DD}(DD) + r^{T}(T) \qquad (I)$$

r^{DD} = weighted average reserve requirements on DD
r^{T} = weighted average reserve requirements on T
DD = demand deposits subject to reserve requirements
T = time deposits subject to reserve requirements

Now, dividing expression (I) by total deposits(38) we get:

$$\frac{RR}{DD_p+DD_G+T_p} = r^{DD}\left(\frac{DD}{DD_p+DD_G+T_p}\right) + r^{T}\left(\frac{T_p}{DD_p+DD_G+T_p}\right) \qquad (2)$$

spliting up DD into DD_p+DD_G and dividing by DD_p we have:

$$\frac{DD}{DD_p+DD_G+T_p} = \frac{DD_p+DD_G}{DD_p+DD_G+T_p} = \frac{I+g}{I+g+t} = u$$ g, t defined previously

and $$\frac{T_p}{DD_p+DD_G+T_p} = \frac{t}{I+g+t} = I-u$$ therefore,

$$r^r = r^{DD}u + r^{T}(I-u) \qquad (3)$$

change in the t ratio involves a change in the proportion of demand deposits to time deposits. Since the reserve requirements against demand deposits and time deposits are different, a change in the t ratio, would bring a change in the required reserve ratio (r^r), which is picked up by our notation u introduced in relationship (3).

In addition, formulation (3) permits us to have explicitly r^{DD}, r^{T}, g, as policy variables and to see how they can affect our multiplier.

As earlier analysis showed,[39] the reserve requirement instrument was used by the Central bank.

A 5 per cent effective reserve requirement was imposed on time deposits throughout the whole I950-70 period, while the reserve requirements on demand deposits changed several times:

I0 % in I950

I4 % Jan. I95I - Sept. I953

I0 % Sept. I953 - Aug. I960

I2 % from Aug. I960

In addition, from Feb. I96I special reserves equal to 38 % were imposed on any increase in the total of demand deposits over the level prevailing at Ist Feb. I96I.

The published data of the Bank give the required reserves on demand deposits, required reserves on time deposits and the corresponding amounts of demand and time deposits subject to reserve requirements. So, we can observe r^{DD}, r^{T}, defined above, although we do not know the exact weights.

Such calculations carried out, are presented in TABLE 6.5 below.

TABLE 6.5

Weighted average reserve requirements on demand deposits and time deposits.

Year	r^{DD}	r^{T}
I950	0.I000	0.0506
I95I	0.I400	0.0505
I952	0.I400	0.0466
I953	0.I275	0.0500
I954	0.I000	0.0535
I955	0.I000	0.0499
I956	0.I000	0.0500
I957	0.I000	0.0499
I958	0.I000	0.050I
I959	0.I000	0.050I
I960	0.I084	0.0500
I96I	0.I283	0.0500
I962	0.I262	0.05I0
I963	0.I30I	0.0500
I964	0.I474	0.0499
I965	0.I604	0.050I
I966	0.I647	0.050I
I967	0.I570	0.05I2
I968	0.I733	0.050I
I969	0.I665	0.0509
I970	0.I8I3	0.050I

Calculations based on time-series presented in Appendix V.

6.3.2. Regression estimates of the ratios.

Great difficulties were encountered in formulating empirical relationships of the various ratios in accordance with the theoretical arguments presented above.

The first problem was to find data for the corresponding variables. There are , for example, no wealth statistics, and instead the GNP concept had to be used. Also, there are no data on the distribution of income.(40)

But even if we overcome to some extent this problem of data, we came across another, most serious problem, that is the high multicollinearity among the various variables. In fact we had to choose between two alternatives. On the one hand, inclusion of more explanatory variables in our relationships could show an insignificant contribution of some independent variables, though in reality this would not be true but it would be simply a consequence of the high multicollinearity.(41) On the other hand, inclusion of only few variables would not explain our relationships adequately.

We should note, however, that the seriousness of the problem of multicollinearity depends very much on the purpose for which we want to use our results.Thus if, for example,we are interested in the coefficients of the various variables to see their direction of influence, their importance in explaining the dependent variable, then, in the case of multicollinearity we should take our results with great caution. But if we want our relationships for the purpose of predicting the dependent variable, then high multicollinearity does not affect our prediction provided that the degree of multicollinearity among the variables remains the same (or almost the same).

In formulating our relationships we used the following criteria: First, with similar variables we included those which appear less correlated with other variables. This choice is justified provided that both variables give the same explanatory power. This for example happens, in our relationships with GNP and GNE. GNP was chosen since it produced the same R^2as GNE, but GNP is less collinear with the other variables. Secondly, and most important, the inclusion of various variables was directed on a priori grounds according to our discussions in earlier chapters of this work.

6.3.2.a. Estimates of the currency ratio.

In estimating the currency ratio relationship several variables were used. Some of the results are presented in TABLE 6.6.[42] First GNP, GNE, and total consumption variables were tested. These variables proved to be significant. GNP and GNE variables produced the same R^2 but, because the correlation of GNP variable with the other explanatory variables is smaller than that of GNE, the GNP variable was chosen. The consumption variable when used with the interest rate variable produced higher R^2 than GNP (compare equations I and 5) but, as more variables were included the results became nearly identical (equations 3, 7).

The sign of the GNP variable is positive suggesting a preference for proportionately more currency than demand deposits as income grows. The monetization of the economy and preference for currency because of liquidity and precautionary considerations seem to outweight the increase in demand deposits with the spread of the banking habit.

No interest rate is paid on demand deposits. We do not also know about existing charges on demand deposit accounts. However, tests were carried out with the interest rate paid on time and savings deposits (r_t), as a first approximation of the opportunity cost of holding currency on the ground that time deposits are the closest alternative to currency demanded for precautionary purposes, which in the context of a LDC may be significant. We should note that a rise in the currency ratio may partly reflect the rising yields on time deposits, i.e., as the yields on time deposits rise the public may be willing to hold a smaller amount of demand deposits relative to their holdings of currency. Although a positive sign was found for the interest rate on time deposits, this variable proved to be quite non-significant in all formulations.

Import duties were used to represent an index of the import controls and restrictions. This variable was found to be highly significant and explains much of the shift variable used to see whether there was any structural shift in our relationship[43] (equations 2,3).

Equations with a stock adjustment mechanism were also estimated, showing that about 40 per cent of any discrepancy between desired to actual ratio is eliminated in one period (equation 8).

TABLE 6.6

Regression estimates of the currency ratio

Equ.	constant	r_t	GNP	C	T_m	K_{-1}	d_1	$\bar{R}^2$	D.W.
1	0.1987	0.0319	0.000097					0.6807	0.429
	(1.814)	(0.560)	(3.591)						
2	0.4355	0.0207	0.000043				0.3064	0.8352	0.803
	(4.509)	(0.505)	(1.870)				(4.228)		
3	- 0.0018	0.0421	0.000049		0.0013			0.8730	1.270
	(0.023)	(1.170)	(2.572)		(5.315)				
4	0.1737	0.0336	0.000036		0.0010		0.1523	0.8919	1.216
	(1.522)	(1.003)	(1.933)		(3.148)		(1.993)		
5	0.1521	0.0156		0.000119				0.7379	0.403
	(1.492)	(0.385)		(4.431)					
6	0.3365	0.0116		0.000061			0.2768	0.8522	0.704
	(3.955	(0.303)		(2.417)			(3.861)		
7	0.0058	0.0440		0.000058	0.0012			0.8698	1.196
	(0.073	(1.204)		(2.457)	(4.386)				
8	- 0.0117	0.0116	0.000016		0.0007	0.6001		0.9279	1.674
	(0.197)	(0.439)	(0.925)		(2.844)	(3.733)			

6.3.2.b. Estimates of the excess reserve ratio.

The treasury bill rate and the interest rate on long-term bonds, were used to represent the opportunity cost of holding excess reserves. In all cases both variables produced the right sign, but only the bill rate variable appears to be significant in some of the formulations. The Bank rate variable was found to be non-significant, so it seems that changes in the Bank rate did not exert any significant influence on the holdings of excess reserves. The difference variable between the bill rate and the Bank rate is also found to be non-significant.

The variable of foreign balances kept abroad is found very significant and with a positive sign. So, it does not seem to be any substitution effect between these balances and domestic excess reserves. In fact, both increased when the economy experienced a boom in economic activity.

Other variables, such as reserves requirements or reserves unborrowed, were non-significant; while changes in the base are significant, with a negative sign.

The loans provided by the banks, were used as an index variable of the demand for such loans; this variable is non-significant too.

Finally, a dummy variable used to pick up any structural shift of the function was found non-significant.

Some of the estimates are illustrated in TABLE 6.7.

TABLE 6.7.

Regression estimates of the excess-reserve ratio

Equ.	constant	r_{Ta}	r_d	FB	R^v	ΔB	CL'	$(r_{Ta}-r_d)$	$\bar{R}^2$	D.W.
1	0.0472 (2.811)	- 0.0333 (3.478)	0.0142 (1.542)						0.5960	0.847
2	0.0423 (1.887)	- 0.0312 (2.647)	0.0128 (1.201)		0.00005 (0.300)				0.5745	0.805
3	- 0.0021 (0.140)		- 0.0043 (1.507)	0.00071 (7.109)		- 0.00017 (2.592)			0.8205	1.411
4	- 0.0055 (0.348)	0.0084 (0.770)	- 0.0103 (1.241)	0.00081 (4.836)		- 0.00019 (2.673)			0.8161	1.620
5	- 0.0126 (0.779)		0.0033 (0.557)	0.00069 (7.112)		- 0.00016 (2.495)	- 0.000027 (1.433)		0.8310	1.450
6	- 0.0109 (1.158)			0.00087 (9.378)		- 0.00020 (3.455)		0.0119 (1.658)	0.8248	1.721

6.3.2.c. Estimates of the time deposit ratio.

The variables used in the specification of the function were GNP and interest rates. The GNP variable appears highly significant. The rate paid on time deposits is non-significant. This suggests that considerations other than the interest rate benefit may be more important in determining the holding of time deposits.

Other interest rates used to represent preferences for alternative assets to time deposits were: treasury bill rate and interest rate on long-term bonds; the rate of interest on bonds was found to have a negative sign and was non-significant. The trasury bill rate, however, produced a significant positive coefficient while the coefficient of time deposits rate, although non-significant, was of a negative sign. The result of the treasury bill rate seems puzzling since it is the opposite of what one would expect. However, examining things in the context of our economy it seems likely that these perverse results do not reflect any real picture but are the result of statistical correlation. The reason for this conclusion is the fact that treasury bills are mainly held by the Central Bank, a small proportion by the banks and a very small proportion is held by the private sector.(44) Therefore, in reality treasury bills do not constitute an alternative form of asset to time deposits.
For government bonds, however, the picture is different. The share of the private sector to the total bond issue has constantly been increased over the period; therefore, bonds are considered by the public as alternative assets to time deposits, so that interest rate on them may affect their relative position in the preferences of the public.

Some of the estimations are illustrated in TABLE 6.8.

TABLE 6.8

Regression estimates of the time-deposit ratio

Equ.	constant	r_b	r_t	GNP	d_1	$\bar{R}^2$	D.W.
1	- 0.4307 (7.723)		0.0172 (0.593)	0.00014 (10.060)		0.9384	0.661
2	- 0.3311 (5.830)		0.0125 (0.518)	0.00012 (8.494)	0.1288 (3.024)	0.9576	0.857
3	- 0.4127 (7.082)	- 0.0342 (1.040)	0.0185 (0.640)	0.00015 (7.313)		0.9386	0.804
4	- 0.2885 (5.210)	- 0.0544 (2.136)	0.0140 (0.637)	0.00014 (8.395)	0.1469 (3.706)	0.9649	1.377

6.3.3. A money supply function - Some elasticities.

Since we have estimations of the various ratios, we can replace them in our formula:

$$M_I = \frac{I + k}{k+(r^r+r^e)(I+t+g)} B \qquad (I)$$

to derive a money supply function. It is obvious, that one could constructnumerous money supply functions according to which variables are included in the estimated relationships, which relationships are taken as behavioural ones and which as constant, and furthermore, which definition of money is adopted.(45)

In what follows, we consider one money supply function, and we derive the various elasticities by considering functions of estimated ratios, which we feel are likely to be more representative of the real situation. The chosen functions, from tables 6.6-6.8 are:

$$k = -0.00I8 + 0.042Ir_t + 0.000049GNP + 0.00I34T_m$$

$$r^e = 0.0472 - 0.0333r_{tb} + 0.0I42r_d$$

$$t = -0.4I27 - 0.0342r_b + 0.0I85r_t + 0.000I555GNP$$

$$r^r = r^{DD}u + r^T(I-u)$$

Substituting in formula (I) the corresponding ratios, we can get the money supply function derived by using the above stated specifications.(46)

We can, in turn estimate the elasticities with respect to the various variables appearing in our money supply function. To avoid excessive computational work we have done it for five years.(47) This can give us an idea about the evolution of the elasticities over time and so a better picture than calculations at the means of the variables. The results are illustrated below.

TABLE 6.9

Elasticities of M_I with respect to:

Year	r_{tb}	r_d	r_t	r_b	r^{DD}	g
I950	0.0306	-0.0627	-0.0833	-0.02I2	-0.I587	-0.0477
I955	0.042I	-0.059I	-0.0257	-0.0I79	-0.I35I	-0.0I63
I960	0.I230	-0.0807	-0.0438	-0.0094	-0.I028	-0.0092
I965	0.I383	-0.0983	-0.0423	-0.0I56	-0.I404	-0.02I7
I969	0.2034	-0.II64	-0.04I2	-0.0II8	-0.I274	-0.I00I

It can be seen that the elasticities with respect to interest rates are very low indeed.(48) Relatively higher values appear in the elasticities with respect to treasury bill rate, with a tendency to increase from 0.03 in I950 to 0.20 in I969, due to the increased significance of the treasury bill rate in excess reserves held by the banks. The elasticities for the other interest rates are lower and without any distinct trend.

The implication of the low interest elasticity of the multiplier is that, provided the monetary authorities can control the monetary base, they can bring highly predictable changes on the money supply by changing the base. Changes in the multiplier produced by any interest rate changes will not be significant.

A comparison of actual multipliers with the forecasted ones from our money supply function gives quite satisfactory results. Furthermore, we can compare actual and forecasted money supply series and to determine the percentage deviation of actual to forecasted values. These results are presented in TABLE 6.I0.

The prediction of the mean value of the multiplier is accurate, so giving support to "Monetarist" arguments.(49) Looking at the individual years they may produce, even when the differences do not seem large, considerable deviation of forecasted money supply values to the actual ones. But we should note that for the above calculations we used the values of monetary base realized. More elaborate

TABLE 6.IO

Year	Actual multipliers	Forecasted multipliers	% deviation of M_F^s to M_A^s
I950	I.8I5	I.986	9.43
I95I	I.866	I.75I	-6.I9
I952	I.833	I.922	4.85
I953	I.872	2.026	8.24
I954	2.050	2.002	-2.37
I955	2.045	I.89I	-7.5I
I956	2.055	I.900	-7.52
I957	2.0I2	I.835	-8.79
I958	I.846	I.869	I.27
I959	I.770	I.770	0.00
I960	I.729	I.734	0.27
I96I	I.648	I.682	2.07
I962	I.6I4	I.64I	I.69
I963	I.587	I.69I	6.56
I964	I.569	I.585	I.02
I965	I.545	I.55I	0.38
I966	I.593	I.524	-4.32
I967	I.585	I.503	-5.I7
I968	I.505	I.463	-2.82
I969	I.487	I.50I	0.92
I970	I.493	I.543	3.38

techniques may give us better forecasts, when the authorities want to achieve a certain change in the money supply.

Finally a word about the elasticity of money supply with respect to reserve requirements against demand deposits (r^{DD}) which may be taken as a policy variable. The elasticities are low; this means that large changes in reserve requirements would be required to bring some change in the money supply. For example, for elasticity 0.I274, to bring a I% change in the money supply, would require 8% change in reserve requirements.

6.3.4. Final remarks.

(i) The followed procedure above, in determining the various elasticities did not consider any effect on interest rates because of changes of the monetary base.(50) This may not be correct since, for example, changes in the base through open market operations may have effects on interest rates. Although we did not investigate this complication since the exact effect, and the direction of influence depends on the particular circumstances and policies followed, our conclusions about the ability to predict the money supply by changing the base are not affected too much, since interest elasticities of the mulitiplier are very low.

(ii) The whole investigation was done by using annual data and at a very aggregate level. Probably, examination of the various relationships in shorter periods of time, would be more relevant for policy considerations.

(iii) The equations of the various ratios did not have any dynamic properties. The various values of the multiplier and the elasticities are of static equilibrium nature, i.e., they are long-run ones, after all adjustments have taken place. Short- run values have not been calculated, but it is likely that they are even smaller.(51)

(iv) No explanation of the causality arguments have been tried, i.e., whether income affects money supply or vice versa. For this, the system should be expanded to consider variables from the real sector of the economy and to associate them with the financial sector.

(v) The estimation technique of O.L.S. may not be appropriate in such a system of multiple interelationships; so, other techniques such as TSLS should be attempted.

NOTES TO CHAPTER 6

(I) NEWLYN (I44) p. 33.

(2) idib. Chapter 2.

(3) NEWLYN (I43) Ch. 8.

(4) JOHNSON (I08) p. 357.

(5) ANDERSEN and JORDAN (4).

(6) There is a controversy whether vault cash of the banks should be included in the reserves - with consequence excess reserves to be larger - as Friedman does. There are good theoretical reasons for including vault cash of the banks - the part not counted as reserves- in the total definition of reserves. However, in our case the Central Bank does not include it. Therefore, we follow the Central Bank's procedure in order to evaluate Central Bank's policies followed.

(7) ANDERSEN and JORDAN (5).

(8) idib. "Comment".

(9) See ch. 3 p. 4I.

(I0) idib. p. 4I.

(II) BURGER (23) ch. 3.

(I2) FRIEDMAN and SCHWARTZ (77).

(I3) CAGAN (26).

(I4) ANDERSEN (3).

(I5) MELTZER (I35).

(I6) Decisively influenced by the work of GURLEY and SHAW (92).

(I7) BRUNNER (I7).

(I8) Appendix I (a).

(I9) Appendix I (b).

(20) Appendix I (c).

(2I) In all calculations data used were annual averages of monthly figures.

(22) Applied formula Appendix I (b).

(23) Section 6.3.

(24) RASCHE (I57).

(25) In the long-run substitution of imports for domestic products can take place. Thus, any restrictions on imports may have less adverse effects on the price level, employment etc. The effects on imports resulting from increases in aggregate demand and from increases in Government expenditures have been examined elsewhere. See ch. 4 p. 6If.

(26) Assuming a system of fixed exchange rates which was prevailing.

(27) The amount of Government advances outstanding, is restricted by Law to IO % of the estimated revenue of the Government. There is no real limit in the ability to use Government paper. The statutory limit on the issue of treasury bills was easily raised by successive resolutions of the Parliament.

(28) We are not talking on the budget itself but on the difference between Government expenditures and receipts.

(29) Monetary Law Act section II5(2). Use of this clause was done once in I959 when an open conflict occurred between the Monetary Board and the Minister of Finance; increase of the Bank rate from 2.5 % on the I6th Dec. by the first, was called off by the latter on 24th Dec.

(30) For banks' borrowings from the Central Bank, comments have been made in section 6.I.2 p. I47.

(3I) CAGAN (24), for a detailed examination.

(32) BAUMOL (I3), TOBIN (I73).

(33) Some work on the demand for currency holdings do not even consider the interest rate as a variable affecting it, e.g., Brunner, Meltzer. While other studies found it non-significant, e.g., Goldfeld, Silber.

(34) Also, more reserves from the public which can be considered under the unborrowed reserves variable stated below.

(35) Central Bank borrowing may also involve other non-money costs. We do not advance the discussion at this point since this would involve us in the discussions about the "needs and reluctance theory" and the "profit" theory. MEIGS (I32), POLAKOFF and SILBER (I53).

(36) As regulation Q in the U.S.

(37) This derivation is heavily based on BURGER (23).

(38) We do not include time deposits of the Government for simplification of our formula. Besides, these deposits constitute a very small proportion.

(39) Chapter 4 section 4.4, p. 77.

(40) Other variables used will come up the specification of the ratios in subsequent pages.

(4I) JOHNSTON (II2) p. I60.

(42) t values in parentheses.

(43) Tests were also carried out using taxes on personal income. In all cases, this variable proved to be non-significant. In other tests, a dummy variable was used to pick up any effects between periods of booms and periods of recession; and this variable was also found non-significant.

(44) See comments chapter 3, p. 42.

(45) FAND (58), for a classification of various money supply functions.

(46) Appendix I (d).

(47) Appendix I (e).

(48) For a comparison of elasticities on existing studies: RASCHE (I57), FAND (58). Generally, the long-run interest elasticities were lower than 0.5.

(49) See section 6.I.3 p. I35.

(50) Appendix I (e).

(5I) In a partial adjustment model: $y_t = a + b_1 x_t + b_2 y_{t-1}$, the long-run values for b_1 is b_1/b_2, $0 < b_2 < 1$ which is larger than b_1.

CHAPTER 7

A STRUCTURAL MODEL OF THE ECONOMY

In this chapter, an attempt is made to construct an econometric model of Ceylon's economy, using annual data for the period I950-70.[I] This will enable us:

(i) To discover quantitative information about the monetary sector of Ceylon's economy.

(ii) To examine the links of this sector with the real sector of the economy.

(iii) To evaluate the effectiveness of various policy variables, on the different sectors of the economy.

As far as we know, no such attempt has been made for Ceylon's economy. Similar models have been constructed for U.S and U.K and have provided many of the theoretical underpinnings of the various specifications that will follow. Therefore, we are not going to elaborate very much on the theoretical arguments behind the various specifications of the functions. A few of the models should be mentioned, very briefly:

F. De Leeuw[2] model, is concerned with the financial sector of the U.S economy. It does not include any examination of the links between this sector and the real sector of the economy but it contains, however, excellent analysis of the theoretical specification of the functions, in particular it analyses how the prototype model should be specified in the various financial markets.

Goldfeld.[3] Although covering the above deficiency by specifying functions for the real sector, he ignores the Government sector. The monetary base is taken as exogenous on the basis of little examination of the question. It is, however, an excellent reference for analysing the behaviour of commercial banks.

Norton[4] covers the above deficiencies of De Leeuw-Goldfeld and it is quite analytical in examining the various financial markets of the U.K monetary sector.

A common deficiency of these models is either the use of only one policy variable, e.g., Bank rate, unborrowed reserves, or use of some monetary policy variables. What is required, however, is

the examination of a mix of fiscal-monetary policy. This will bring into consideration explicitly the important, though often neglected subject,[5] viz., the interdependence of fiscal and monetary actions. Another deficiency of these models- related to the above point- is that they ignore the way in which the monetary base changes. Omission of this issue essentially means that the effect on the economy's real variables produced by changes of the monetary base is the same whether these changes originate, say, in the foreign sector or as a result of deficit financing by the Government. So, the mechanism of supplying money is neglected.

Our economy provides a good opportunity to examine the effects of changing the monetary base because of differnet factors. As an earlier chapter showed, the main influence on the monetary base was the foreign sector in the first decade of our period and deficit financing by the Government in the second decade.

Finally, in all models, the policy variables are considered as exogenous. A proper procedure should be, however, to relate the various policy variables to the objectives pursued by the authorities, that is, to specify "reaction functions" reflecting the behaviour of the monetary authorities. A function of this kind is incorporated in our model by examining the determination of the long-term interest rate on Government bonds.

The model adopted, in its general form, together with an explanation of the symbols used is presented below. The model consists of I4 structural equations and 7 identities. All functions are in linear form.

7.I. THE MODEL

7.I.I. Specification of the model.

I. The Public's Demand for Currency

$$C_p = a_I + b_{I.I}GNP + b_{2.I}DD_p + b_{3.I}T_m + b_{4.I}d_I + u_I$$

2. The Public's Demand for Demand Deposits

$$DD_p = a_2 + b_{I.2}r_{tb} + b_{2.2}GNP_{nf} + b_{3.2}d_I + b_{4.2}(DD_p)_{-I} + u_2$$

3. The Public's Demand for Time Deposits

$$T_p = a_3 + b_{I.3}r_t + b_{2.3}GNP + b_{3.3}DD_p + b_{4.3}d_I + u_3$$

4. Supply of Commercial Loans by Commercial Banks

$$CL^s = a_4 + b_{I.4}R^u + b_{2.4}TD + b_{3.4}r_{cl} + b_{4.4}r_b + b_{5.4}(CL^s)_{-I} + u_4$$

5. Commercial Banks' Excess Reserves

$$RE = a_5 + b_{I.5}r_d + b_{2.5}FB + b_{3.5}AB + b_{4.5}TD + u_5$$

6. Commercial Banks' Borrowings from the Central Bank

$$DB = a_6 + b_{I.6}(r_{cl}-r_d) + b_{2.6}CL^s + b_{3.6}R^u + u_6$$

7. Commercial Banks' holdings of Treasury Bills

$$TB = a_7 + b_{I.7}r_{tb} + b_{2.7}CL^s + b_{3.7}TD + b_{4.7}GS + u_7$$

8. Commercial Banks' holdings of Government Securities

$$GS = a_8 + b_{I.8}r_{cl} + b_{2.8}(DD_p)_{-I} + b_{3.8}T_p + u_8$$

9. Private Consumption Expenditure

$$C = a_9 + b_{I.9}(GNP_{nf})_d + b_{2.9}GNP_f + b_{3.9}C_{-I} + u_9$$

IO. Private Fixed Investment Expenditure

$$I = a_{IO} + b_{I.IO}GNP + b_{2.IO}r_b + b_{3.IO}K_{-I} + b_{4.IO}I_{-I} + u_{IO}$$

II. Expenditure on Imports

$$I_m = a_{II} + b_{I.II}GNP + b_{2.II}FR_{-I} + b_{3.II}(I_m)_{-I} + u_{II}$$

I2. Taxes on Income

$$T_y = a_{I2} + b_{I.I2}GNP_{nf} + u_{I2}$$

I3. Taxes on Expenditure

$$T_E = a_{I3} + b_{I.I3}GNP + u_{I3}$$

I4. Long-term Interest rate (Bond Rate)

$$r_b = a_{I4} + b_{I.I4}r_d + b_{2.I4}BPsec + b_{3.I4}\Delta O + b_{4.I4}(r_b)_{-I} + u_{I4}$$

IDENTITIES

I5. Gross National Product identity

$$GNP \equiv I + C + GE + Ex - Im - T_E + OE$$

I6. Non- Agricultural GNP identity

$$GNP_{nf} \equiv GNP - GNP_f$$

I7. Disposable Non-agricultural Income identity

$$(GNP_{nf})_d \equiv GNP_{nf} - T_y$$

I8. Government Budget Balance identity

$$EIG \equiv GE - T_y - T_E - BPsec - OR$$

I9. Unborrowed Reserves identity

$$R^u \equiv RE + RR - DB$$

20. Total Deposits identity

$$TD \equiv DD_p + T_p + ODEP$$

2I. Changes in Monetary Base identity

$$\Delta B \equiv (Ex - Im) + NCFL + BPsec + EIG + \Delta DB + \Delta O$$

The endogenous variables of the model are:

C	Consumption expenditure of the private sector
CL^s	Loans and advances provided by commercial banks to the private sector
C_p	Currency held by the public
DD_p	Demand deposits held by the public
DB	Discount borrowings of commercial banks from the Central Bank
ΔB	Changes in the monetary base
EIG	Expansionary impact of Government deficit financing (Includes borrowings from the Central Bank plus changes in cash balances of the Government plus borrowings from commercial banks)
GNP	Gross National Product valued at market factor cost prices
GNP_{nf}	GNP of the non-agricultural sector
$(GNP_{nf})_d$	Disposable GNP of the non-agricultural sector
GS	Government securities held by commercial banks
I	Fixed investment expenditure of the private sector
Im	Expenditure on imports
r_b	Interest rate on long-term Government securities (I5-20 years)
RE	Excess reserves held by commercial banks
R^u	Unborrowed reserves held by commercial banks
TB	Treasury bills held by commercial banks
TD	Total deposits of commercial banks
T_p	Time deposits held by the public
T_y	Taxes on income
T_E	Taxes on expenditure

The pre-determined variables are as follows:

BPsec Budget financing from the non-bank public (It includes and administrative borrowing)

d_I Dummy shift variable (I950-60 takes value 0, I96I-70 value I)

ΔO Other factors in the changes of monetary base (as residual)

Ex Exports of goods and services

FB Foreign balances of commercial banks

FR_{-I} Foreign reserves of the Central Bank lagged one period

GE Government expenditure

GNP_f GNP of the agricultural secotr (Including forestry, hunting and fishing)

K_{-I} Capital stock lagged one year (defined as $\sum_{t=1}^{t-1} I_t$, 1= I949)

NCFL Net foreign capital flows accrued to the private sector and to the Government

ODEP Other deposits out of demand and time deposits

OE Other expenditure (Includes net factor income from abroad and changes in inventories plus the residual required to complete the GNP identity).

OR Other revenue received by the Government to balance the Government budget identity.

RR Reserves required against demand and time deposits

r_{cl} Interest rate on commercial loans

r_d Discount rate (Bank rate)

r_t Interest rate on time deposits

r_{tb} Interest rate on treasury bills

T_m Taxes imposed on imports

In addition to the above, the following one-period lagged values of the endogenous variables are included:

$(DD_p)_{-I}$, $(CL^S)_{-I}$, $(C)_{-I}$, $(Im)_{-I}$, $(r_b)_{-I}$, $(DB)_{-I}$, $(I)_{-I}$

Very briefly, the basic elements of our model are:

(i) It contains equations of the non-bank public concerning its demand for currency, demand deposits and time deposits (equs. I-3)

(ii) It contains equations reflecting commercial banks' behaviour in providing loans and advances to the private sector, in keeping excess reserves, borrowed reserves from the Central Bank, Treasury bills and Government securities (equations 4-8).

(iii) For the real sector of the economy, a very aggregative picture is presented by fitting functions for private consumption expenditure, investment expenditure and a function for imports (equations 9-II).

(iv) For the Government sector, functions for taxes on income and taxes on expenditure are specified and also, a function for determining the bond rate (equations I2-I4).

In the next sections, detailed examination of these structural equations is undertaken. Meanwhile, let us examine the identities included in the model.

Equation I5, specifies the Gross National Product identity, showing how GNP, valued at current factor cost prices, is defined in terms of flows consisting of private consumption, private investment, Government expenditures (Government consumption plus Government investment plus subsidies) exports of goods and services, imports of goods and services, taxes on expenditure and a residual factor to equalize the identity. (It includes: Net factor income from abroad, changes in stocks and other unidentified elements)
We should note that our model is essentially a demand-determined model, that is, supply factors set no limit to the level of income. An extension to this direction should include production functions or some measure of the level of capacity utilization.

Equation I6, disaggregates total GNP into GNP of the non-agricultural sector and GNP of the agricultural sector. The latter is taken as exogenous in the system. Considering the high dependence of the economy on exports of agricultural products, this assumption is fairly realistic. We should recall here, the importance attached to the "dual" character of the economy usually found in LDCs.
A consistent analysis would make greater use of this segregation but lack of data prevents more being done in this direction.
The above identity, however, might be considered as a first step in this direction.

Equation I7 is also an accounting identity, showing Gross disposable income of the non-agricultural sector, valued at current factor cost prices, as equal to GNP non-agricultural income minus taxes on income. We should notice that, since taxes are referred to the total GNP, the implicit assumption in this identity is that direct taxes are derived only from non-agricultural income. Since the personal income in the agricultural sector is probably very low, the above assumption probably does not introduce too much bias.

Equation I8 defines the way which Government expenditures can be financed. That is, from taxes on income, taxes on expenditure, a budget deficit, which can be financed either by borrowing from the non-bank public (BPsec) or by borrowing from the banking system (Central Bank and commercial banks) plus changes in cash balances (EIG: Expansionary impact of Government budget financing) and finally, from other sources (such as foreign finance and other taxes).

We considered the EIG element as an endogenous variable rather than the GE component. This is based on our examination of the behaviour of the Government in financing its deficits. It seems that the Government used to determine Government expenditures- trying of course to achieve certain social economic objectives- and then, that part of the deficit which was not covered by taxation or by borrowing from the public sector and other sources, such as foreign finance, was covered by borrowing from the banking system and changes in cash balances. On the other hand, if the Government was conducting its borrowing from the banking system in accordance with the achievement of certain objectives, such as increasing per papita incomes, price stability, balance of payments situation etc., it would be more appropriate to consider, in our system, borrowing from the banking system as an exogenous variable. To confirm our view that the first approach was followed by the Government authorities, rather than the second one, we ran regressions for both GE and EIG with respect to certain objectives. In all cases, the performance of EIG variable was very poor indeed.(6)

Equation I9 defines unborrowed reserves of commercial banks in terms of excess reserves, reserves required and discount borrowings.

Equation 20 is a balancing equation on the liabilities side of the commercial banks of their total deposits. Finally,

Equation 2I states explicitly, the various sources of change in the monetary base as determined by:

(i) The balance of payments situation, i.e., flows of exports and imports of goods and services (Ex - Im), net flows of foreign capital - private and accrued to the Government (NCFL).

(ii) Budget financing, i.e., borrowing from the non-bank public (BPsec), borrowing from the banking system - Central Bank and commercial banks - and changes in cash balances (EIG).

(iii) Changes in the discount borrowing of commercial banks from the Central Bank (ΔDB).

(iv) Other elements. We should note that this item reflects the net purchases of Government bonds undertaken through open market operations by the monetary authorities.

7.I.2. Formulation of the model.

In formulating the model, an experimental stage preceded the final specifications. The general criteria for selecting the various functional relationships were:

(i) A priori information available from economic theory about the signs and magnitudes of the coefficients of the explanatory variables.

(ii) The t values of the estimated coefficients, which show the significance of the explanatory variable in explaining the dependent variable.

(iii) The squared coefficient of multiple correlation, corrected for the degrees of freedom ($\bar{R}^2$), which shows what proportion of the variance of the dependent variable is explained by the included explanatory variables; the correction for the degrees of freedom permits us to compare different functions with different numbers of explanatory variables.

(iv) The Durbin-Watson test statistic as a test for the existence of first order serial correlation in the residuals.

The general procedure followed was to include those explanatory variables which proved to be significant and sometimes those which

produced estimated coefficients greater than their standard error, taking into consideration the a priori information from the theoretical point of view, the overall fit of the function, and the seriousness of the autocorrelation problem.

We should point out that these statistical criteria are appropriate for single-equation models and not for cases where we want to formulate a simultaneous equations-system.
Unfortunately, the lack of alternative statistical criteria for such cases, forces us to use these criteria throughout our model.

7.I.3. Some econometric problems.

Before examining the various functions of our model separately, we should mention some econometric problems faced during the estimations.

a) The multicollinearity problem. It is usually very common for the time series in aggregate data to be highly collinear. Unfortunately, we could do little about this problem, since we had to accept a certain set of data avialable. It is very difficult to decide whether the degree of multicollinearity among the explanatory variables is intolerable or not, since the answer depends on the purpose of the study, viz., when we want to estimate a particular coefficient multicollinearity is a serious problem since it makes it very difficult, or even impossible, to disentangle the separate influences of the entered variables. Also if we want to test the significance of the variables, we must treat the results with some caution, since when there is multicollinearity the standard errors of the estimates tend to be high and therefore we are more likely to get small t values. However, if our purpose is to make predictions of the dependent variables, the problem of multicollinearity might be less significant, provided the intercorrelation between the variables remains the same in the prediction period.

The general procedure followed was to avoid using highly collinear variables in the same relationship.

b) The presence of lagged dependent variables in some of our relationships. This tends to bias the Durbin-Watson statistic towards the value of two, i.e., towards accepting the hypothesis that there is no first order serial correlation in the disturbance term.

In addition, the presence of lagged dependent variables, produces biased estimates but consistent, if the disturbance term is not autocorrelated; otherwise, the estimates are biased and inconsistent. Also, the coefficient of the lagged variable will be biased downwards.

c) The problem of simultaneity. In a single equation estimations, the explanatory variables should be true independent variables but, obviously, the various relationships are simply part of a whole system of equations. The consequence of this is that the single equation estimates will be biased and inconsistent. This difficulty can be countered by using simultaneous equation estimation techniques. For this purpose at a later stage we will apply the Two Stage Least Squares (TSLS) method.

For the moment, the Ordinary Least Squares (OLS) estimates are presented, with brief notes on the specification and procedures followed.

7.2. The non-bank Public' behaviour.

In this section the non-bank public's behaviour for the demand for currency, demand deposits, and time deposits is examined.

7.2.I. The Demand for Currency.

Although we have estimated the public's demand for money function quite extensively, in chapter 5, it is considered advisable to estimate separately its components, that is, demand for currency and demand for demand deposits.

There are some reasons for this disaggregation:

(i) We may minimize the error of aggregation, which results when we use an aggregate demand for money function. As we will see, both currency and demand deposits functions have shifted considerably between the two sub-periods, while the estimates of the demand for money function did not show such shifts, at least in some formulations.

Furthermore, in our case, as earlier analysis showed, currency constitutes a large proportion of the total money variable. We should also expect different sets of individuals to have different demands for currency and demands for demand deposits. Specifically, in a LDC, we should expect that demand deposits are mainly used by business firms and that only a small proportion of

of individuals keep current accounts with commercial banks. This is due to the fact that people have not yet learned to use cheques as a means of payments and therefore the general lack of confidence in the cheque as a means of payments. The above remarks suggest that a different set of explanatory variables may be needed in the demand function for currency and the demand function for demand deposits.

(ii) If we assume that the authorities follow a policy of controlling the cash base, then we need to know the form of the public's demand for currency function, if we are to present accurately the effects of a change in the cash base on the cash reserves of the commercial banks.

We have already advanced some arguments about the factors affecting the holdings of currency, in our earlier discussion of the currency/demand deposit ratio.(7) Here, therefore, we only report the results and the variables used as explanatory variables.

The rate on time deposits (r_t) is used as a first approximation for the opportunity cost of holding currency. Theoretically, it would be more correct to use an interest rate paid on demand deposits but, unfortunately, such a rate does not exist, since no explicit interest is paid on demand deposits. On the other hand, implicit calculations of it meet conceptual and statistical difficulties. However, the rate on time deposits can be justified on the ground that time deposits in LDCs are the closest alternative to currency demanded for precautionary purposes because of the lack of other financial assets and the unwillingness of the public to hold them.

Other variables acting as a sort of constraint imposed on the function are: GNP as a proxy for disposable wealth. Demand deposits as an alternative to keeping currency. In addition, the inclusion of this variable may show us the relation between currency and demand deposits, that is whether it is one of complementarity- positive sign of the coefficient- or one of substituability- negative sign of the coefficient.

Taxes on imports are included in our function because of their special importance after I96I.

A variable representing the rate of change of prices is also

used, taken from the GNP implicit price deflator, and also a moving average over the previous five values is used to represent the expected rate of change of prices.

A dummy variable is used to catch any structural shift of the function over the examined sample period.

Some of the results obtained are presented in TABLE 7.I.(8) The interest rate variable in all formulations, is found non-significant but with a positive sign.(9) The positive sign result is opposite to a priori expectations if we take the interest rate on time deposits as representing the opportunity cost of holding currency.

The GNP variable is highly significant and the estimated coefficient shows small variability in the various formulations.

The demand deposits variable, in all formulations, though it comes with a positive sign is, however, non-significant - the magnitude of its estimated coefficient is almost the same as its standard error. The positive sign would suggest that currency and demand deposits have a relationship of complementarity rather than one of substituability. This result is in line with what is usually assumed.

The taxes imposed on imports variable is found highly singificant. This is probably because of the special conditions which prevailed in Ceylon, because while during the I950-60 period imports were almost free of any control, after I96I heavy controls and restrictions on imports were imposed. These restrictions, in view of the high dependence of the economy on imports, might have led individuals to find illegal ways, such as black market activities to obtain the items wanted. Thes activities necessitate the holding of currency rather than demand deposits. We should note, that Cagan(IO) found a similar variable to be significant in war periods but not in peace time.

The shift dummy variable is significant too. It is interesting to notice that even in formulations where the taxes on imports variable and the dummy variable appear together, both variables are still highly significant and the inclusion of the dummy raises D.W statistic considerably (compare equations 2 and 3). This might be an indication that the demand for currency was increased not only

because of higher taxes on imports but also because of other factors as well, such as public's preferences.

The rate of change of price variable, although comes with the correct negative sign, is not significant. This is probably because over our sample period the rate of price changes was not large[II] (equations 4-5).

Finally the lagged value of currency holdings is highly significant but, the size of its coefficient was changing considerably according to the other variables included. The general result was a high coefficient (0.80-0.95), which means a very low coefficient of adjustment of actual holdings to any desired level of currency holdings. We can hardly accept this result since our data are annual and the currency holdings are the main means of payments so, we should expect a quicker coefficient of adjustment. The reported equation 7 is the only one that gave the largest coefficient of adjustment (0.45).

In preliminary tests we experimented with other variables as well, such as taxes on income and taxes on expenditure; these variables were not significant. We should point out that although taxes on imports are the main part in taxes on expenditure variable, the latter variable was not significant. This might prove Liu's [I2] point that for the purpose of finding the "true" structural relationship, more promising results might be got, if we use principal components of the explanatory variables of the model rather than the explanatory variables themselves.

Equation 6 is selected as our OLS estimate of the demand for currency defined as a function of GNP, demand deposits, taxes on imports and a shift variable. The fitting is quite high and the D.W statistic shows no autocorrelation at the I % level.

TABLE 7.1.

Regression estimates of the Public's demand for Currency (C_p)

Equ.	constant	r_t	GNP	DD_p	Tm	P	d_1	$C_{p.1}$	$\bar{R}^2$	D.W
1	-377.325	24.1849	0.0858	0.5727					0.8901	0.515
	(2.723)	(0.708)	(3.399)	(1.570)						
2	-398.754	27.7275	0.0727	0.2598	0.8434				0.9639	1.332
	(5.018)	(1.416)	(4.968)	(1.206)	(5.983)					
3	-222.778	19.8208	0.0659	0.1727	0.5294		129.1330		0.9810	1.861
	(3.049)	(1.381)	(6.124)	(1.094)	(4.075)		(3.922)			
4	-217.963	25.4808	0.0685	0.1407	0.5012	-3.1018	127.0700		0.9820	1.913
	(3.056)	(1.743)	(6.420)	(0.903)	(3.904)	(1.335)	(3.955)			
5	-170.099	24.7483	0.0750		0.5099	-3.4248	130.8800		0.9822	1.797
	(3.588)	(1.706)	(9.566)		(4.007)	(1.502)	(4.134)			
6	-206.929		0.0706	0.1496	0.5096		135.5180		0.9799	1.569
	(2.790)		(8.023)	(0.927)	(3.839)		(4.044)			
7	-106.917	16.4382	0.0264	0.0721	0.3384		52.8263	0.5515	0.9918	1.997
	(1.974)	(1.742)	(2.370)	(0.681)	(3.569)		(1.937)	(4.575)		

7.2.2. The Demand for Demand Deposits.

The Public's demand for demand deposits is specified using similar arguments to the demand for currency function. Some of the estimates are presented in TABLE 7.2.

A rate of interest is used to represent the opportunity cost of holding demand deposits as an alternative to holding other assets such as currency or time deposits. Experiments were carried out using the interest rate on time deposits and the treasury bill rate. The interest rate on time deposits is non-significant and not of a uniform sign. So, when a lagged dependent variable is added, the interest rate variable takes a positive sign (equation 3).(I3) On the other hand, the treasury bill rate is always of a negative sign and highly significant.

We have already pointed out (I4) that, there is no significant treasury bill market proper, since the main transactions on treasury bills are between the Central Bank and the Treasury and, therefore, the treasury bill rate is not a common rate but rather an administrative rate. With this qualification, the treasury bill rate can be considered as a proxy for the opportunity cost of holding demand deposits as a alternative to holding other assets.

As a constraint variable, the GNP of the non-agricultural sector is used rather than total GNP. This specification seems more realistic in the context of a LDC where the agricultural sector does not keep large demand deposits because of the lack of bank branches in agricultural areas and the lack of aquaintance with the use of cheques. The GNP_{nf} variable is highly significant.(I5)

It would be interesting at this point to compare the income elasticities of the demand for currency and of the demand for demand deposits. The long-run estimates at their means are:

C_p	DD_p
0.74	0.66

That is, the income elasticity of currency is greater than the elasticity of demand deposits. This result is opposite to the evidence from developed countries.(I6)

The Public's demand for time deposits would be a relevant variable to be also included in our specification, and would give us

TABLE 7.2

Regression estimates of the public's demand for demand deposits (DD_p)

Equ.	constant	Y_t	Y_{TE}	$GNP_{n.f.}$	d_1	$(DD_p)_{-1}$	$\bar{R}^2$	D.W.
1	405.317	- 17.4215		0.0757			0.7799	1.215
	(1.182)	(0.813)		(5.644)				
2	266.739	- 0.2270		0.0434		0.3509	0.8070	1.431
	(3.316)	(0.010)		(2.038)		(1.879)		
3	279.534	0.1434		0.0376	21.7816	0.3493	0.7992	1.507
	(3.291)	(0.006)		(1.578)	(0.583)	(1.833)		
4	357.300		- 58.7425	0.1094			0.8408	1.247
	(11.441)		(2.793)	(6.588)				
5	218.888		- 60.7088	0.0861		0.3691	0.8849	1.703
	(3.913)		(3.392)	(5.268)		(2.811)		
6	246.284		- 73.4523	0.0800	60.4671	0.3646		
	(4.757)		(4.303)	(5.346)	(2.240)	(3.087)		

an idea about the relationship between time deposits and demand deposits. Unfortunately, the time deposits variable has been excluded as it is highly correlated with the GNP variable (r=0.97) and so it produced non-significant coefficients and the wrong signs.

A shift dummy variable is found significant (equation 6). Finally, the lagged dependent variable is significant too, and the estimated coeficient fairly stable, in all formulations, showing a rather "reasonable" coefficient of adjustment towards any desired level, i.e., around 60 % of any discrepancy between desired and actual holdings is eliminated in one period.

Equation 6 is our OLS estimate, considering demand deposits as a function of treasury bill rate, GNP of non-agricultural sector, a shift dummy variable and the lagged one period dependent variable.

All entered variables are significant and the statistical performance of the function is quite satisfactory.

7.2.3. The Demand for Time Deposits.

The specification of the public's demand for time deposits follows similar lines to the specification of the demand deposits function, that is:

(i) The use of the interest rate on time deposits to represent the own rate of interest on holding time deposits and also other interest rates, such as treasury bill rate and government bond rate, to represent the alternative assets available to the public when deciding their portfolios.

(ii) Other variables such as GNP and demand deposits which act as constraints in the function.

TABLE 7.3 illustrates some of the estimates. The interest rate on time deposits is non-significant though with the correct positive sign. The treasury bill rate always resulted in non-significant coefficients and in the wrong (positive) signs. The government bond rate gave a similar result although in some estimates the correct negative sign was produced, but with non-significant coefficients. The overall fit of the functions did not imporve with the addition of other interest rates - same $\bar{R}^2$, lower D.W statistic.

TABLE 7.3.

Regression estimates of the public's demand for time deposits (T_p)

Equ.	constant	r_t	GNP	DD_p	d_1	$(T_p)_{-1}$	$\bar{R}^2$	D.W
1	- 579.286 (10.487)	18.3791 (1.343)	0.1139 (11.317)	0.2370 (1.630)			0.9834	1.875
2	- 497.402 (9.552)	15.1681 (1.363)	0.1082 (12.896)	0.1378 (1.124)	62.9414 (3.112)		0.9890	2.377
3	- 584.295 (12.988)	20.2980 (1.828)	0.0992 (10.475)	0.2011 (1.691)		0.3395 (3.109)	0.9890	2.756
4	- 534.391 (9.128)	17.6207 (1.592)	0.1020 (10.705)	0.1582 (1.306)	36.7490 (1.295)	0.1975 (1.285)	0.9894	2.624

So, we retained the interest rate on time deposits.

The GNP variable is highly significant. The demand deposits variable is in all formulations non-significant though with estimated coefficient greater than its standard error, and of positive sign, suggesting that a relationship of complementarity exists between time deposits and demand deposits.

Finally, a dummy variable for any structural shift and a lagged dependent variable are both significant only when they enter separately in the function (equations 2,3) but not when they are taken together, obviously because of the multicollinearity problem. The lagged value is excluded because of the high correlation with the other variables.

Equation 2 is taken as our OLS estimate.

7.2.4. Summary

Summing up, the main findings from the estimates of the non-bank public's demand for currency, demand deposits and time deposits are:

(i) Interest rate considerations are not significant in holding currency and time deposits, while they are found to be significant in determining the holding of demand deposits probably because demand deposits are mainly kept by the non-agricultural- advanced sector of the economy.(I7)

(ii) Import duties are significant in decisions concerning the holding of currency.

(iii) There is a complementarity relationship between currency, demand deposits, and time deposits in the public's portfolios.

(iv) Strong shifts of the functions during the examined period are present.

(v) All the relationships perform well statistically.

7.3. Commercial Banks' Behaviour

For many years, banks were seen as an uninteresting sector and not deserving separate analysis. This attitude was mainly the result of two widely held views:

(i) Banks hold a fixed proportion of deposits to reserves (from causal empiricism in British clearing banks).

(ii) Bank reserves and other items on bank balance sheet are seen as determined largely by the preferences of the non-bank public rather than by those of the commercial banks themselves.

However, views have changed and nowadays, banks are considered as deserving separate analysis because it is recognized that the essential characteristic of the banking sector is its interdependence with other parts of the economic system. Indeed, the banking sector acts as a transmission mechanism between the monetary authorities and the non-bank public. It works in both directions; by reinforcing or weakening the impact of monetary policy vis-a-vis the public and by transmitting more or less easily interpretable information on changes in the economic situation, back to the authorities and providing the latter with a basis for further action. It is essential, therefore, to examine the behaviour of the commercial banks and then to incorporate it in the other sectors of the economy in a general model.

In this section, we specify functions for explaining the supply of loans, excess reserves, borrowings from the Central Bank, holdings of treasury bills, and holdings of government securities.

7.3.I. Supply of Loans and Advances.

For the specification of the supply of loans function, the following arguments are used:

(i) A rate of interest imposed on loans provided, and an interest rate of alternative assets available to the banks in formulating their portfolios, such as government bonds and treasury bills. The loan rate is considered to be the rate charged fon loans secured by stocks of trade since the largest proportion of loans are provided for this purpose. The bond rate variable is used as a rate of alternative assets available to the banks in formulating their portfolios. Ceteris paribus, we should expect the loan rate to be

of positive sign, while the bond rate of negative sign.[I8]

(ii) The reserve position of the banks. The reserves unborrowed variable is used for this purpose; the higher is the level of unborrowed reserves kept by banks, the smaller is the amount of loans provided, and vice versa. Or more explicitly, since by definition, reserves unborrowed equal excess reserves plus reserves required minus discount borrowings ($R^u = RE + RR - DB$), an increase in RR or RE decreases the loans provided to the public, while increases in DB tend to increase loans.

(iii) Other constraints used are: a) Inflow of total deposits. b) The lagged value of loans provided - to reflect past commitments of the banks to their customers, or more generally, customer-bank relationships.

The fitted equation is:

$$CL^s = \underset{(2.50I)}{-436.777} - \underset{(2.2II)}{I.2660R^u} + \underset{(3.235)}{0.6283TD} + \underset{(I.I94)}{44.93I6r_{cl}} - \underset{(0.958)}{20.0092r_b} + \underset{(I.345)}{0.3370CL^s_{-I}}$$

$$\bar{R}^2 = 0.9984 \qquad D.W. = I.950$$

(t values in parentheses)

As it can be seen, the reserve position of the banks and their deposit liabilities are significant, while the interest rate and the lagged value are non-significant. All variables appear with the correct sign, and the fitting of the function is quite high.

Attempts to include a variable, such as GNP or changes in GNP, to reflect the pressure from the public for the provision of loans were unsuccessful, probably because of the high multicollinearity of this variable with the other explanatory variables.

Finally, we should point out the absence from our specification of qualitative factors affecting the provision of loans, such as moral suasion exerted by the monetary authorities.

7.3.2. Excess Reserves.

The demand function for excess reserves may be defined in terms of:

(i) Market interest rates to reflect the alternative cost of holding funds in the form of excess reserves. Since excess reserves do not earn any explicit return banks may try to economize in them as yields on alternative assets rise. Treasury bills are probably the closest substitute for excess reserves; therefore, the treasury bill rate is considered as representing this opportunity cost of holding excess reserves. We should point out here that whether banks consider treasury bills or, say, government bonds as an alternative to excess reserves, depends on their ability to liquidate them (quickly and with minimum cost) which largely depends on the policy followed by the monetary authorities. So, for example, if there is a policy of stabilizing the government bond rate, then, government bonds can be an equally good alternative to excess reserves.

(ii) The "penalty" rate for a required reserve deficiency which may face banks to liquidate securities or call loans or to borrow reserves from the Central Bank or the interbank market or a combination of them. For the banking system as a whole, only the discount mechanism can add to the total reserves, the other alternatives simply shift reserves among banks. So, we consider the discount rate as the appropriate rate. We should expect a positive relationship between Bank rate and holding of excess reserves.

(iii) Changes in unborrowed reserves (or reserve requirements), may affect the volume of excess reserves. We should note that a change in excess reserves because of change in banks' reserves (unborrowed or required) may go both ways. On the one hand, increases of reserves required will lead to a reduction in excess reserves, at least in the very short run, but after a period, higher reserve requirements may lead to higher excess reserves for precautionary reasons, particularly if banks do not anticipate changes in their total reserves (or monetary base). On the other hand, there may be a move in the opposite directions in the sense that because of higher reserve requirements, banks keep less excess reserves in order to reduce the costs involved in keeping more required reserves,

particularly if they anticipate changes in the monetary base. Our data confirm the second rather than the first view, as it is shown below.

(iv) Since a large proportion of banks are foreign-owned, their balances abroad might be associated significantly with the excess reserves variable. There has been much controversy about the extent to which foreign balances can frustrate and/or make policy actions of the monetary authorities unpredictable. We referred to this discusion in an earlier chapter,[19] adhering to the view that the above danger should not be overestimated. The volume of these balances can be affected by the monetary authorities by adopting various measures and, most important, we should examine to what extent these balances constitute a permanent source for expanding credit by commercial banks.

(v) Other constraints included in the function are: Inflows of total deposits, loans provided and a lagged dependent variable. Some of the estimates are shown in TABLE 7.4.

First we experimented with the treasury bill rate and the Bank rate variables. Both these variables came non-significant, although with estimated coefficient greater than its standard error. The treasury bill rate variable in some formulations was found with the wrong positive sign.[20] The Bank rate variable is of the correct positive sign (equations I-2). Use of the difference between the treasury bill rate variable and the Bank rate variable results in similar conclusions (equations 3-5). So, it seems that interest rate considerations do not play a significant role in the size of excess reserves that banks keep.

The loans provided variable, although of the correct sign, is non-significant (equation 5).

Changes in the monetary base variable is non-significant too, with a negative sign.

On the other hand, the foreign balances variable is highly significant and has a positive sign; it seems, therefore that there has not been a substituability relationship between excess reserves and balances kept abroad. Foreign balances were mainly increased during boom periods in exports, usually because of encouragement from the Central Bank to do so. Also excess reserves were increased.

TABLE 7.4

Regression estimates of commercial banks' excess reserves (RE)

Equ.	constant	r_{TB}	r_d	$(r_{TB}-r_d)$	FB	ΔB	TD	R^v	CL	$\bar{R}^2$	D.W.
1	1.9045 (0.189)	6.1799 (1.277)			0.5725 (5.955)	- 0.0675 (1.487)	- 0.0289 (2.504)			0.8502	1.890
2	3.4311 (0.349)		5.5996 (1.218)		0.5017 (7.643)	- 0.0558 (1.250)	- 0.0323 (2.235)			0.8490	1.680
3	7.3817 (0.755)			- 0.1387 (0.021)	0.4780 (4.816)	- 0.0558 (1.154)	- 0.0163 (1.986)			0.8350	1.625
4	13.9010 (1.257)			- 2.9807 (0.427)	0.4335 (4.643)		- 0.0219 (2.965)	- 0.0312 (0.415)		0.8232	1.480
5	- 1.0218 (0.130)			3.0899 (0.487)	0.5156 (5.206)	- 0.0720 (1.492)			- 0.0119 (1.542)	0.8209	1.678

This, in combination with the non-significance of the loans provided variable, suggests that there has not been any danger of expanding credit because of the excess liquidity of commercial banks.

The total deposits variable, is in all formulations of negative sign and significant, that is, an increase in the inflow of deposits leads to a decrease in excess reserves. This is plausible, if we take into consideration that more deposits necessitate more required reserves.

The lagged dependent variable, although it was significant, it was found with a positive sign, that is opposite to a priori expectations, thus it was excluded from our specification.
It is assumed that banks, ceteris paribus, increase their efficiency in using their excess reserves over time.

Finally, experiments with a shift dummy and a dummy variable to represent active policy of the Central Bank in encouraging banks during boom periods to keep their excess balances abroad, have proved non-significant. Equation 2 is selected as our OLS estimate.

7.3.3. Borrowed Reserves from the Central Bank

The arguments used in the specification of the function for borrowed reserves from the Central Bank should be:

(i) A market interest rate to represent the return to be earned from aquiring the earning asset with the borrowed funds.

(ii) The discount rate as an explicit monetary cost of borrowed reserves.

(iii) Other main factors which will influence borrowing behaviour such as:

- Instability or volatility of commercial banks' deposits.
- Availability of interbank borrowing or overseas borrowing from the head offices.
- Changes in the supply of their reserves by the monetary authorities (or changes in reserve requirements).
- Existence of excess reserves.
- Other institutional changes or changes in attitudes against borrowing by the commercial banks.

We experimented with all these arguments using corresponding variables. So, for the market interest rate, we have used the treasury bill rate and the rate on commercial loans. Since it is differences between these

rates and the discount rate which for profit reasons is relevant for discount borrowing, the difference therefore, of market rate and the discount rate is taken.

Total deposits, unborrowed reserves of commercial banks and a shift dummy are the other variables used.

Some of the estimates are presented in TABLE 7.5. The difference between the treasury bill rate and the discount rate is significant but with the wrong negative sign, since the higher this difference is, the more it pays the commercial banks to borrow from the Central Bank and to use these funds for buying treasury bills. We should note at this point that the significance or not of this difference, has been usually connected with the arguments about two alternative theories on the Central Bank borrowing, namely:

(i) The "profit" theory[21] which asserts that banks borrow whenever there is a difference in rates, in order to benefit from it.

(ii) The "needs and reluctance" theory,[22] which asserts that banks even if there is a difference in interest rates, do not necessarily borrow because of the existence of other constraints, such as fear of more surveilance from the Central Bank, traditional attitudes of bankers against such borrowing etc. We should point out that it is difficult to prove which aspect is more valid by examining the interest rate differential alone, since, for expample, even if there is an interest differential banks may not resort to discount borrowing because of the existence of other measures such as moral suasion from the Central Bank. Since our difference variable between treasury bill rate and Bank rate is of the wrong sign (equations I-2), we disegarded this difference. Instead we use the difference between between loan rate and Bank rate. This differential rate is of the correct, positive sign, and significant (equations 3-5).

The supply of loans variable is highly significant, a result which is consistent with the above significance of the interest rate differential between loan rate and bank rate. It seems, therefore, that banks would borrow to expand their loans, to the private sector. We should point out, that although in our case, the amount of borrowings is relatively small to the total loans provided, only around 10% in 1969-70, this response may be an important policy variable for

TABLE 7.5

Regression estimates of commercial banks' borrowings from the Central Bank (DB)

Equ.	constant	$(r_{re}-r_d)$	$(r_{cl}-r_d)$	CL^s	R^u	d_1	TD	$\bar{R}^2$	D.W.
1	- 5.5257 (0.294)	- 26.5814 (2.504)		0.0891 (7.498)	- 0.5436 (3.502)			0.8746	0.862
2	- 21.5375 (0.963)	- 27.1942 (2.321)			- 0.7498 (4.785)		0.0831 (6.595)	0.8482	0.686
3	- 144.013 (3.082)		18.7544 (2.972)		- 0.4117 (3.178)		0.1122 (9.548)	0.8685	1.004
4	- 106.022 (2.572)		16.5696 (2.843)	0.1159 (10.262)	- 0.1704 (1.290)			0.8837	1.444
5	- 113.295 (2.327)		18.4879 (2.122)	0.1108 (5.410)	- 0.1842 (1.287)	5.9767 (0.303)		0.8771	1.520

affecting loans provided to the private sector, both in the case of expansion and in the case of contraction.

The reserves unborrowed variable is of negative sign but insignificant in most of the specifications.

The total deposits variable, is highly significant and of positive sign, which seems plausible, since the inflow of deposits necessitates more required reserves, and therefore, the greater the likely need for more borrowing. Besides, with more total deposits the variability factor is larger, ceteris paribus.(23)

Finally a dummy shift variable is insignificant (equation 5). Equation 4 is considered as our OLS estimate.

7.3.4. Holdings of Treasury Bills.

The commercial banks' holdings of treasury bills may be specified as a function of:

(i) The own interest rate and interest rate on alternative assets.

(ii) The holdings of alternative assets, such as government bonds, loans provided to the private sector.

(iii) Other constraints, such as demand deposits, time deposits (or total deposits), excess reserves.

Some of the estimates are shown in TABLE 7.6.

In all formulations, the treasury bill rate appears significant and with a positive sign, that is, according to a priori expectations. The bond rate was significant but with a positive sign. This is opposite to a priori expectations and to the negative sign of holdings of government bonds variable. So, the bond rate was excluded from our specifications.

The loans provided variable, is significant and with a negative sign. It appears, therefore, that banks consider the provision of loans as an alternative to the holding of treasury bills.

Notice that the same conclusion is verified by using the loan rate variable. In all cases it has been found with a negative sign and significant, though the fit of the function is quite low (equation 4).

The total deposits variable is of positive sign and significant. That is, an inflow of deposits induces banks to put part of this inflow into treasury bills.

TABLE 7.6.

Regression estimates of commercial banks' holdings of Treasury bills (TB)

Equ.	constant	r_b	r_{TB}	r_{CL}	CL^s	TD	GS	$\bar{R}^2$	D.W.
1	- 133.217 (4.517)	22.3651 (3.021)	15.8157 (2.200)		- 0.2778 (5.500)	0.2177 (4.874)		0.6829	1.657
2	- 88.8730 (2.857)		19.5893 (2.276)		- 0.2387 (4.022)	0.2253 (4.156)		0.5314	1.532
3	- 57.8105 (1.636)		26.3107 (2.859)		- 0.3024 (4.388)	0.2850 (4.489)	- 0.2665 (1.624)	0.5726	1.698
4	291.081 (2.093)		6.4026 (0.660)	- 34.7308 (2.299)		0.1182 (2.363)	- 0.2999 (1.156)	0.2921	1.485

Holdings of government bonds variable is found with a negative sign though insignificant. This signifies that the keeping of treasury bills and bonds are viewed by commercial banks as alternatives rather than complementaries.(24)

Finally a dummy shift variable and the lagged dependent variable are found insignificant.

Equation 3 is considered as our OLS estimate, specifying the holdings of treasury bills as a function of treasury bill rate, loans provided, total deposits and holdings of government bonds.
Notice that the $\bar{R}^2$ is a bit low, though the D.W. statistic shows no problem of autocorrelation.
(An attempt to increase the fit of the function, by including other variables, such as total amount of treasury bills outstanding or total amount of government securities outstanding was abandoned, because of the high correlation of these variables with the other explanatory variables (r over 0.90).

7.3.5. Holdings of Government Securities.

We thought it more advisable to specify a separate function for commercial banks' holdings of government securities rather than estimating an aggregate function for government securities and treasury bills mainly because the factors that determine the holding of these two kinds of assets may be different.

The variables used were interest rate on government securities, the loan rate, excess reserves, demand deposits and time deposits and the borrowings of the government from the private sector to finance budget deficits. The idea behind this last variable is that the larger is the financing of deficits by borrowing from the private sector, the less pressure is likely to be exerted on commercial banks to finance government deficits, a common feature in LDCs. In our case we should not expect this variable to be significant since Government financing was mainly through borrowings from the Central Bank rather from commercial banks.

Some of the estimates are presented in TABLE 7.7.
We have found it very difficult to get "satisfactory" statistical results for our function. So, for example, for excess reserves and

borrowings from the private sector variables their significance and their signs were changing according to the other included explanatory variables (e.g., equations I,2).
So, we excluded these variables from our function.

Demand deposits and time deposits variables produced more "plausible" results. The demand deposits variable has been found insignificant while its lagged -one period- variable is significant. The time deposits variable was found to be significant (equations 3-4). The lagged dependent variable was also significant but rendered all the other included variables insignificant (e.g., equation 2).

Equation 4 is considered as our OLS estimate by considering the holdings of government securities as a function of the loan rate, time deposits and demand deposits lagged one period.
Although the statistical performance of the function is not completely satisfactory - relatively low $\bar{R}^2$ and D.W statistic in the inconclusive region for testing the existence of autocorrelation - we consider this specification as more plausible.

The loan rate is highly significant; since this rate was found relatively insignificant in the holding of treasury bills, it seems reasonable for it to be significant in determining holdings of government securities.
Furthermore, the demand deposits variable was found significant in the holding of treasury bills but not its lagged value. The opposite is found in holdings of Government securities. This suggests that banks, when they have an inflow of demand deposits, keep them first in the form of treasury bills and after a period they turn then into government securities, while for time deposits inflows, their current value is significant. This is probably because the volatility factor in the inflows-outflows in demand deposits is larger than in time deposits, so the banks hesitate to invest (or disinvest) in long term securities in the first instance, while they can do that in the case of the time deposits.(25)

TABLE 7.7.

Regression estimates of commercial banks' holdings of Government securities (GS)

Equ.	constant	r_b	r_{cL}	RE	BP$_{sec}$	$(DD_p)_{-1}$	T_p	$(GS)_{-1}$	$\bar{R}^2$	D.W
1	405.213 (6.073)	7.6739 (0.640)	− 17.2939 (1.446)	− 1.1586 (3.284)	0.0920 (1.243)				0.5244	1.034
2	− 64.228 (0.663)	7.5690 (1.040)	− 2.6857 (0.346)	0.7604 (1.815)	− 0.0589 (1.111)			1.2049 (5.331)	0.8248	1.736
3	465.405 (5.223)	2.0125 (0.169)	− 42.9138 (3.803)			0.1847 (2.184)	0.1401 (2.230)		0.6217	0.937
4	465.297 (5.378)		− 42.0424 (4.316)			0.1821 (2.256)	0.1457 (2.810)		0.6433	0.938

7.3.6. Summary

Summing up the main findings from the specifications of the commercial banks' equations:

(i) Interest rate considerations play a significant role in determining the composition of banks' portfolios, especially as far as borrowings from the Central Bank and holding of treasury bills and government securities are concerned. We should point out here that this result should not be confused with the usually alleged unimportant role of interest rate in LDCs. Such kinds of arguments may be relevant for the public as borrowers but not for the banks as lenders. This has implications for the money supply process which becomes, at least partly, endogenous.

(ii) Lagged values for the specified assets of banks were found non-significant. This suggests that the stock adjustment model is not an appropriate one; in other words, banks do not have a long-term desired holding of these assets, but are indifferent, at least within a wide range, to the composition of their assets. They are influenced by external conditions such as the policies followed by the monetary authorities to regulate economic activity.

(iii) No structural shifts are present in the specified functions during our period.

7.4. The Real Sector.

In the previous sections we specified structural relationships explaining the behaviour of the public and commercial banks in arranging their portfolios.

It would be of great interest to see how these relationships are integrated with the real sector of the economy.
This may give us an idea of the existing links between the real sector and the monetary sector, an issue on which very little is known with certainty. Unfortunately, the lack of adequate and reliable data and the need not to make our model unduly large, forced us to specify only three simple functions for this sector, namely, an aggregate function for the private consumption expenditure, a function for the private investment expenditure and an import function of goods and services.

In the next section additional functions for the Government sector are specified, which will enable us to examine a monetary-fiscal policy mix.

A further note: As the literature on the specification of these functions is quite vast, no comments are made on their theoretical specification. All functions are specified in nominal terms. However, most of the literature argues in favour of specifying them in real terms. Such a procedure would involve us in great difficulties because of the lack of appropriate price deflators. Tests using our GNP implicit price deflator gave very similar results to that reported in nominal terms. Besides, since our model is essentially a demand determined one (equation I5) use of nominal values is justified.

7.4.I. The Consumption Function

For the specification of the consumption function the standard arguments are used, that is:

(i) A wealth variable, represented in our case by the disposable income. In line with our earlier notions of the dual character of the economy, a disaggregation of total income is made, into non-agricultural income and agricultural income. The agricultural income is subject to relatively wide variability because of the high dependence on exports. Therefore, we should expect our consumption data to be less associated with agricultural income than agricultural income.

(ii) Liquid assets are approximated by the sum of currency, demand deposits and time deposits.

(iii) A lagged dependent variable.

(iv) Interest rates. Higher interest rates may induce higher saving reducing therefore consumption expenditure and/or signifying more strict credit conditions in financing consumption expenditures and in this way tending to reduce consumption. On the whole, the empirical evidence has not found any significant contribution of the interest rate variable. Our fitted equations are:

I. $C = 534.639 + 0.7208(GNP_{nf})_d + 0.5368GNP_f - 63.3994r_b + 0.1730C_{-1}$
(2.348) (7.207) (4.005) (1.069) (0.719)

$\bar{R}^2 = 0.9921$ D.W. = 1.295

2. $C = 485.562 + 0.5179(GNP_{nf})_d + 0.6696GNP_f + 0.7225LA_{-1} - 0.0114C_{-1}$
(2.477) (4.688) (5.255) (2.708) (0.108)

$\bar{R}^2 = 0.9942$ D.W. = 1.431

3. $C = 536.021 + 0.7084(GNP_{nf})_d + 0.4951GNP_f + 0.1546C_{-1}$
(2.345) (7.101) (3.845) (1.552)

$\bar{R}^2 = 0.9920$ D.W. = 1.366

(t values in parentheses)

The variables have the correct sign. The interest rate variable is non-significant (equ. I). The liquid assets variable is found significant (equ. 2) but renders the lagged value of consumption of negative

sign, and reduces the significance of the GNP variable, because of the existence of high multicollinearity (r= 0.98).
So, the liquid assets variable was excluded from our specification. The lagged value shows a rather quick adjustment.

Equation 3 is selected as our OLS estimate, defining consumption expenditure in terms of disposable non-agricultural income, agricultural income and lagged one period value.
The $\bar{R}^2$ is very high although D.W. statistic shows the existence of autocorrelation.

7.4.2. The Investment Function.

The specification of the investment function, representing Gross fixed investment expenditure, used similar arguments to the specification of the consumption function viz:
GNP variable, interest rate a capital stock variable, defined as $\sum_{t=1}^{1-t} I_t$ 1= 1949, and lagged-one-period value of investment.
The bond rate is used as the interest rate. The fitted equation is:

I. $I = -640.285+0.2219GNP-66.7023r_b-0.0512K_{-1}+0.6567I_{-1}$
(3.109) (3.932) (1.361) (2.036) (3.607)

$\bar{R}^2$= 0.9302 D.W. 2.688

All variables appear with their correct sign and are significant, except the interest rate variable though its estimated coefficient is greater than its standard error. This variable is the only one which establiches the link between the financial sector and the real sector. Attempts to find additional links through the commercial loans variable or changes of these loans were unsuccesful as the following equations show:

2. $I = 165.922-0.0576GNP+1.4572CL^s-0.0518K_{-1}+0.5146I_{-1}$
(4.338) (0.523) (2.546) (2.708) (3.164)

$\bar{R}^2$= 0.9445 D.W. = 2.402

3. $I = -634.412+0.1788GNP+0.2161\Delta CL^s-0.0478K_{-1}+0.6379I_{-1}$
(2.200) (2.256) (0.301) (1.670) (2.945)

$\bar{R}^2$= 0.9225 D.W. = 2.596

In equation (2) GNP appears with a negative sign, because of the multicollinearity problem (r=0.99) while in equation (3) the considered changes in loans variable is insignificant.

7.4.3. The Imports Function.

The function for imports of goods and services is specified in terms of the GNP variable, the foreign reserves at the Central Bank, lagged one period and the lagged dependent variable.
We should note that the foreign reserves at the Central Bank, reflect the balance of payments conditions of the movements of exports and imports of goods and services and also, net capital flows.

The estimated equation is:

	$\bar{R}^2$	D.W.
$Im = 318.909+0.1449GNP+0.5673FR_{-1}+0.2722Im_{-1}$	0.8350	1.768
(1.351) (4.111) (2.427) (1.699)		

GNP, FR_{-1} variables are significant and the statistical performance of the function is quite satisfactory.

Calculation of the income elasticity at the means gives a value of 0.478 which is rather high. In this respect, as we have already pointed out,[26] this may have implications for the effectiveness of the Keynesian theory of fiscal policy, since any attempts to mobilize domestic resources by Government expenditures, can be frustrated because of the large leakage of imports out of the income stream.

7.5. The Government Sector.

Two simple functions for taxes are specified:

a) One for taxes out of income, as a function of the disposable non-farm income, and

b) Another function of taxes on expenditure as a function of GNP. The obtained equations are:

		$\bar{R}^2$	D.W.
a)	$T_y = 105.864 + 0.0384GNP_{nf}$ (4.331) (6.753)	0.6749	1.147
b)	$T_E = -409.510 + 0.2148GNP$ (9.999) (36.323)	0.9843	1.867

Despite the simplicity of the forms, they perform quite satisfactory, especially the taxes on expenditure function.

Through these functions, we will be able at a later stage, to examine the effects on the other variables because of a change in the autonomous element of these two kinds of taxes.

Finally, a function explaining the determination of the bond rate is attempted. The used explanatory variables are:

(i) The Bank rate. Changes in this rate induced changes in the whole spectrum of interest rates in the same direction.

(ii) The amount of Government bonds purchased by the non-bank public, for the financing of the Government deficit. Ceteris paribus, the larger is the amount of bonds that the non-bank public is willing to hold, the smaller will be the depressing effect on the bond rate.

(iii) Net purchases of Government bonds undertaken by the monetary authorities- Open market operations.

The larger these purchases are, the greater will be the downward effect on the bond rate.

(iv) A lagged one period dependent variable is used to represent the influence of past rates in formulating the present policy, or in other words, the existence of achieving a desired level of interest rates. The fitted equation is:

	$\bar{R}^2$	D.W.
$r_b = -0.5071 + 0.5702r_d - 0.00358Psec - 0.0014\Delta 0 + 0.6925(r_b)_{-1}$ (1.296) (3.699) (2.910) (2.710) (4.084)	0.9115	1.608

All variables have the correct sign and they are highly significant.

7.6. Concluding Comments

Judging, overall, the performance of the various fitted equations - using OLS estimates- is quite satisfactory, despite the relatively simple forms adopted. They appear to provide good statistical estimates - relatively high $\bar{R}^2$'s, the problem of autocorrelation is absent from almost all of our functions. The conclusions are in line with arguments advanced in earlier parts of this work.

The next stage is to permit the interaction of the various variables in the form of a simultaneous equations system, so that the simultaneous bias existing in OLS estimates can be eliminated. Although comprehensive techniques of estimation have been developed in this direction, we apply the Two Stage Least Squares (TSLS) method, which is the most commonly used because of the availability of computational facilities.

7.7. TSLS Estimates.

The basic reason for the need to use TSLS estimation method, is, very briefly, this: Since an equation is a part of a simultaneous equations system, some of the explanatory variables in one equation appear as dependent variables elsewhere in the system, with the consequence that the stochastic term of an equation is not independent of the explanatory variables, which must be the case if we are to get unbiased and consistent estimates using OLS estimation techniques.

In order to "purge" the explanatory variables of the stochastic component associated with the disturbance term, we first regress all the endogenous variables in all the predetermined variables in the system, and then, replacing the endogenous variables in the original relations by the estimated values in terms of the predetermined variables and applying OLS in this reformulated relation.

However, since the number of predetermined variables exceeds the number of observations(26 predetermined variables, 22 observations) the above TSLS procedure cannot be applied directly. Instead, the Principal Components TSLS method is used.[27]

Eight principal components, which explained 98 % of the variance of the predetermined variables, were used to get the estimates for the first stage, which in turn were used to obtain the second stage. The results obtained with this principal components TSLS method, together with the selected OLS estimates are presented below:[28]

I. The Public's Demand for Currency

A) $C_p = -206.929+0.0706GNP+0.1496DD_p+0.5096T_m+135.5180d_I$
(2.790) (8.023) (0.927) (3.839) (4.044)

$\bar{R}^2 = 0.9799$ D.W = 1.569

B) $C_p = -231.142+0.0746GNP+0.1699DD_p+0.5458T_m+122.324d_I$
(2.630) (6.761) (0.774) (4.053) (5.604)

$\bar{R}^2 = 0.9802$ D.W = 1.745

2. The Public's Demand for Demand Deposits

A) $DD_p = 246.284-73.4523r_{tb}+0.0800GNP_{nf}+60.4671d_I+0.3646(DD_p)_{-1}$
(4.757)(4.303) (5.346) (2.240) (3.087)

$\bar{R}^2 = 0.9069$ D.W = 2.680

B) $DD_p = 244.248-75.0572r_{tb}+0.0815GNP_{nf}+59.4002d_I+0.3645(DD_p)_{-1}$

$\bar{R}^2 = 0.9028$ D.W = 2.636

3. The Public's Demand for Time Deposits

A) $T_p = -497.402+15.1681r_t+0.1082GNP+0.1378DD_p+62.9414d_I$
(9.552) (1.363) (12.896) (1.124) (3.112)

$\bar{R}^2 = 0.9890$ D.W = 2.377

B) $T_p = -517.847+14.2502r_t+0.1068GNP+0.1902DD_p+56.9327d_I$
(5.727) (0.928) (8.244) (0.848) (1.956)

$\bar{R}^2 = 0.9792$ D.W = 2.458

4. Supply of Loans

A) $CL^s = -436.776 - 1.2660R^u + 0.6283TD + 44.9316r_{cl} - 20.0092r_b + 0.3370CL^s_{-1}$
(2.501)(2.211) (3.235) (1.924) (0.958) (1.346)

$\bar{R}^2 = 0.9984$ D.W = 1.950

B) $CL^s = -346.121 - 0.9516R^u + 0.5132TD + 32.4979r_{cl} - 15.0451r_b + 0.5005CL^s_{-1}$
(1.910)(1.499) (2.629) (1.255) (0.575) (2.073)

$\bar{R}^2 = 0.9868$ D.W = 1.994

5. Excess Reserves

A) $RE = 3.4311 + 5.5996r_d + 0.5017FB - 0.0558\Delta B - 0.0323TD$
(0.349)(1.218) (7.643) (1.250) (2.235)

$\bar{R}^2 = 0.8490$ D.W = 1.680

B) $RE = 0.2251 + 4.8157r_d + 0.5277FB - 0.1186\Delta B - 0.0262TD$
(0.025)(1.171) (8.850) (2.575) (1.998)

$\bar{R}^2 = 0.8770$ D.W = 1.903

6. Discount Borrowings

A) $DB = -106.022 + 16.5696(r_{cl} - r_d) + 0.1159CL^S - 0.1704R^u$
(2.572)(2.843) (10.262) (1.290)

$\bar{R}^2 = 0.8837$ D.W = 1.444

B) $DB = -101.358 + 16.2123(r_{cl} - r_d) + 0.1154CL^s - 0.1929R^u$
(2.356) (2.707) (9.876) (1.350)

$\bar{R}^2 = 0.8774$ D.W = 1.768

7. Holdings of Treasury Bills

A) $TB = -57.8105 + 26.3107r_{tb} - 0.3024CL^s + 0.2850TD - 0.2665GS$
(1.636) (2.859) (4.388) (4.489) (1.624)

$\bar{R}^2 = 0.5226$ D.W = 1.698

B) $TB = -41.993 + 27.2207r_{tb} - 0.2964CL^s + 0.2774TD - 0.3129GS$
(0.876) (2.341) (3.431) (3.511) (1.416)

$\bar{R}^2 = 0.4369$ D.W = 1.890

8. Holdings of Government Securities

A) $GS = 465.297 - 42.0424 r_{cl} + 0.1821 (DD_p)_{-1} + 0.1457 T_p$
(5.378) (4.316) (2.256) (2.810)

$\bar{R}^2 = 0.6433$ D.W = 0.938

B) $GS = 483.113 - 43.8171 r_{cl} + 0.1711 (DD_p)_{-1} + 0.1574 T_p$
(5.473) (4.445) (2.118) (2.953)

$\bar{R}^2 = 0.6548$ D.W = 0.870

9. Private Consumption Expenditure

A) $C = 536.021 + 0.7084 (GNP_{nf})_d + 0.4951 GNP_f + 0.1546 C_{-1}$
(2.345) (7.101) (3.845) (1.552)

$\bar{R}^2 = 0.9220$ D.W = 1.366

B) $C = 449.133 + 0.6761 (GNP_{nf})_d + 0.5421 GNP_f + 0.1718 C_{-1}$
(1.589) (5.280) (3.462) (1.337)

$\bar{R}^2 = 0.9880$ D.W = 1.929

10. Private Fixed Investment Expenditure

A) $I = -640.285 + 0.2219 GNP - 66.7023 r_b - 0.0512 K_{-1} + 0.6567 I_{-1}$
(3.109) (3.932) (1.361) (2.036) (3.607)

$\bar{R}^2 = 0.9302$ D.W = 2.688

B) $I = -600.713 + 0.2198 GNP - 78.8937 r_b - 0.0457 K_{-1} + 0.6455 I_{-1}$
(2.950) (3.705) (1.422) (1.822) (3.528)

$\bar{R}^2 = 0.9263$ D.W = 2.661

11. Expenditure on Imports

A) $Im = 318.909 + 0.1449 GNP + 0.5673 FR_{-1} + 0.2722 Im_{-1}$
(1.351) (4.111) (2.427) (1.699)

$\bar{R}^2 = 0.8350$ D.W = 1.768

B) $Im = 311.929 + 0.1554 GNP + 0.6129 FR_{-1} + 0.2316 Im_{-1}$
(1.356) (4.328) (2.643) (1.438)

$\bar{R}^2 = 0.8435$ D.W = 1.577

		$\bar{R}^2$	D.W.
I2.	Taxes on Income		
A)	T_y = I05.864+0.0384GNP_{nf} (4.33I) (6.753)	0.6749	I.I47
B)	T_y = I06.092+0.0384GNP_{nf} (4.29I) (6.664)	0.6688	I.I75
I3.	Taxes on Expenditure		
A)	T_E = -409.5I0+0.2I48GNP (9.999) (36.323)	0.9843	I.867
B)	T_E = -4I4.400+0.2I55GNP (I0.277) (37.0I0)	0.9849	I.828

I4. Long-term Interest Rate (Bond Rate)

A) r_b = -0.507I+0.5702r_d-0.00358Psec-0.00I4Δ0+0.6925$(r_b)_{-I}$
(I.296) (3.699) (2.9I0) (2.7I0) (4.084)

$\bar{R}^2$= 0.9I75 D.W = I.608

B) r_b = -0.507I+0.5702r_d-0.00358Psec-0.00I4Δ0+0.6925$(r_b)_{-I}$
(I.296) (3.699) (2.9I0) (2.7I0) (4.084)

$\bar{R}^2$= 0.9I75 D.W = I.608

Comparing OLS and TSLS estimates, we see that in all formulations the TSLS method has not brought any change in the signs of the estimated coefficients. Also the size of the coefficients has not changed considerably, together with the $\bar{R}^2$. The D.W statistic shows considerable improvement in some of the specifications such as in excess reserves, discount borrowing and consumption functions.

Since the TSLS method is more theoretically correct than the OLS method, in our subsequent analysis we consider the TSLS estimates. We first calculate the impact multipliers of the model and then we proceed to test the predictability of the model in an ex-post sense.

7.8. Impact Multipliers[29]

From our system of equations, the impact multipliers can be calculated, which can give us an idea of the effect of any predetermined variable on the whole set of the endogenous variables.

Formally, our system can be written in the form:

$$Ay_t = Bx_t \qquad (I)$$ where:

A = Matrix of coefficients of endogenous variables

y = Vector of endogenous variables

B = Matrix of coefficients of predetermined variables

x = Vector of predetermined variables

Equation (I) can be solved in terms of the predetermined variables only, i.e., to get the reduced form of the model. viz:

$$y_t = A^{-I}Bx_t \qquad (2)$$

The calculation of the impact multipliers involves the calculation of the matrix $(A^{-I}B)$.

The complete matrix was computed[30] but for purposes of illustration only the impact multipliers of some policy variables are reported in TABLE 7.8. The policy variables considered are: The Bank rate (r_d), reserves required against demand and time deposits (RR), Government expenditures (GE), autonomous taxes out of income (t_y), and autonomous taxes on expenditure (t_E).

Let us consider first the impact multipliers of the Bank rate. They are negative except for excess reserves, treasury bills, bond rate, borrowings from the Central Bank, unborrowed reserves and changes in the base, results which are in line with the specifications of the various functions as far as commercial banks' assets are concerned. The positive effect on borrowings from the Central Bank in order to finance the Government deficit is because of the depressing effect of an increase in the Bank rate on the other ways of financing the deficit, such as taxes.

Notice should be given to the fact that the multipliers are quite high both for the financial variables and the real variables. So, for example, a I per cent increase in the Bank rate causes around Rs 90 m. decrease in GNP; this in terms of I970 figures means a decrease of approximately 0.8 per cent. Also, the effect on loans supplied by commercial banks to the private sector would decrease

by Rs 48.7 m. which means a 3 per cent decrease in terms of 1970 figures. The multiplier effect on investment can be translated as a 3.5. per cent reduction. Although no explicit money supply function is present in our model, we can calculate the effect of the Bank rate, taking into consideration that the money supply can be defined as the sum of currency and demand deposits. The multiplier effect can then be calculated by combining the corresponding multipliers viz:

$$\frac{\partial DD_p}{\partial r_d} + \frac{\partial C_p}{\partial r_d} = -15.251$$

This in terms of 1970 figures is around a 0.9 per cent decrease. To conclude, the significant role of the Bank rate both in the financial and real sector has been established. This conclusion has implications for the policy of the Central Bank in terms of its ability to affect the money supply and economic activity.

In contrast to the Bank rate, the required reserves variable appears to have a small effect on banks' financial assets.(31) e.g., the multiplier with respect to the loans provided is -1.439. An increase in the Bank rate of 1 per cent brought about a decrease on loans Rs 48.7 m. as stated above, while to bring about the same effect with an increase in reserves required a 14 per cent increase is required, in terms of 1970 figures.

The rest of the policy variables work in the anticipated way, such as a higher effect of Government expenditures on real variables than on financial variables. So for example, the multiplier with respect to GNP is approximately 2, with respect to consumption is 1.3 and 0.44 with respect to investment.

The pattern is the same for the autonomous taxes, with the multipliers of the expenditure taxes on each variable being greater than the multipliers of the income taxes except on T_y and T_E. The multiplier of Government expenditure with respect to a deficit financing is 0.493 which is rather high.

We should emphasize here, that the link between the real and financial sectors via the bond rate is rather a weak one, since the coefficient of the bond rate variable in the investment function is not significant at the five per cent level. The above conclusions, therefore, must be treated with great caution.

TABLE 7.8

Impact Multipliers

Endog. variables \ Policy instrum.	r_d	RR	GE	t_y	t_E
C_p	- 7.942	...	0.177	-0.119	-0.177
DD_p	- 7.319	...	0.163	-0.110	-0.163
T_p	-10.982	...	0.244	-0.165	-0.244
CL^s	-48.748	-1.439	0.294	-0.254	-0.294
RE	4.266	0.054	-0.038	0.066	0.038
DB	-28.077	-0.458	0.051	-0.052	-0.051
TB	9.913	0.426	0.014	0.007	-0.014
GS	- 1.729	...	0.038	-0.026	-0.038
C	-58.381	...	1.298	-1.554	-1.298
I	-64.723	...	0.439	-0.297	-0.439
Im	-13.955	...	0.310	-0.210	-0.310
T_y	- 3.448	...	0.077	0.948	-0.077
T_E	-19.351	...	0.430	-0.291	0.570
r_b	0.570	...	0.000	0.000	0.000
GNP	-89.798	...	1.996	-1.350	-1.996
GNP_{nf}	-89.798	...	1.996	-1.350	-1.996
$(GNP_{nf})_d$	-86.349	...	1.920	-2.298	-1.920
EIG	22.800	...	0.493	-0.657	-0.493
R^u	32.343	1.512	-0.090	0.119	0.090
TD	-18.301	...	0.407	-0.275	-0.407
ΔB	8.677	-0.458	0.234	-0.500	-0.234

... value near zero

7.9. Forecasting performance of the model.

In this section an attempt is made to test the forecasting ability of the model in an ex-post sense, that is, given the actual values of the predetermined variables to estimate the forecasted values of the endogenous variables. Three approaches are considered:

(i) Forecasts from the structural equations;

(ii) Forecasts from the reduced form of the model; and

(iii) Forecasts from the reduced form in a dynamic sense.

The first method consists in getting values for each endogenous variable by giving values to the explanatory variables (endogenous and predetermined) in the TSLS estimates.

In the second method, values are given to the predetermined variables (exogenous and lagged dependent variables) to obtain forecasted values of the endogenous variables from the reduced form equation. Formally, our system is:

$$Ay_t = Bx_t + Cy_{t-I} \qquad (I) \quad \text{or}$$

$$y_t = A^{-I}Bx_t + A^{-I}Cy_{t-I} \qquad (2) \quad \text{reduced form.}$$

Values are given both for the x_t vector and the y_{t-I} vector.

In the third method, values are given only to the exogenous variables (x_t) and observations for the first period of the lagged dependent variables (y_{t-I}) and then equation (2) is applied iteratively to obtain the subsequent values of the dependent variables.

The three approaches are compared by using two indices:

a) Mean bias defined as $\frac{1}{n}\sum(F-A)$, which gives an idea to what extent the forecasted values are underpredicted or overpredicted (F= forecasted values, A= actual values); and

b) Mean error defined as $\frac{1}{n}\sum|F-A|$ which gives the variance of the forecasts. The smaller this difference is the better our forecasts are.

One should expect the forecasts to be better with the structural equations than with the reduced forms and to perform least well with the dynamic approach since the information given in the first case is greater than in the second approach and least in the third approach. TABLE 7.9 reports our results.

TABLE 7.9

Tests on Forecasts

Endog. variab.	Structural forms		Reduced forms		Dynamic forms	
	mean bias	mean error	mean bias	mean error	mean bias	mean error
C_p	-0.0048	27.6238	-0.438I	30.6762	-	-
DD_p	0.0095	26.5905	-0.2333	33.6524	-20.8I90	57.4I9
T_p	0.0048	28.I095	-0.36I9	43.2667	-	-
CL^s	-0.0095	3I.97I4	I2.I6I9	60.8000	-45.038I	I46.000
RE	-0.007I	4.9500	-9.2767	I8.59I0	-	-
DB	0.0095	II.9905	4.0095	23.8667	-	-
TB	-0.0048	I6.28I0	-3.6952	I8.8667	-	-
GS	-0.0048	I6.86I9	-0.0333	I6.9667	-	-
C	...	I29.2286	-I.4000	253.638I	-I30.I429	387.98I
I	-0.0090	80.5762	-I.II90	II6.938I	-I08.2I9I	255.8I0
Im	0.0048	98.0333	-0.I57I	9I.0905	-36.8095	I06.i52
T_y	0.0048	30.7I90	0.I286	3I.4048	-	-
T_E	0.0048	4I.8429	-0.5476	68.3286	-	-
r_b	...	0.2295	0.0I05	0.2333	0.0629	0.2686
GNP	-	-	-I.8429	274.2524	-	-
GNP_{nf}	-	-	-I.8333	274.2523	-	-
$(GNP_{nf})_d$	-	-	-I.938I	259.68I0	-	-
EIG	-	-	-80.6667	I24.3809	-	-
R^u	-	-	-I3.2857	39.I525	-	-
TD	-	-	-0.5857	66.538I	-	-
ΔB	-	-	78.I048	I54.0000	-	-

... value near zero

As can be seen, the forecasts from the structural equations are better than the forecasts from the reduced forms. In the first case, the mean bias is nearly zero, that is, the predicted values follow the movements of the actual values. The mean error is quite small for almost all of the equations. Even in the consumption function, with the highest mean error value, the error represents I.5 per cent in I970 figures.

A better illustration is provided by the graphs of predicted against actual values, from the structural equations, which are presented in the Appendix IV.

7.I0 Conclusions

The main conclusions of this chapter can be summarized as follows:

Interest rate considerations are not significant in determining the holding of currency and time deposits, while the significance of the treasury bill rate in holding demand deposits is, probably, due to the fact that these deposits are mainly kept by the non-agricultural-advanced sector of the economy.

Import duties are significant in decisions concerning the holding of currency.

There is a relationship of complementarity between currency, demand deposits and time deposits, in the non-bank public's portfolios.

Strong structural shifts occurred in the public's functions during our period.

In the banking system, interest rate considerations are significant in the borrowings from the Central Bank and in holding treasury bills and Government securities, while they are not significant in holding excess reserves and in providing loans to the private sector.

Lagged values for the specified assets of the banks were found to be non-significant. This suggests that the stock adjustment model is not an appropriate one with annual data.

No structural shifts are present in the banks' functions.

The bond rate is the only variable which establishes the link between the real sector and the financial sector together

with the actions of the Government. Attempts to find additional links through commercial loans variable or liquid assets variable were unsuccessful, mainly due to multicollinearity problems.

Comparisons between OLS estimates and the Principal Components TSLS estimates generally did not produce significantly different estimates.

Computation of the impact multipliers of the model, for the initial period, gave a significant effect for the Bank rate changes both on real and financial variables, while the reserve requirements instrument is found to have a small impact. The fiscal policy variables such as Government expenditures, autonomous income taxes and autonomous expenditure taxes gave expected results, that is, stronger effect on real variables than on financial variables; and taxes on expenditure were found to have, generally, a stronger impact than the taxes out of income. The multipliers computed, however, should be treated with caution, since the coefficient of the bond rate variable which provides the link between the real and financial sectors is not significant at the five per cent level.

Finally, tests on the forecasting performance of the model, in an ex-post sense, using the structural relationships and the reduced forms, produced relatively better results using the structural equations than the reduced forms.

NOTES TO CHAPTER 7

(I) Sources and data used are presented in Appendix V.

(2) DE LEEUW (50).

(3) GOLDFELD (82).

(4) NORTON (I45).

(5) An exception are two articles by CHRIST (35), (36).

(6) Appendix II illustrates some of the results obtained.

(7) Chapter 6 section 6.3.I.a p. I56f.

(8) t values in parentheses.

(9) Experiments with other interest rates gave similar results.

(I0) CAGAN (24).

(II) A similar result was found for U.S. Our variable constructed for the expected rate of price changes was found non-significant and with a varying sign.

(I2) LIU (I29).

(I3) This equation gave non-significant coefficients for the other variables as well. In the comments that follow, this equation is not taken into consideration.

(I4) See chapter 3 section 3.2.3 p. 42.

(I5) Tests with the GNP variable gave a bit worse fit.

(I6) GOLDFELD (82) p. 8I. Also note the existence of economies to scale.

(I7) One might argue that a similar effect could be expected for time deposits since both demand and time deposits are mainly kept by the non-agricultural sector of the economy because the per capita incomes in the agricultural sector are relatively low. The above argument is partly true but, on the other hand, even within the non-agricultural sector, the structure of ownership between demand and time deposits may be different. Figures available for I970, shown below, justify the above contention.

Ownership	Demand Dep. (% total DD)	Time Dep. (% total TD)
Financial Institutions	5.7	24.0
Plantations	5.8	7.5
Trading	I8.8	I6.8
Manufacturing	I0.0	7.4
Non-Business Institutions	6.I	9.6
Other Business	I0.9	9.0
Local Authorities	I.7	2.2.
Individuals	4I.0	23.5

Of the total amount of Savings Deposits- which are included in our Time Deposits variable- 92.6% are kept by individuals. Annual Report (26) I97I, p. 95.

(I8) Experiments with the treasury bill rate variable gave a positive sign and non-significant contribution.

(I9) Chapter 4 section 4.4, p. 77.

(20) One could think of a case where the treasury bill rate variable could come with a positive sign. Suppose that the banks want to build up their excess reserves, so by selling treasury bills bring their prices down therefore the treasury bill rate goes up together with an increase in their excess reserves. This argument is all right provided the banks have a dominant role in determining the treasury bill rate, while in our case, as it was pointed out earlier, the bill rate is heavily determined by the Central Bank as the bulk of the transactions take place between the Central Bank and the Treasury.

(2I) MEIGS (I32).

(22) POLAKOFF and SILBER (I53).

(23) Use of demand deposits variable gave similar results; significance of this variable and higher estimated coefficient.

(24) The validity of this was checked by using the holdings of treasury bills variable in the function for holdings of Government securities. It had a negative sign and was non-significant.

(25) Other variables such as total Government securities outstanding were excluded from our specification because of the high correlation with the other explanatory variables, e.g., between T_p and total Government securities, r=0.994.

(26) Chapter 4 section 4.I.I, p. 6I.

(27) KLOCK and MENNES (I24). I am indebted to Professor Klock, for comments on our results during his visit to the University of Kent.

(28) A): OLS Estimates.
B): TSLS Estimates. t values in parentheses.

(29) The theoretical background on these sections is based on: GOLDBERGER (8I).

(30) See Appendix III.

(3I) A similar conclusion is supported by KARUNATILAKE (II8).

CHAPTER 8

CONCLUSIONS AND SUGGESTIONS

8.I. Conclusions. The main conclusions of this work, though mentioned in each chapter, may be summarized very briefly:

Chapter 2 pointed out the vast number of issues outstanding in the area and the fact that the answers to most of these issues are not clear-cut. Therefore, the necessity to restrict ourselves to a very limited number of these issues and the need for more research. In addition, this chapter pointed out, how our study is relevant to some of these issues.

Chapter 3 examined the main characteristics of our economy, during the examined period I950-70, as a necessary first step to evaluate the economic policies followed by the monetary authorities and to facilitate the interpretation of the empirical investigation. The economy is a typical example of a less developed export economy of a few primary products together with a high proportion of imports in the total GNP. This basic characteristic has its effects, either directly or indirectly, throughout the economy, namely, fluctuations in income and other main aggregates such as consumption, investment, Government revenues etc. The situation in the balance of payments was largely determined by the situation in the trade balance, which in turn affected the external assets and the money supply.
The price level was strongly affected by factors outside the country in the sense that the country could not essentially affect either the price of exports or the price of imports. By this statement, we do not mean that the price level determination was completely outside the control of the authorities or that there was not any relationship with the money supply changes, but rather that the effect on prices worked through changes in external assets. As long as the terms of trade were favorable and imports were free of any restrictions, there was not a close relationship between money supply changes and changes in the price level. When, however, the terms of trade deteriorated, the use of external assets for imports could not go indefininitely. By I960, some sort of control and restriction on imports had to be imposed, and this put some pressures on the domestic

price level. In addition other factors contributed as well. Government revenues were largely dependent on the trade sector. Hence, a deterioration in the terms of trade plus the desire to promote economic development together with efforts to substitute imports for domestic production resulted in increasing budget deficits, financed by the Central Bank. So, during the second decade domestic factors played an increasingly important role in the changes of money supply and in changes in the price level.

The above described situation, in turn, created problems for the implementation of the various economic objectives, such as price stability, balance of payments equilibrium, economic development etc., the potential degree of conflict among them and the weaknesses of fiscal-monetary policies in LDCs, were brought out too.

The banks' activities were mainly concentrated on serving the trade sector- though after 1960, some expansion for other purposes took place because of efforts made by the State to make banking facilities more widespread. During the 1950-60 period, the liquidity position of the banks followed conditions in the trade sector, while during the second decade, the liquidity position of commercial banks reflected the measures taken by the monetary authorities to restrain bank credit and conserve as far as possible for essential purposes the foreign exchange reserves available to the country.

Currency constitutes a large proportion of the total money supply. The organized money and capital markets are weak and the links with the unorganized sector are unclear. The above has implications both for the kind and the effectiveness of the various policy measures. The structure of money and capital markets was examined together with some implications for the working of the monetary system.

Chapter 4, with the background and the issues raised in chapter 3, examined the economic stabilization policies followed by the monetary authorities. Thus the problems encountered by the Government and the effectiveness of the various tools were considered. The main problems were:

(i) To mitigate the effects of fluctuations in the export sector which permeated their effects throughout the economy, because of the high dependence on the trade sector.

(ii) To meet the consequences of the liquidity created because of the Government financing of its deficits through borrowings from the Central Bank.

(iii) The strong necessity for economic development.

The liquidity created by Government deficits put pressure on imports and therefore on the amount of foreign reserves of the country. Thus the dilemma over the long-run period was either restrictions on imports, which could put pressures on the price level, or the running down of foreign reserves, which cannot go indefinitely, particularly with adverse conditions in the terms of trade. So, in the long-run there is a relationship between changes in money supply and price level. The Government therefore was pushed in the direction of import restrictions together with, and most important, a surveillance of the scarce foreign reserves to ensure their efficient use, both by the private sector and the public sector. After 1960, restrictions and controls on imports had to be imposed which, however, created a new situation with important implications for: the kind of monetary measures taken by the monetary authorities in order to check liquidity; the relationship of changes in prices and changes in money supply; the public's portfolios to keep currency and demand deposits.

On the other hand, the weaknesses on the fiscal side became more clear as attempts to mobilize more domestic resources by Government expenditures were to a large extent frustrated due to the main characteristics of the economy such as high proportion of imports in the total GNP (so the leakage out of the income stream was high), high dependence of Government revenues on exports, low per capita incomes, inefficient administrative system, weak organized money and capital markets which imposed restrictions on the Government revenue side. Also political considerations created pressures for large amounts of current expenditure, such as subsidies, which did not permit any increase of the percentage of Government investment throughout the period. So, there is a strong connection between the balance of payments situation and fiscal actions and therefore a high interdependence of monetary and fiscal policies, which cannot as a result be examined separately.

Besides the measures to put control and restrictions on imports after 1960, the instruments of monetary policy were used to some extent but, the measures adopted during the 1950-60 period were in nature different from those of the 1961-70 period. During the 1950-60 period, the measures taken to check liquidity had a rather precautionary character in order to prevent expansion for non-essential and speculative purposes, while during the 1961-70 period vigorous action had to be taken to restrict bank credit and to affect banks' portfolios.

The Bank rate during the first period changed in order to mark changes in the market conditions of interest rates and not to affect the discounting of commercial banks. During the second decade, Bank rate was used to affect the discounting of commercial banks.

Open market operations were used to a limited extent with the objective of promoting the long-run development of the Government securities market and of influencing rates of interest, but were not generally used to affect the cash reserves of the banks.
In this context, efforts by the Central Bank to maintain considerable flexibility of interest rates in order to affect Government borrowing were frustrated because of the existence of a small market for Government securities and the insensitivity of Government expenditures to interest rate considerations.

The reserve requirements tool was used extensively, and after 1961 reserves required were as high as 50 per cent above certain ceilings. The reserve requirements tool was mainly used to influence the reserve position of the banks.

Other qualitative measures, such as recommendations, moral suasion, were used with considerable success throughout the period.

The next chapters of this work went on to a more quantitative investigation, starting with the examination of the demand function for money in chapter 5. This investigation, gave rather hazy conclusions to the basic issues such as the appropriate definition of money, the stability of the function, the variables entered and the magnitude of the various elasticities.

It seems that the price level variable contributes independently to the explanation of real balance holdings so the homogeneity assumption of nominal balances with respect to the price level is not established by our data.

The bond rate is found to be non-significant, while the treasury bill rate is found significant in formulations using the price level variable. The values of interest elasticities are very low.

The income elasticities are, generally, greater than unity and relatively greater with the M_2 definition of money balances.

Examining the partial adjustment-income expectations models, it seems, very tentatively, that there is a quick adjustment of actual balances towards the desired level, probably, because of the limited array of financial assets and the annual period used, while there is relatively slow adjustment towards the expected values of income and prices, because the fluctuations in these variables were quite large during our examined period. In addition, the inadequacy of the distributed lag formula in explaining the form of expectations in developed - LDCs is also suggested. In view of the uncertainty of the results obtained, together with the problem whether causation runs from money to income and/or vice versa, which cannot be answered adequately with the single equation models of the demand for money, the analysis directed attention to the need for greater disaggregation and for the study of the mechanism of supplying money.

So, the money supply investigation in chapter 6, based on the money supply-multiplier-base formula ($M^S=mB$), proceeded from simple expressions of the multiplier,such as those of Cagan and Friedman, to more elaborate ones, and considered the evolution and the variability of the multiplier and the various ratios, such as the currency ratio, the time deposit ratio and the reserves ratio.

In this context, the discussions of the "monetarist" view and the "new" view of the money supply mechanism entered, which proved to be relevant only when we specify whether the discussion is in terms of a short-run or a long-run period i.e., the "monetarist" view seems more valid in the long-run while the "new" view in the short-run.

In addition, specification of behaviour equations of the various ratios was undertaken with the object of deriving some elasticities from a money supply function. The low interest elasticities together with the relatively small value of the multiplier suggest that the monetary base is more important than the multiplier in defining changes in the money supply.

There is, of course, the question to what extent the monetary authorities can control the monetary base by taking offsetting actions to other changes, e.g., from the balance of payments situation. The answer to this question is largely dependent upon the success with which it can reconcile the conflict between the price stability and economic development goals together with the degree of co-operation of the Central Bank and the Government.

Furthermore, consideration of the monetary base should direct attention to the Government's role, which is predominant in LDCs, in particular to the way the Government finances its deficits since these constitute a major item in the changes of the base. Such an approach would also bring the issues of possible conflicts between the various objectives to a closer examination.

The formulation of a relatively simple model in chapter 7 gave more quantitative information on some main sectors of the economy, traced out possible links between the real sector with the other sectors and gave some insight into the effectiveness of some policy variables.

For the public non-banking sector, interest rate considerations are not significant in holding currency and time deposits, while the significance of the treasury bill rate in holding demand deposits is probably due to the fact that these deposits are mainly kept by the non-agricultural advanced sector of the economy.

There has been an increasing proportion of currency in the total money stock due to the monetization of the economy and the imposition of controls and restrictions on imports.

There is a complementarity relationship between currency demand deposits and time deposits in the public's portfolios.

The income elasticity of currency holdings is found larger than the income elasticity of demand deposits.

Strong structural shifts occur in the public's functions during our period.

In the banking sector, interest rate considerations are significant in determining borrowings from the Central Bank, and to a lesser degree the holdings of treasury bills and Government securities, while they are not significant in determining holdings of excess

reserves and the provision of loans to the private sector. The insensitivity of loans provided to interest rates is due to the fact that loan rates did not change very much over the period as other methods of control, such as rationing and imposed ceilings were under operation.

The sensitivity of discount borrowings to interest rates may be an important variable for affecting loans provided to the private sector. This result should not be confused with the usually alleged non-significant role of interest rates in LDCs. Such kinds of arguments are relevant for the public as borrowers but not for the banks as lenders. This has implications for the money supply process which becomes, at least partly, endogenous. This, however, does not exclude control of the money supply, since banks' behaviour is subject to behavioural relationships, so the authorities can predict the effect of their actions on banks' portfolios. As we have noted, borrowings from the Central Bank were of relatively small amount and besides, banks contribute a small proportion to the total finance of the economy, that's why we gave above, priority to a careful consideration of the monetary base and to the role of the Government.

Lagged values for the specified assets of the banks were found to be non-significant. This suggests that the stock adjustment model is not an appropriate one; in other words, banks do not have a long-term desired holding of these assets but they are indifferent, at least within a wide range, to the composition of these assets. They are influenced by external conditions such as the policies followed by the monetary authorities to regulate economic activity.

No structural shifts were present in the banks' functions specified.

The link between the real sector and the financial variables is only through the bond rate. Attempts to find other links through commercial loans or liquid assets were unsuccessful, mainly due to multicollinearity problems. The bond rate is endogenous in the system so, a link is provided between the authorities' actions and the other sectors of the economy.

Computation of the impact multipliers of the model for the initial period showed that Bank rate changes had a significant effect

both on real and financial variables, while the reserve requirements instrument was found to have only a small impact. The fiscal policy variables, such as Government expenditures, autonomous income taxes and autonomous expenditure taxes, gave the expected results; that is, stronger effects on real variables than on financial variables and taxes on expenditure having generally a stronger impact than taxes on income.

We should point out, however, that the link between the real and financial sectors via the bond rate is rather a weak one, since the coefficient of the bond rate variable in the investment function is not significant. The values of the various multipliers, therefore, must be treated with great caution.

Comparison between OLS estimates and the Principal Components TSLS estimates, generally, did not produce significantly different estimates.

Finally the forecasting tests in an ex-post sense, using structural relationships, the reduced form and the reduced form in a dynamic approach, gave better forecasts with the structural equations than with the reduced forms and performed least well with the dynamic approach since the information given in the first case is greater than in the second approach and least in the third approach.

8.2. Suggestions for further research

Besides the suggestions and the limitations that were already pointed out in the particular chapters of this work, some more general points could be made here.

(i) The data used were annual. It could be argued that data for shorter periods, e.g., quarterly, may be more appropriate if we accept that monetary policy is more relevant for the short-run period. Also, with quarterly data dynamic formulations and the problem of lags could be examined more carefully. While there are quarterly or even monthly data for most of the variables in the financial sector, there are not quarterly data available for the variables in the real sector. Generation of the relevant series has not been pursued because of the limited time available and the difficulties, theoretical and practical, of adopting such procedures.

(ii) Expansion of the model in some directions could take place by considering more behavioural equations in the sectors examined such as:

a) For the private sector, relationships for holdings of other financial assets; though such holdings are not significant at present because of the weak money and capital markets, they may become significant as the economy develops.

b) Disaggregation of the banking system, in order to take into consideration any institutional differences in their behaviour, e.g., between Ceylonese banks and foreign banks, as in some aspects different regulations wer applied to these two groups of banks.

c) Consideration of other financial institutions which become more significant as the economy develops.

d) The real sector needs more disaggregation and more reliable data.

e) Extensions could also take place, by considering endogenous variables which in our system appear as exogenous, for example, the price level, loan rates of the banks, capital movements etc.

(iii) The role of the Government is an important one. So, its activities should receive further serious consideration, such as:

a) A disaggregation of the various kinds of Government expenditures, could take place, to see whether the corresponding income multipliers differ from each other.

b) The various policy variables were taken as exogenous. A more proper approach would be to consider the policy variables as endogenous, since the authorities respond to changes in other variables such as their policy objectives in determining their policies; in other words, we need to specify the "reaction functions" of the monetary authorities and to find the "trade-offs" between the policy objectives. So, any conflicts between the objectives, such as price stability and economic development, will become more apparent.

(iv) Consideration of the qualitative aspects of monetary policy together with the impact of the various policy variables over a period of subsequent years, i.e., calculation of the dynamic multipliers, in order to evaluate with more safety the impact of the various policy changes. In this context distabilizing effects and the lags problem will be better dealt with.

(v) Balance of payments policies have not received detailed consideration and the whole work was implicitly done in the context of fixed exchange rates which prevailed during our period. Modifications are needed when a flexible exchange rates system is applied.

(vi) Because of the importance of economic development in a less developed country, there is need for a more integrated theory of economic development and monetary theory and policy.

Such refinements remain for other studies. This study is at best a beginning, an indication of the direction in which future work can, as more data becomes available, be pursued.

APPENDIX I

a) Symbols used.

M_I = Narrow definition of money stock = $C_p + DD_p$

B = Monetary base = $C_p + R$

C_p = Currency held by the nonbank public[i]

DD_p = Demand deposits held by the nonbank public at commercial banks

T_p = Time and savings deposits held by the nonbank public at comm. banks

DD_G = Government demand deposits at commercial banks

RR = Reserves required against deposits subject to reserve requirements[ii]

R = Total reserves = RR + RE

RE = Excess reserves = R - RR

k = Currency ratio (C_p/DD_p)

t = Time deposit ratio (T_p/DD_p)

g = Government deposit ratio (DD_G/DD_p)

r^r = Required reserve ratio $(RR/(DD_p+T_p+DD_G))$

r^e = Excess reserve ratio $(RE/(DD_p+T_p+DD_G))$

b) Derivation of the multiplier

From the above definitions, we can define:

$$B = C_p + RR + RE \qquad (I)$$

and from the definitions of the ratios:

$$C_p = k(DD_p) \qquad (2)$$

$$T_p = t(DD_p) \qquad (3)$$

$$DD_G = g(DD_p) \qquad (4)$$

$$RR = r^r(DD_p+T_p+DD_G) \qquad (5)$$

$$RE = r^e(DD_p+T_p+DD_G) \qquad (6)$$

Substituting relationships (2) to (6) into (I) we have:

$$B = k(DD_p) + r^r(DD_p+T_p+DD_G) + r^e(DD_p+T_p+DD_G)$$

$$= k(DD_p) + (r^r+r^e)\left[DD_p + t(DD_p) + g(DD_p)\right]$$

$$= \left[k + (r^r + r^e)(I + t + g)\right] DD_p$$

therefore,

$$DD_p = \frac{B}{k+(r^r+r^e)(I+t+g)} \qquad \text{or,}$$

$$M_I = \frac{I+k}{k+(r^r+r^e)(I+t+g)} B \qquad \text{since } M_I = C_p+DD_p = (I+k)DD_p$$

(using equ. (2))

i.e.,

$$m = \frac{I+k}{k+(r^r+r^e)(I+t+g)}$$

c) Some derivatives.

$$\frac{\partial m}{\partial k} = \frac{(r^r+r^e)(I+t+g)-I}{\left[k+(r^r+r^e)(I+t+g)\right]^2} < 0 \qquad (r^r+r^e)(I+t+g) < I$$

$$\frac{\partial m}{\partial t} = \frac{-(r^r+r^e)(I+k)}{A} < 0 \qquad \text{putting } A = \left[k+(r^r+r^e)(I+t+g)\right]^2$$

$$\frac{\partial m}{\partial g} = \frac{-(r^r+r^e)(I+k)}{A} < 0$$

$$\frac{\partial m}{\partial r^r} = \frac{-(I+t+g)(I+k)}{A} < 0$$

$$\frac{\partial m}{\partial r^e} = \frac{-(I+t+g)(I+k)}{A} < 0$$

$$\frac{dm}{m} = \frac{(r^r+r^e)(I+t+g)-I}{m(A)^2} dk + \frac{-(r^r+r^e)(I+k)}{m(A)^2} dt + \frac{-(r^r+r^e)(I+k)}{m(A)^2} dg +$$

$$+ \frac{-(I+t+g)(I+k)}{m(A)^2} dr^r + \frac{-(I+t+g)(I+k)}{m(A)^2} dr^e$$

d) A money supply function

Writing our selected relationships in a general form we have:

$$k = a_I + a_2 r_t + a_3 GNP + a_4 T_m$$

$$r^e = b_I + b_2 r_{tb} + b_3 r_d$$

$$t = c_I + c_2 r_b + c_3 r_t + c_4 GNP$$

$$r^r = r^{DD} u + r^T (I-u) \quad , \quad u = \frac{I+g}{I+t+g}$$

Our money supply function is:

$$M_I = \frac{I+a_I+a_2 r_t+a_3 GNP+a_4 T_m}{(a_I+a_2 r_t+a_3 GNP+a_4 T_m) + (r^r+b_I+b_2 r_{tb}+b_3 r_d)(I+c_I+c_2 r_b+c_3 r_t+c_4 GNP+g)} B$$

For convenience, we replace:

$$I+a_I+a_2 r_t+a_3 GNP+a_4 T_m = A$$

$$r^r+b_I+b_2 r_{tb}+b_3 r_d = B'$$

$$I+c_I+c_2 r_b+c_3 r_t+c_4 GNP+g = C$$

$$\text{denominator} = D$$

e) Some elasticities

The elasticity of multiplier m with respect to an interest rate r is:

$$e(m, r) = \frac{m}{r} \frac{r}{m}$$ It can also be proved that:

$$e(m, r) = e(m,k)e(k,r) + e(m,r^e)e(r^e,r) + e(m,t)e(t,r)$$

$$e(m, r_{tb}) = \frac{-b_2 C}{D} r_{tb} \quad , \quad e(m, r_t) = \frac{a_2 D - a_2 + c_3 B' A}{(D)^2} \frac{r_t D}{A}$$

$$e(m, r_d) = \frac{-b_3 C}{D} r_d \quad , \quad e(m, r_b) = \frac{-c_2 B'}{D} r_b$$

$$e(m, r^{DD}) = \frac{-uC}{D} r^{DD} \quad , \quad e(m, g) = \frac{-B'}{D} g$$

APPENDIX II

Regressions of Government expenditure (GE) with respect to certain economic objectives, such as price level (P), foreign reserves at the Central Bank (FR), per capita GNP (GNP/N), rate of change in the GNP variable ($\dot{Y}$), produced the following results: (t values in parentheses).

		$\bar{R}^2$	D.W.
I.	$GE = \underset{(2.406)}{2637.71} + \underset{(12.022)}{11.1486}(GNP/N) - \underset{(5.092)}{7962.65}P$	0.9291	1.818
2.	$GE = \underset{(2.199)}{2570.79} + \underset{(7.812)}{10.9296}(GNP/N) - \underset{(3.962)}{7726.33}P - \underset{(0.214)}{0.08333}FR_{-1}$	0.9252	1.799
3.	$GE = \underset{(2.697)}{-4465.82} - \underset{(2.356)}{27.0897}\dot{Y} + \underset{(4.560)}{7214.06}P - \underset{(4.822)}{2.3851}FR_{-1}$	0.7411	1.106

The per capita GNP variable is significant and of a positive sign. This possibly reflects the desire of the authorities to raise incomes because of the less developed state of the economy.

The price level variable is significant too, but of a negative sign, which might suggest that an anti-cyclical behaviour of Government expenditures towards movements in the price level exists, which sounds reasonable provided the authorities were concerned with the price level objective.

The foreign reserves variable is non-significant and of negative sign. So, for example, when foreign reserves were increased less GE were taking place, to reduce pressures on the effective demand because of the improved conditions in the foreign trade. (The lagged value of foreign reserves is used as the current value gave a worse fit and proved to be more insignificant).

When the rate of change in GNP is used (equation 3), this variable is significant but comes with a negative sign suggesting an anti-cyclical behaviour of GE towards the rate of change in GNP. The price level variable comes now with a positive sign reflecting possibly the inflationary pressures resulting from the increases in Government expenditures. This result might also suggest the existence

of a conflict between the goals of price stability and economic growth. The foreign reserves variable is still of negative sign but significant. (Attempts to use lagged value of GE produced a high significance of this variable but rendered all the other variables very insignificant with changing signs of the coefficients, because of the multicollinearity problem).

On the other hand, regressions of the borrowing financing of the Government (EIG) with respect to the same objectives, gave very poor fits as the following equations illustrate.

		$\bar{R}^2$	D.W.
I.	$EIG = \underset{(0.556)}{399.637} + \underset{(1.299)}{0.3110} FR_{-1} + \underset{(2.017)}{1.7337}(GNP/N) - \underset{(1.247)}{1495.01} P$	0.1130	1.549
2.	$EIG = \underset{(0.894)}{-805.828} - \underset{(1.604)}{0.5026} FR - \underset{(1.642)}{0.7681}(GNP/N) + \underset{(0.945)}{1583.02} P$	0.1531	1.599
3.	$EIG = \underset{(0.853)}{-431.686} - \underset{(2.150)}{0.3208} FR - \underset{(0.786)}{289.718}\dot{Y} + \underset{(1.379)}{678.088} P$	0.1629	1.539

Notice that the use of the current or the lagged value of the foreign reserves variable (equations I-2) makes a considerable difference to our results (different signs and in the significance of the entered variables).
(Lagged values of EIG did not imporve the fit of the equations as the lagged value was very insignificant).

Furthermore, in our suggestions to consider the various policy variables as endogenous variables with respect to the policy objectives pursued by the authorities, some preliminary tests, using the Bank rate produced the following results.

		$\bar{R}^2$	D.W.
I.	$r_d = \underset{(2.179)}{4.9583} - \underset{(2.301)}{0.0017} FR_{-1} + \underset{(4.969)}{0.0135}(GNP/N) - \underset{(2.439)}{9.2582} P$	0.8899	1.907
2.	$r_d = \underset{(1.455)}{-3.6388} - \underset{(6.138)}{0.0046} FR_{-1} - \underset{(1.736)}{0.0301}\dot{Y} + \underset{(3.809)}{9.0984} P$	0.7706	1.572

3. r_d = -5.2663-0.0047FR-I.8384$\dot{Y}$+I0.6I69P 0.8726 I.53I
(2.969) (9.026) (I.422) (6.I57)

Although the above results are preliminary and we do not elaborate on this aspect, as more work is needed on the behaviour of the monetary authorities, it seems that they are subjected to behavioural relationships.

APPENDIX III

IMPACT MULTIPLIERS

Endog. Var.	r_{tb}	r_{cl}	r_d	r_t	Tm	d_1	Ex
Cp	-12·75	...	- 7·94	...	0·546	132·4	0·177
DDp	-75·06	...	- 7·32	...	0	59·4	0·163
Tp	-14·28	...	-10·98	14·25	0	68·2	0·244
CL^s	-57·73	64·62	-48·75	9·21	0	82·5	0·294
RE	3·42	- 3·58	4·27	-0·54	0	- 4·9	-0·038
DB	- 9·07	30·18	-28·08	1·45	0	13·0	0·051
TB	20·25	- 5·44	9·91	0·52	0	7·6	0·014
GS	- 2·25	-43·82	- 1·73	2·24	0	10·7	0·038
C	...	...	-58·38	...	0	...	1·298
I	...	...	-64·72	...	0	...	0·439
Im	...	...	-13·95	...	0	...	0·310
T_y	...	...	- 3·45	...	0	...	0·077
T_e	...	...	-19·35	...	0	...	0·430
r_b	0	0	0·57	0	0	0	0
GNP	...	...	-89·80	...	0	...	1·996
GNP_{nf}	...	...	-89·80	...	0	...	1·996
$(GNP_{nf})_d$	...	...	-86·35	...	0	...	1·920
EIG	...	...	22·80	...	0	...	-0·507
R^u	12.49	-33·76	32·34	-1·99	0	-17·8	-0·090
TD	-89·33	...	-18·30	14·25	0	127·6	0·407
ΔB	- 9·07	30·18	8·68	1·45	0	13·0	0·234

... value near zero

IMPACT MULTIPLIERS

Endog. Var.	GE	OE	RR	OR	BPsec	NCFL	ODEP
Cp	0·177	0·177	...	...	0·049	...	...
DDp	0·163	0·163	...	...	0·045	...	...
Tp	0·244	0·244	...	...	0·067	...	...
CL^s	0·294	0·123	-1·439	-0·171	0·097	0·171	0·646
RE	-0·038	0·087	0·054	0·125	0·023	-0·125	-0·038
DB	0·051	-0·003	-0·458	-0·054	0·008	0·054	0·102
TB	0·014	0·064	0·426	0·051	-0·001	-0·051	0·086
GS	0·038	0·038	...	...	0·011	...	...
C	1·298	1·298	...	...	0·358	...	...
I	0·439	0·439	...	...	0·397	...	...
Im	0·310	0·310	...	...	0·086	...	...
T_y	0·077	0·077	...	...	0·021	...	...
T_e	0·430	0·430	...	...	0·119	...	...
r_b	0	0	...	0	-0·004	0	0
GNP	1·996	1·996	...	...	0·551	...	...
GNP_{nf}	1·996	1·996	...	...	0·551	...	...
$(GNP_{nf})_d$	1·920	1·920	...	...	0·530	...	...
EIG	0·493	-0·507	...	-1.000	-1·140	...	...
R^u	-0·090	0·090	1·512	0·179	0·014	-0·179	-0·14
TD	0·407	0·407	...	...	0·112	...	1·00
ΔB	0·234	-0·820	-0·458	-1·054	-0·217	1·054	0·102

... value near zero

IMPACT MULTIPLIERS

Endog. Var.	C_{-1}	I_{-1}	Im_{-1}	r_{b-1}	DB_{-1}	t_y	t_e
Cp	0·030	0·114	-0·041	- 9·646	...	-0·119	-0·177
DDp	0·028	0·105	-0·038	- 8·888	...	-0·110	-0·163
Tp	0·042	0·158	-0·057	-13·338	...	-0·165	-0·244
CL^s	0·021	0·080	-0·068	-19·100	-0·171	-0·254	-0·294
RE	0·015	0·056	0·009	- 4·516	0·125	0·066	0·038
DB	-0·001	-0·002	-0·012	- 1·652	-0·054	-0·052	-0·051
TB	0·011	0·041	-0·003	0·152	0·051	0·007	-0·014
GS	0·007	0·025	-0·009	- 2·099	...	-0·026	-0·038
C	0·396	0·838	-0·301	-70·903	...	-1·554	-1·298
I	0·075	0·929	-0·102	-78·605	...	-0·297	-0·439
Im	0·053	0·200	0·160	-16·948	...	-0·210	-0·310
T_y	0·013	0·049	-0·018	- 4·188	...	0·948	-0·077
T_e	0·074	0·278	-0·100	-23·502	...	-0·291	0·570
r_b	0	0	0	0·693	0	0	0
GNP	0·343	1·289	-0·462	-109·060	...	-1·350	-1·996
GNP_{nf}	0·343	1·289	-0·462	-109·060	...	-1·350	-1·996
$(GNP_{nf})_d$	0·330	1·239	-0·445	-104·870	...	-2·298	-1·920
EIG	-0·087	-0·327	0·117	27·690	...	-0·657	-0·493
R^u	0·015	0·058	0·021	- 2·860	0·179	0·119	0·090
TD	0·070	0·263	-0·094	-22·230	...	-0·275	-0·407
ΔB	-0·141	-0·529	-0·054	42·990	-1·054	-0·500	-0·234

... value near zero

IMPACT MULTIPLIERS

Endog. Var.	ΔO	FB	GNP_f	FR_{-1}	K_{-1}	DDp_{-1}	CL_{-1}
Cp	0·020	...	-0·032	-0·110	-0·008	0·062	...
DDp	0·018	...	-0·099	-0·100	-0·007	0·365	...
Tp	0·027	...	-0·042	-0·150	-0·011	0·069	...
CL^s	0·209	-0·759	-0·069	-0·180	-0·006	0·280	0·593
RE	-0·116	0·556	-0·010	0·024	-0·004	-0·017	-0·010
DB	0·058	-0·243	-0·007	-0·031	...	0·044	0·087
TB	-0·051	0·225	-0·016	-0·008	-0·003	-0·020	-0·176
GS	0·004	...	-0·007	-0·024	-0·002	0·182	...
C	0·143	...	-0·248	-0·795	-0·059	...	...
I	0·159	...	-0·047	-0·269	-0·066	...	...
Im	0·034	...	-0·034	0·423	-0·014	...	...
T_y	0·008	...	-0·047	-0·047	-0·004	...	...
T_e	0·048	...	-0·047	-0·264	-0·020	...	...
r_b	-0·001	0	0	0	0	0	0
GNP	0·220	...	-0·216	-1·223	-0·091	...	...
GNP_{nf}	0·220	...	-1·216	-1·223	-0·091	...	...
$(GNP_{nf})_d$	0·212	...	-1·169	-1·176	-0·088	...	...
EIG	-0·056	...	0·093	0·311	0·023	...	...
R^u	-0·174	0·798	-0·003	0·055	-0·004	-0·060	-0·098
TD	0·045	...	-0·141	-0·249	-0·019	0·434	...
ΔB	0·967	-0·241	0·119	-0·144	0·037	0·044	0·087

... value near zero

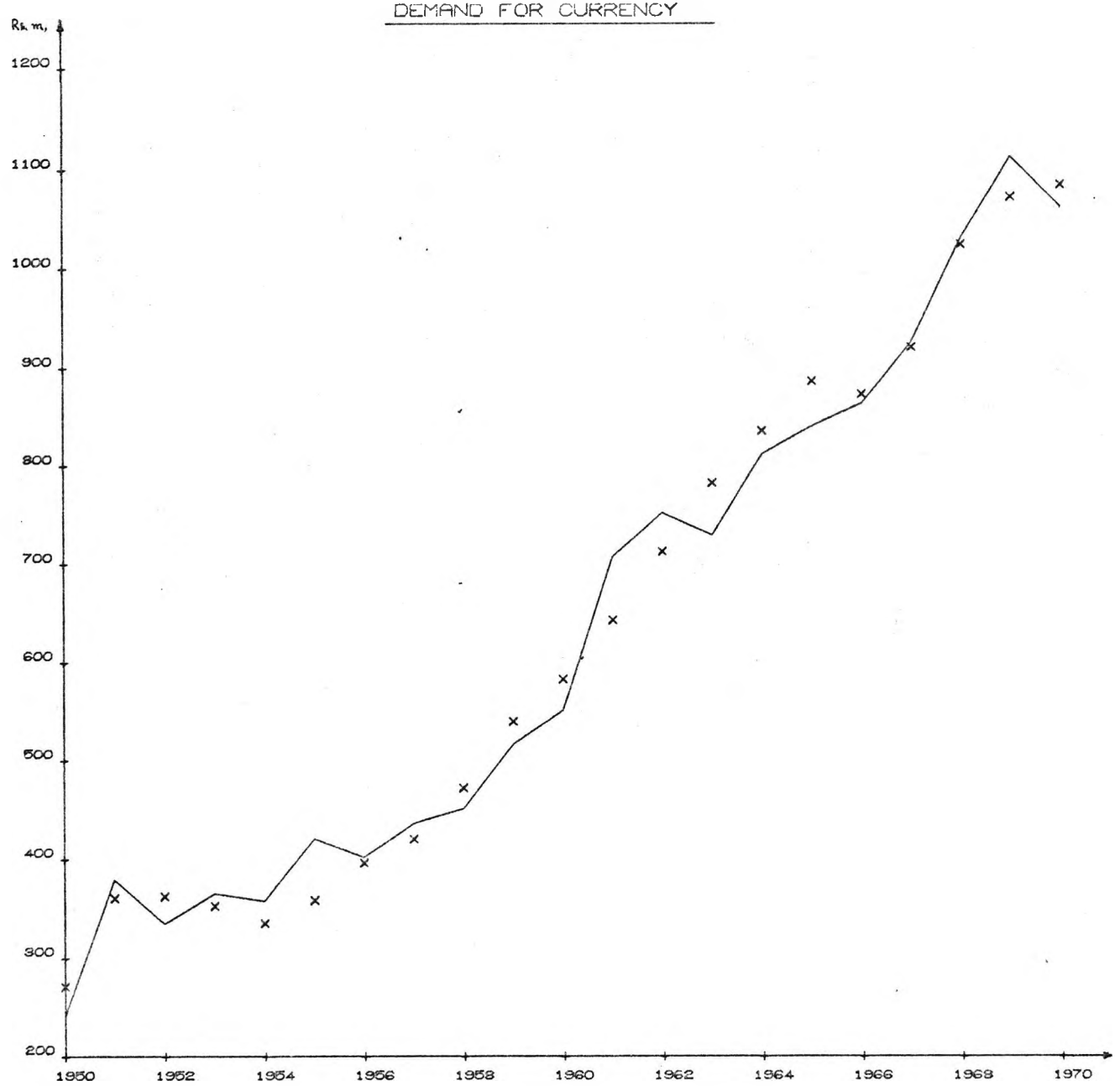
APPENDIX IV

FIGURES 7.I - 7.I4

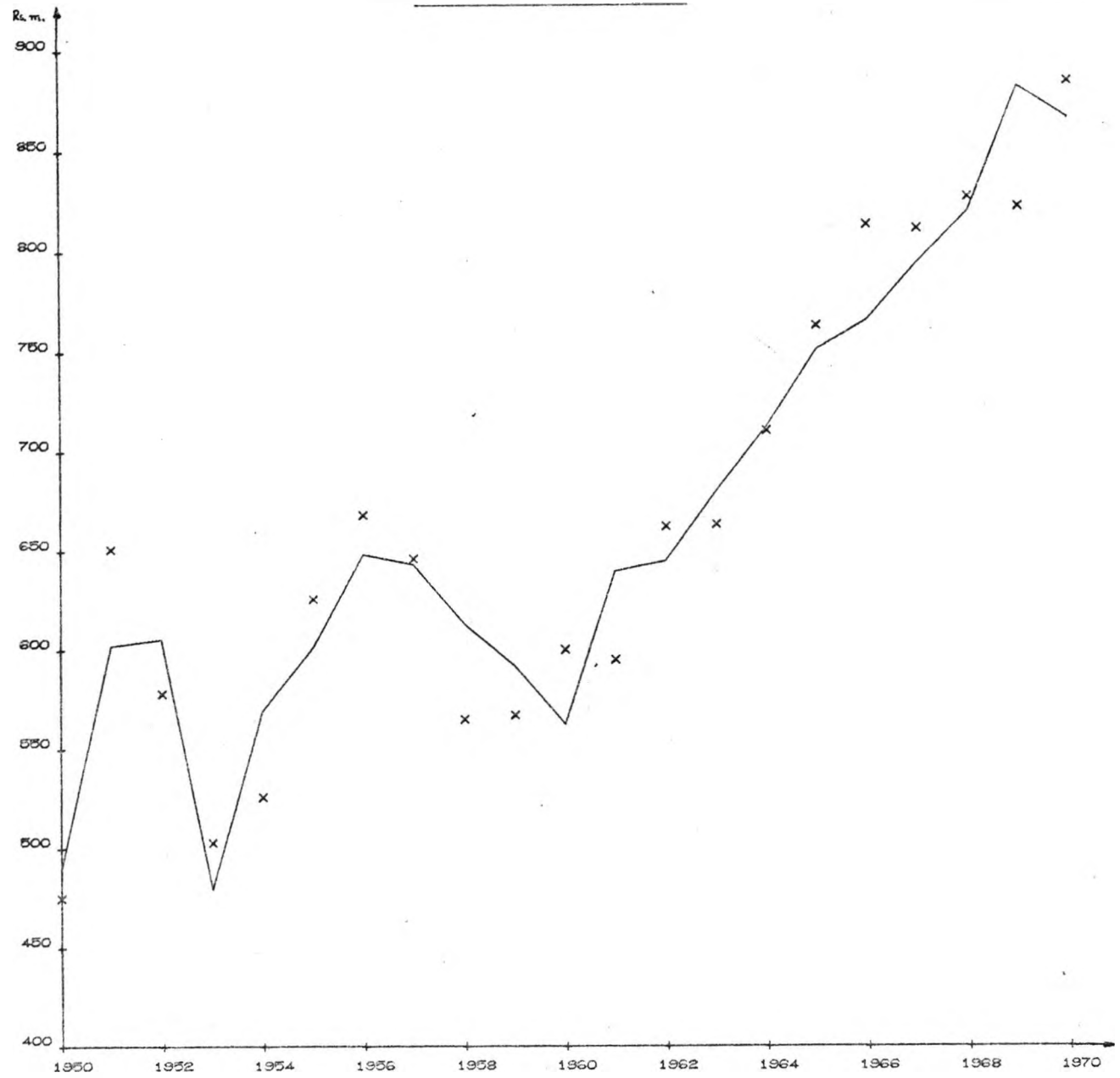
———— Predicted Values

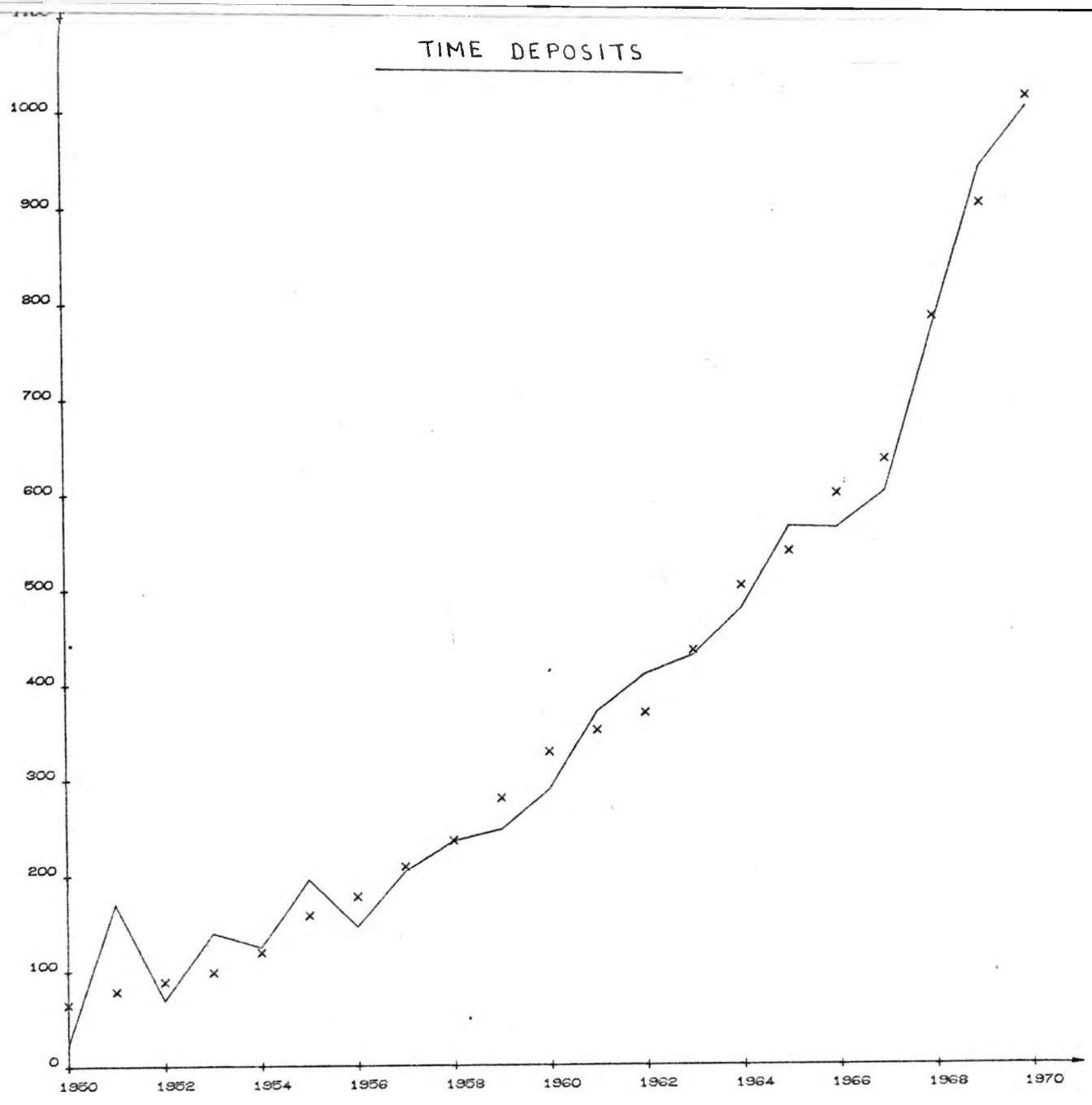
× × × × × × Actual Values

DEMAND FOR CURRENCY

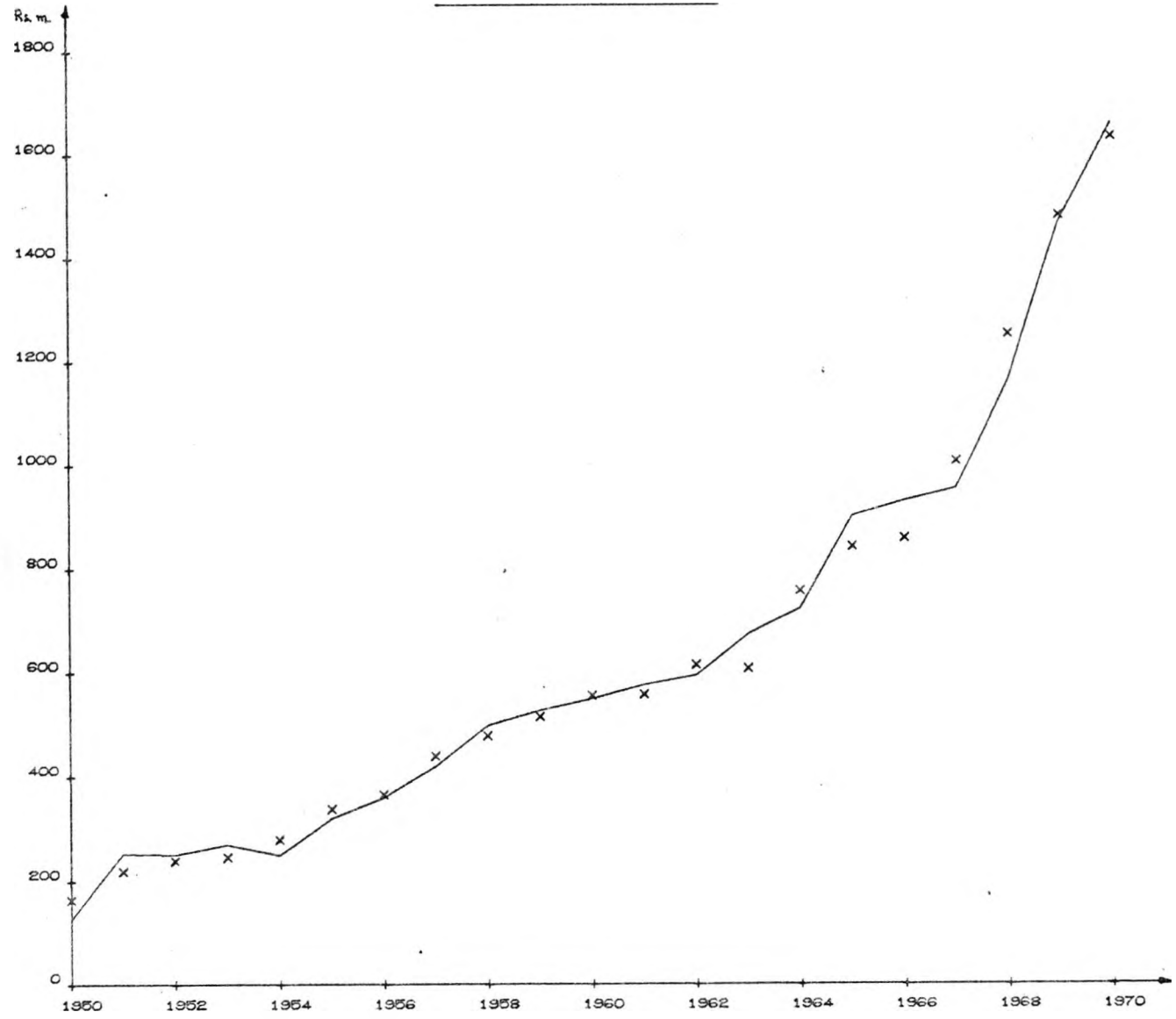


DEMAND DEPOSITS

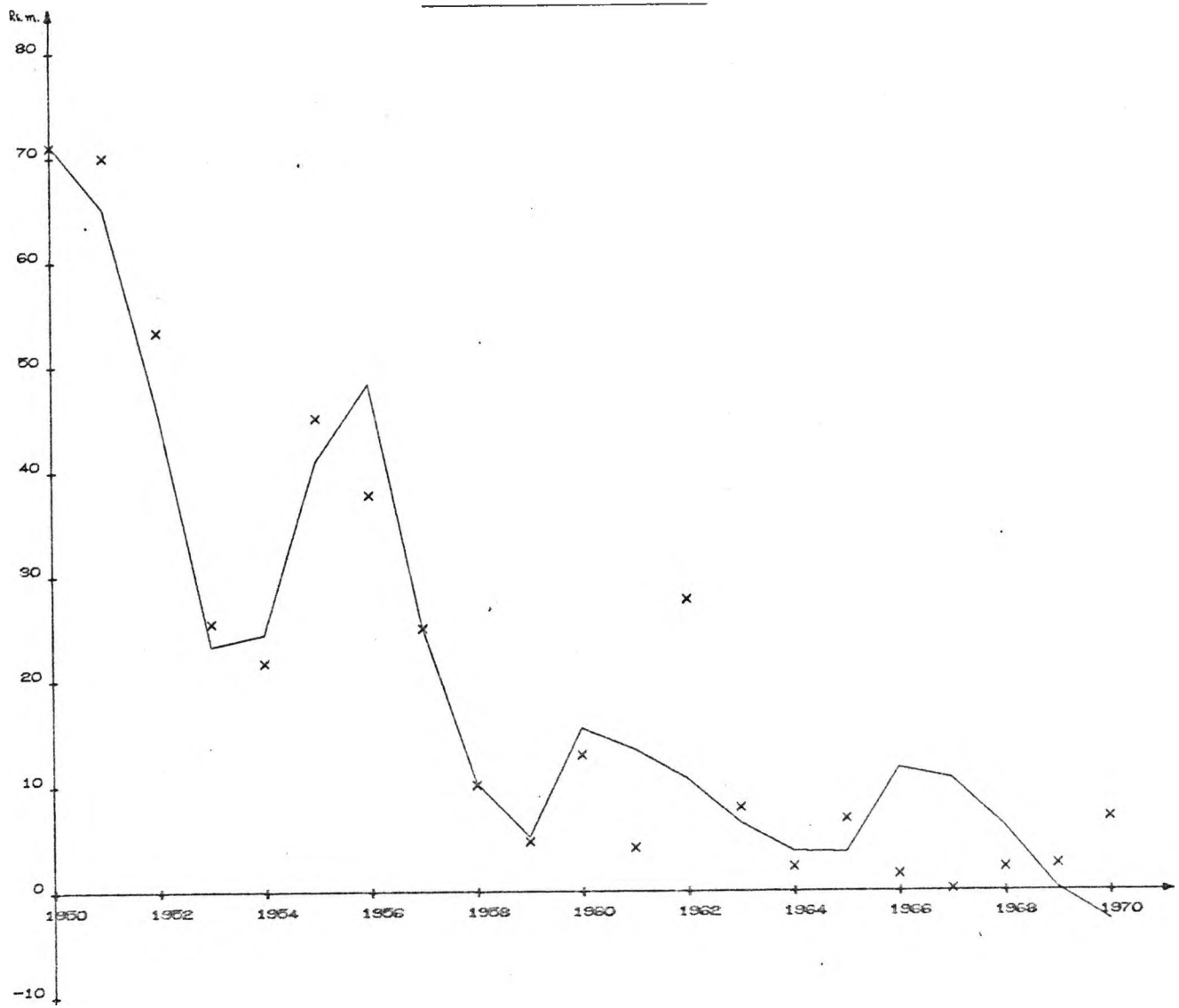


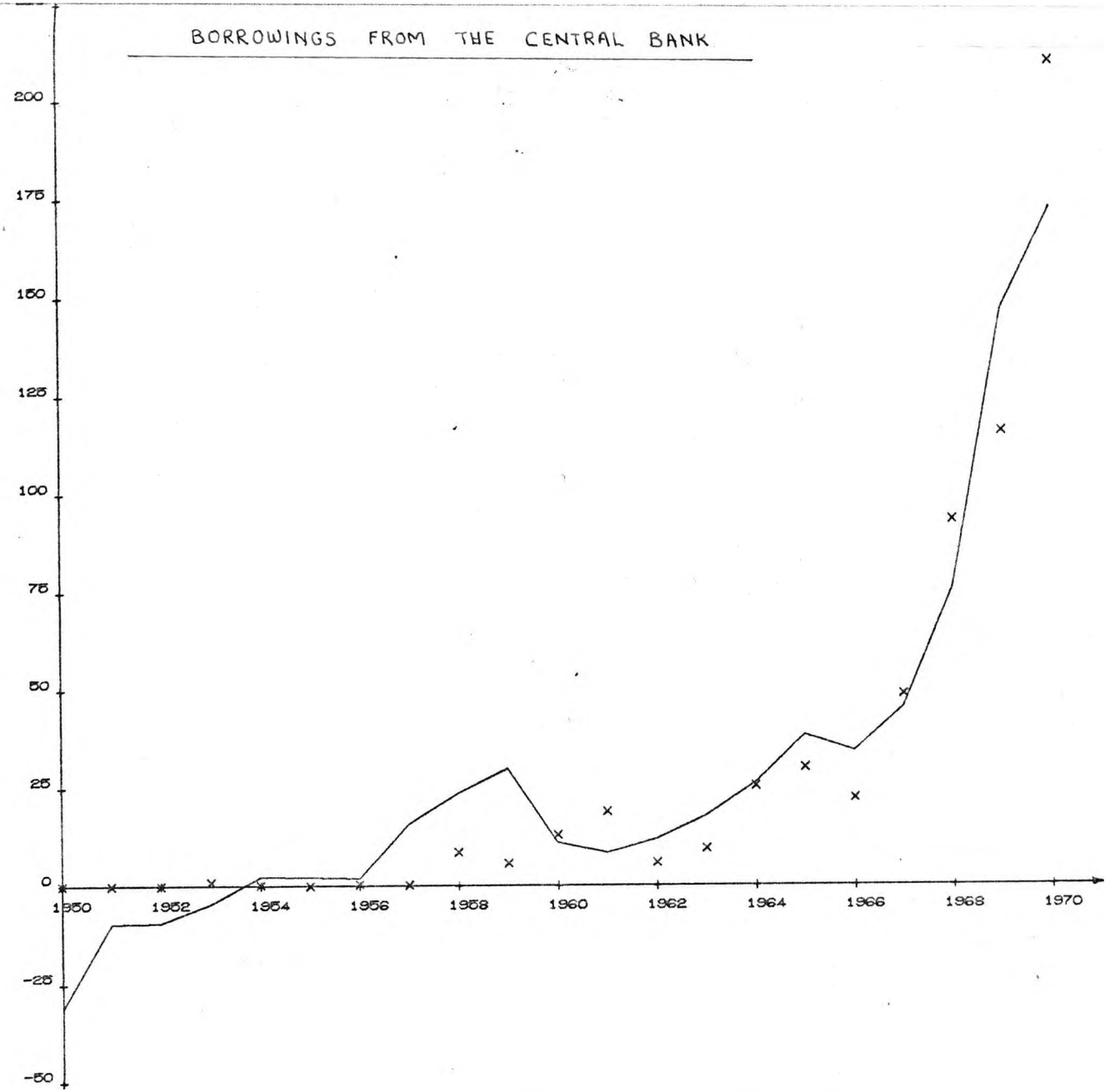

TIME DEPOSITS
1000
900
800
700
600
500
400
300
200
100
0
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970

SUPPLY OF LOANS

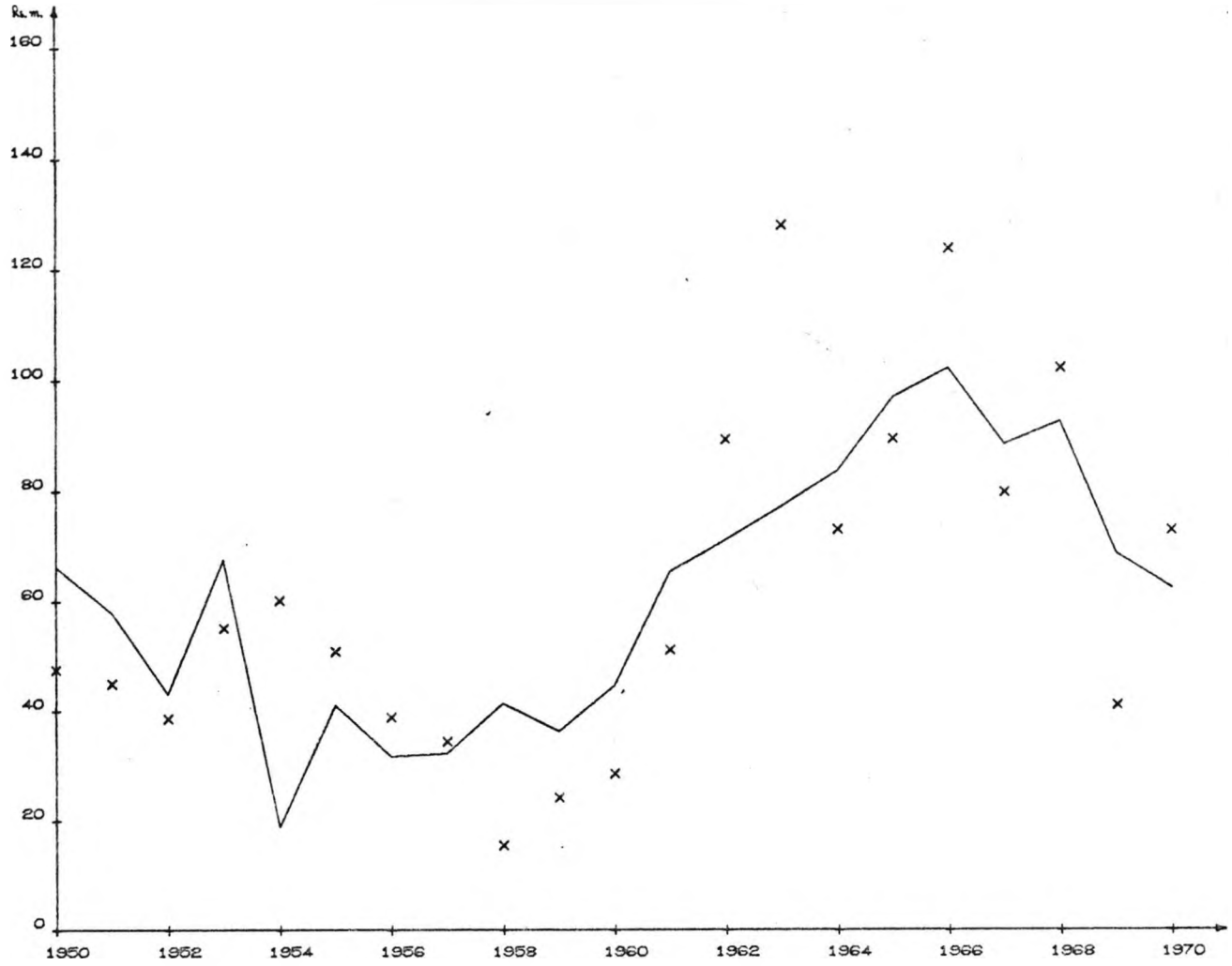


EXCESS RESERVES

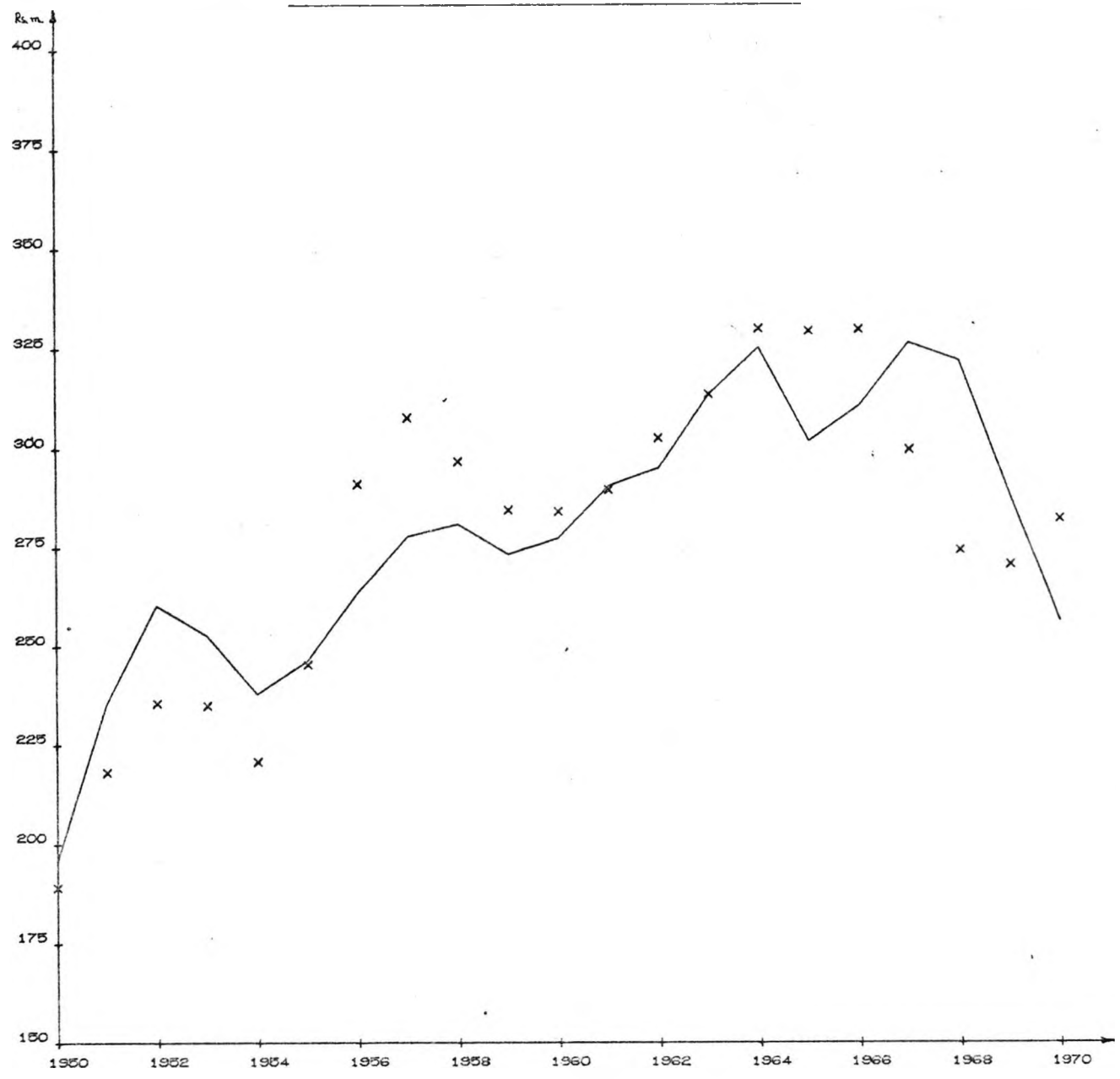



BORROWINGS FROM THE CENTRAL BANK
200
175
150
125
100
75
50
25
0
-25
-50
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970

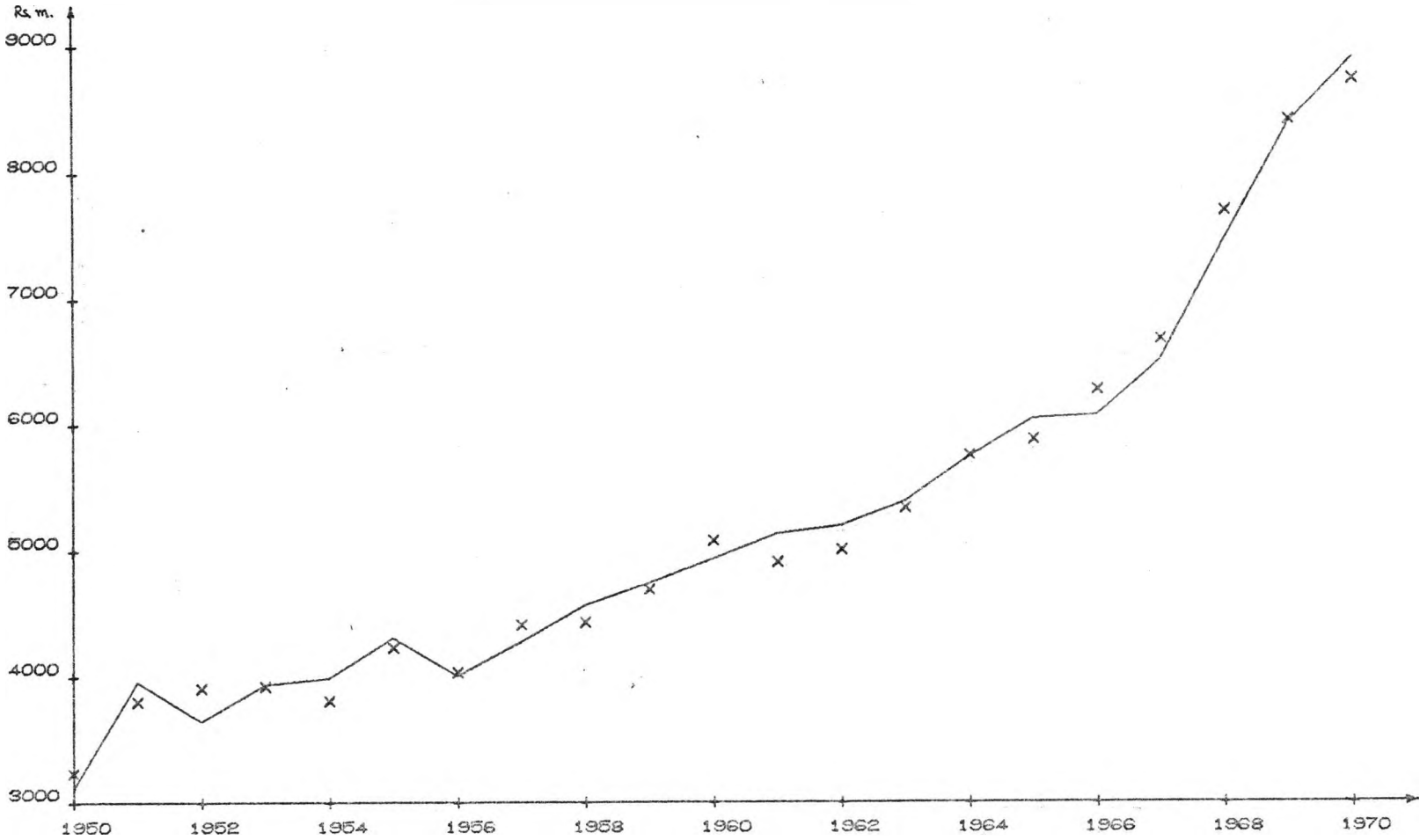
HOLDINGS OF TREASURY BILLS



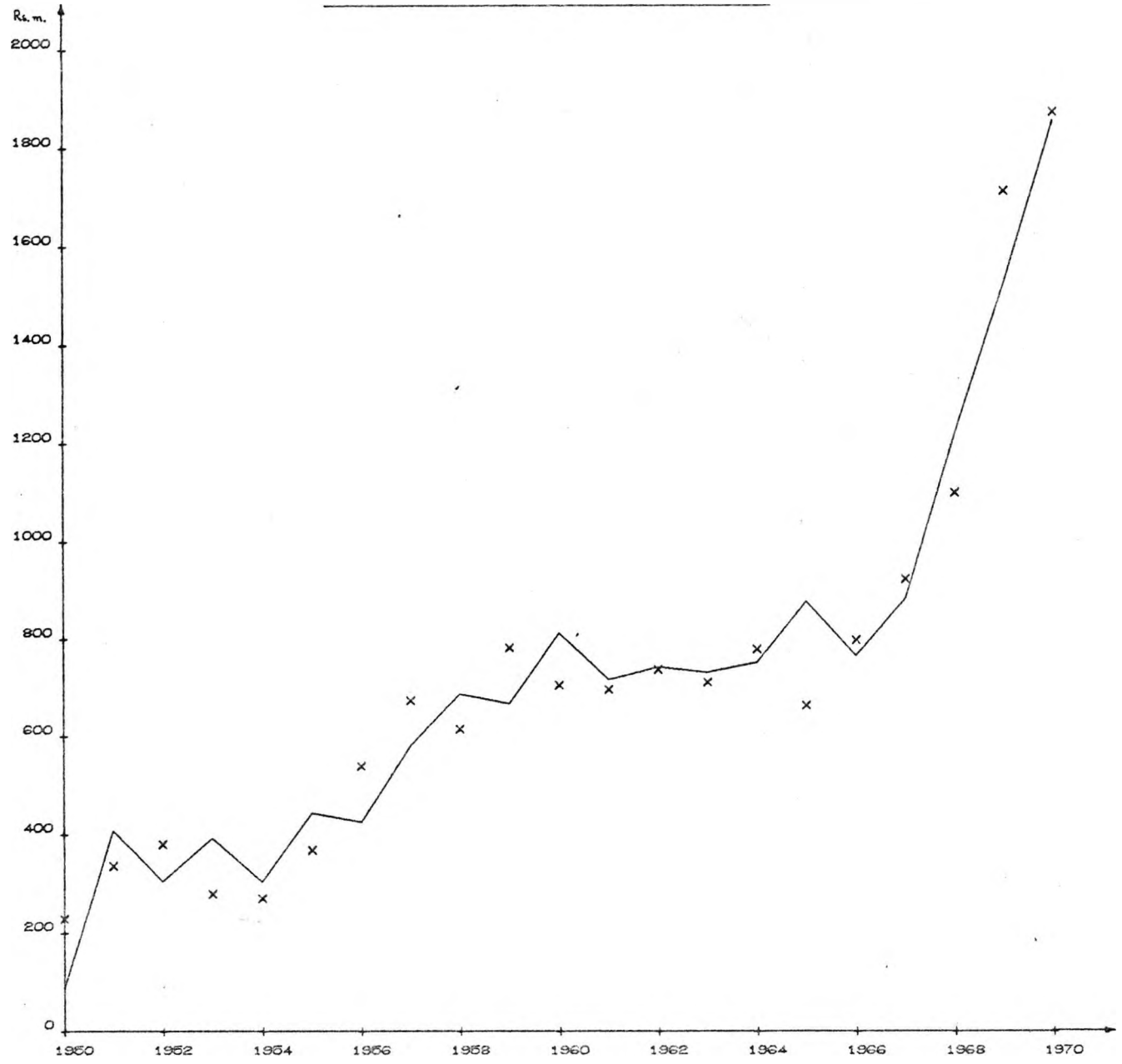
HOLDINGS OF GOVERNMENT SECURITIES



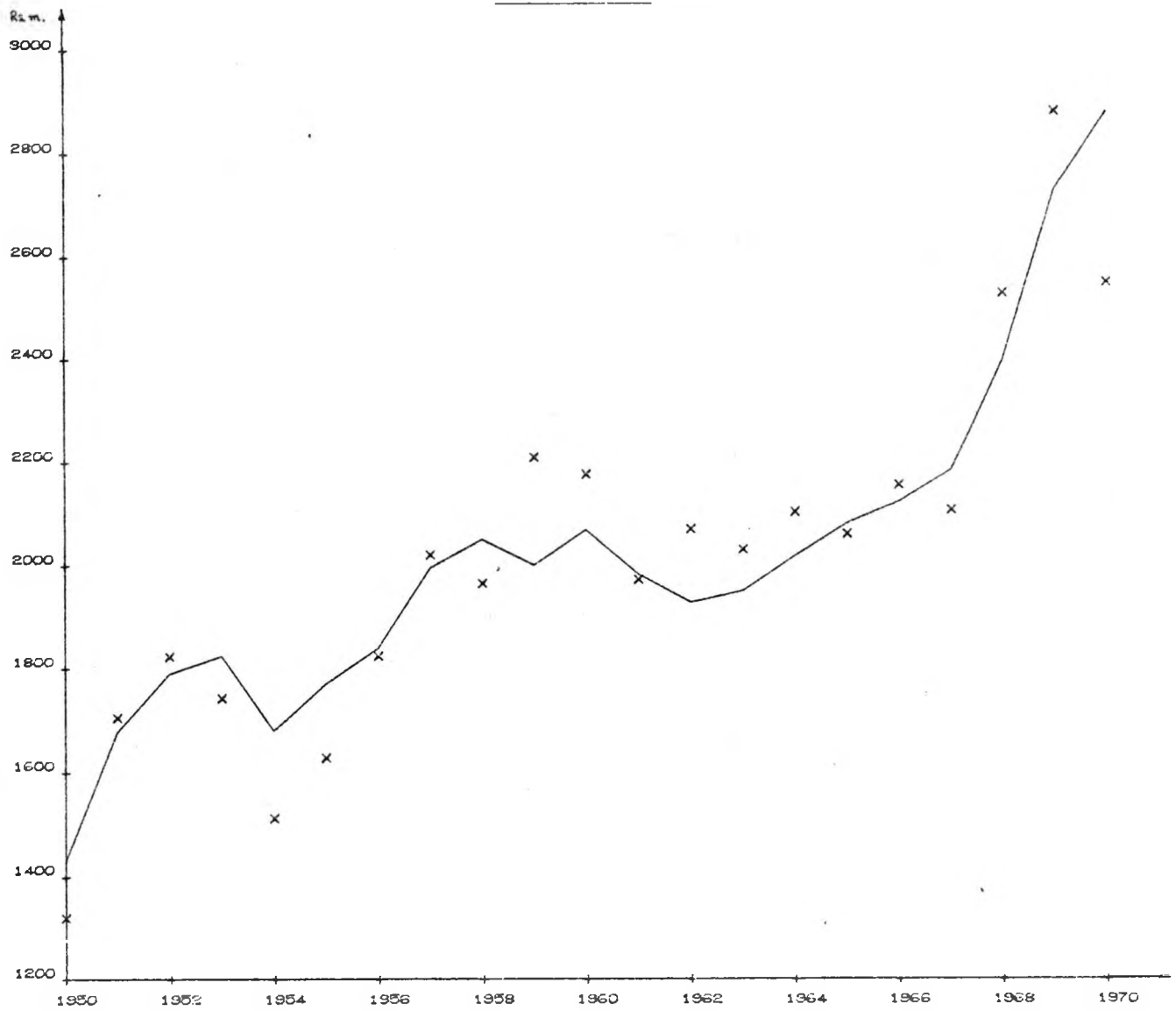
CONSUMPTION EXPENDITURE



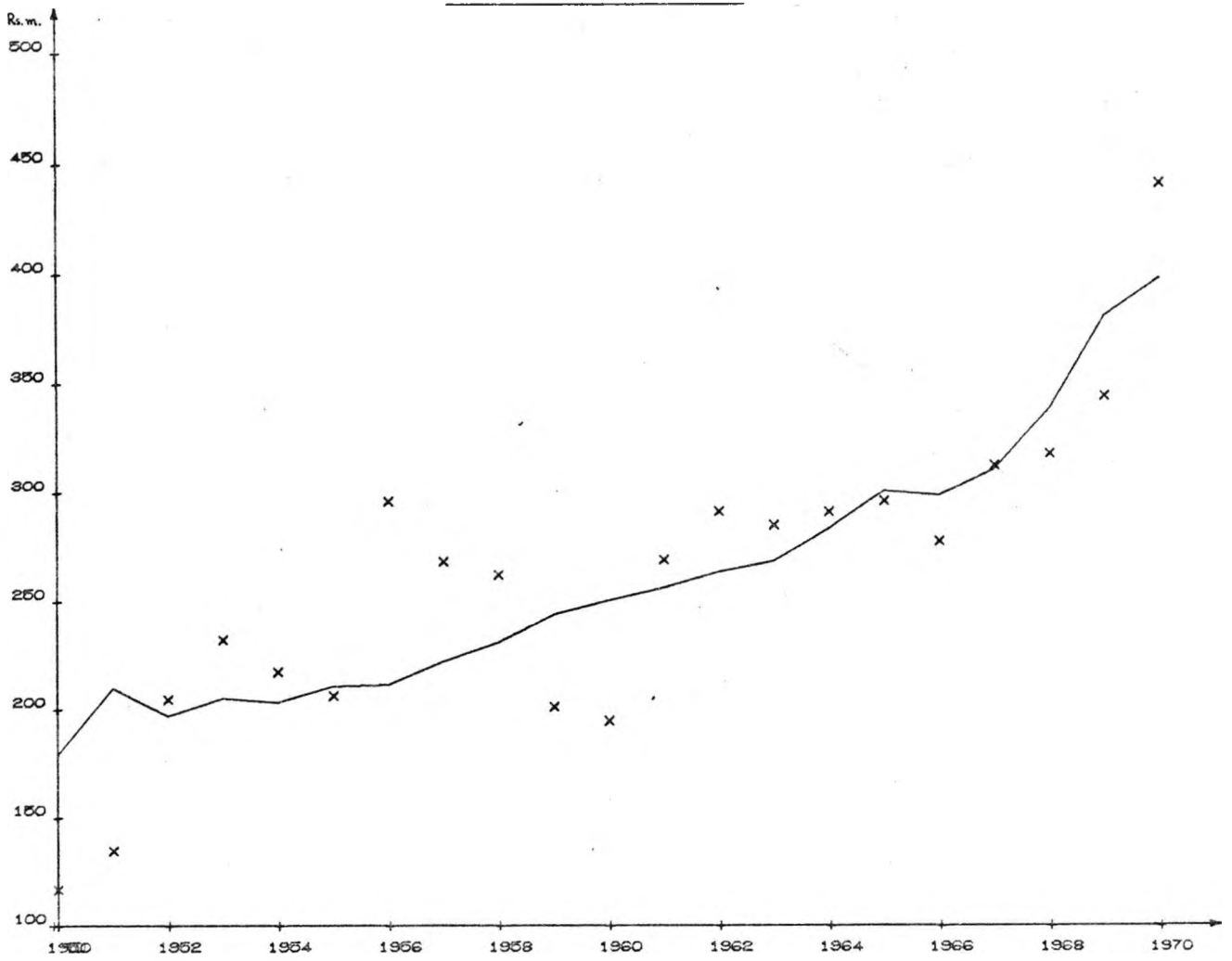
FIXED INVESTMENT EXPENDITURE



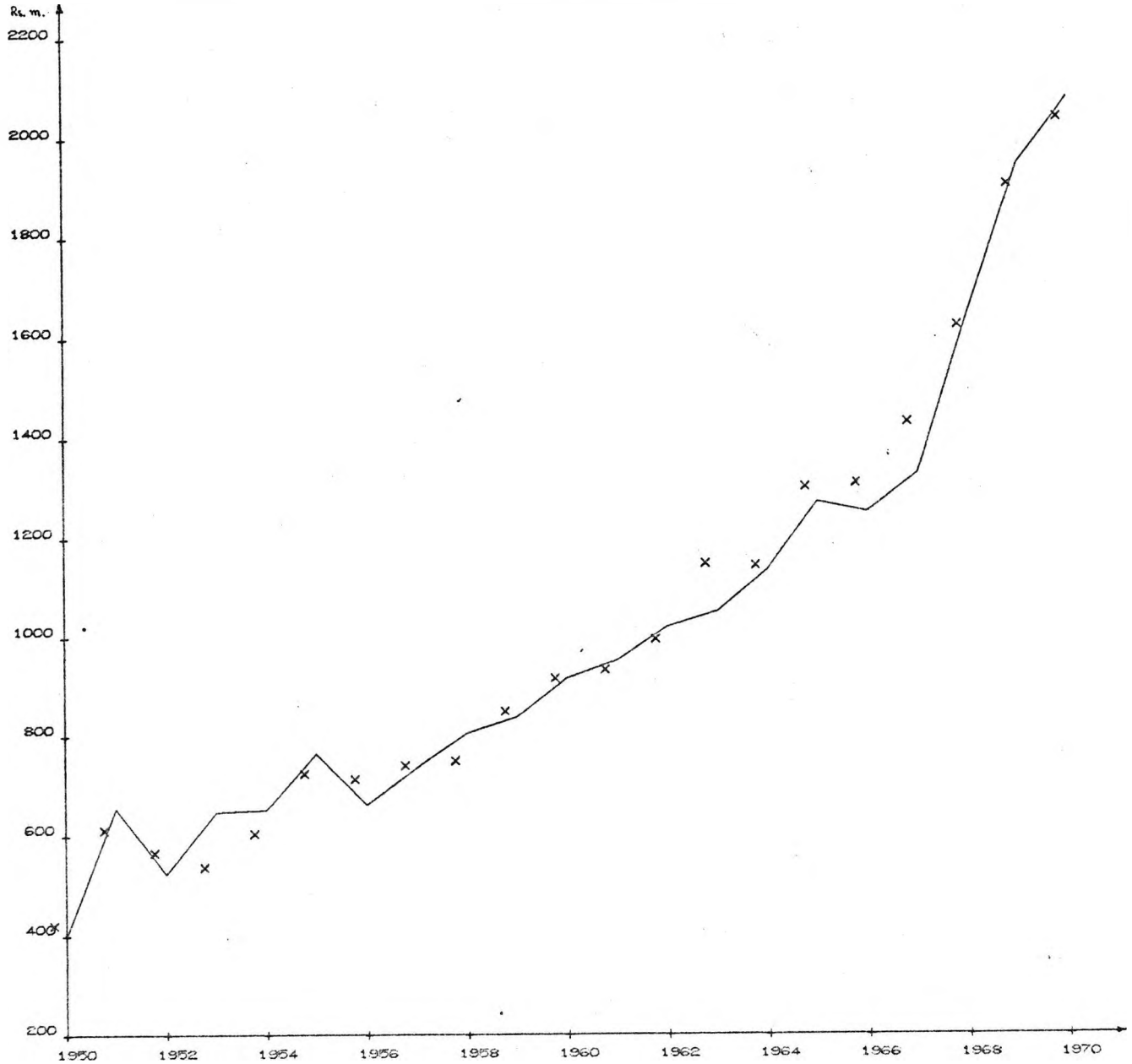
IMPORTS

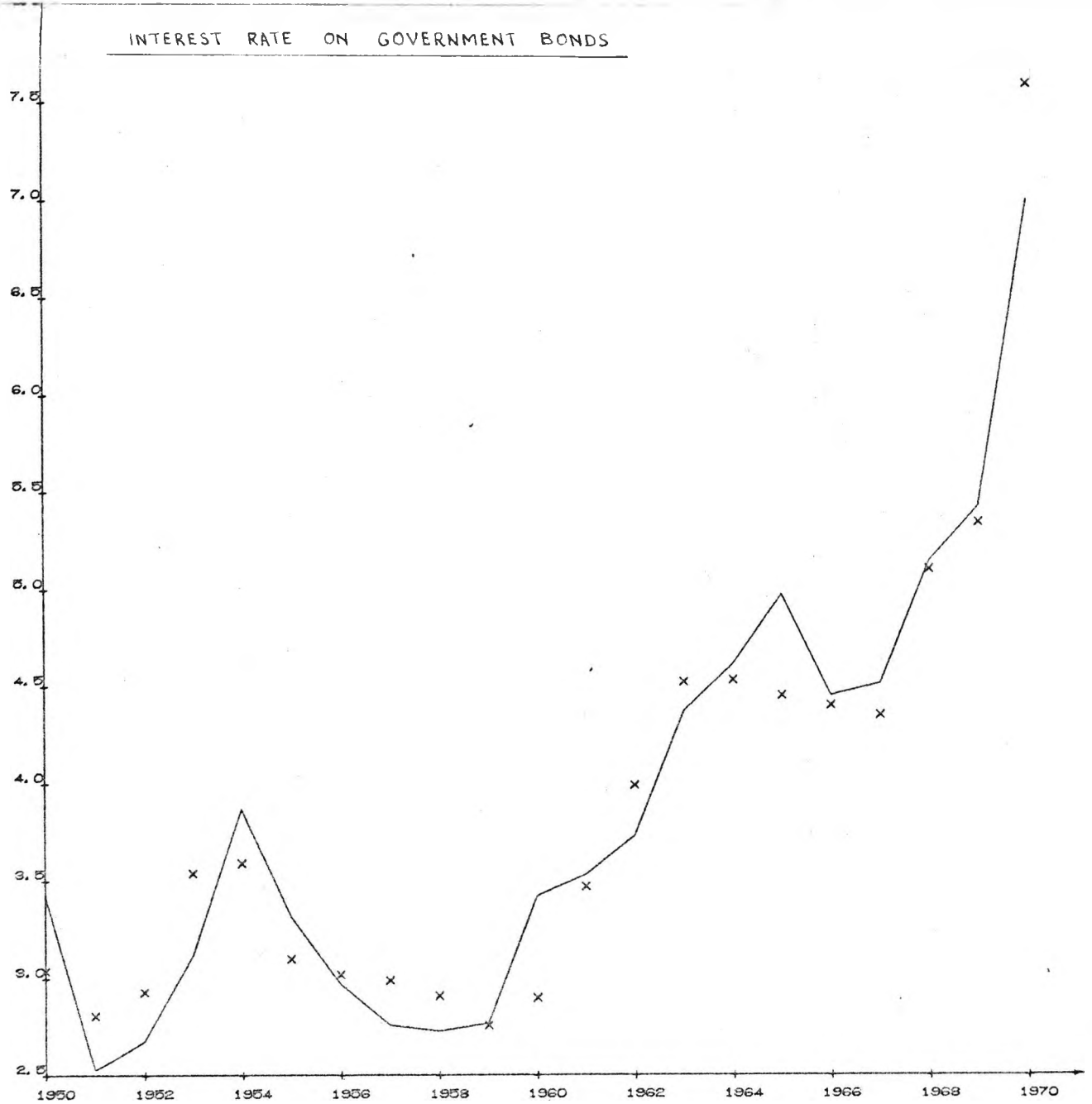

Rs.m.
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970

TAXES ON INCOME



TAXES ON EXPENDITURE




INTEREST RATE ON GOVERNMENT BONDS
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970

APPENDIX V

NOTES TO DATA SERIES.

The examined period is I950 - I970. All data are seasonally unadjusted. Variables are expressed in millions of Rupees, unless otherwise specified. Interest rates are expressed in percentages.

The basic sources for the various monetary time series used in this study were: the Annual Reports (26); and the Bulletin (27). In our calculations annual averages of monthly figures were taken.

The interest rate series are end-of-period data as given in the sources cited above. The bond rate series were taken from I.M.F. Financial Statistics.

For the variables of the real sector (GNP, C, I, Ex, Im,) the I950-I958 figures were taken from SNODGRASS (I67), while the I959-I970 figures were taken from the Annual Reports (26). As, in some cases the data from the first source were underestimated or overestimated in comparison with the series given in the Annual Reports, an adjustment factor was applied by considering data of common years from both sources.

For I949 in case when observations were not available, those of I950 were considered.

The data used are reported below. More details on the individual series may be made available by the author on request.

YEAR	Cp	DDp	Tp	M1	M2
1949	239·2	354·8	50·9	594·0	644·9
1950	271·1	474·6	65·2	745·7	810·9
1951	361·1	650·8	78·9	1011·9	1090·8
1952	363·2	578·3	89·3	941·4	1030·7
1953	353·6	502·9	99·4	856·4	955·8
1954	335·9	525·6	120·6	861·6	982·2
1955	359·0	625·6	158·5	984·6	1143·1
1956	396·7	668·0	177·8	1064·7	1242·5
1957	420·8	645·7	209·3	1066·5	1275·8
1958	472·5	564·9	236·4	1037·4	1273·8
1959	540·2	566·9	280·0	1107·0	1387·0
1960	583·0	600·1	327·8	1183·1	1510·9
1961	642·8	595·4	351·4	1238·3	1589·7
1962	713·0	661·5	368·9	1374·5	1743·4
1963	782·5	663·0	433·6	1445·3	1878·9
1964	835·6	709·8	502·1	1545·3	2047·4
1965	886·5	763·4	538·1	1649·9	2188·0
1966	873·0	813·3	598·4	1686·2	2284·6
1967	921·2	811·1	633·6	1732·3	2365·9
1968	1024·2	827·4	783·1	1851·6	2634·7
1969	1071·8	821·9	899·6	1893·6	2793·2
1970	1084·3	884·2	1009·7	1968·5	2978·2

Cp: Currency held by the Public.

DDp: Demand Deposits at Commercial Banks held by the Public.

Tp: Time and Savings Deposits at Commercial Banks held by the Public.

M1: Narrow definition of money stock defined as: Cp+DDp.

M2: Broader definition of money stock defined as: Cp+DDp+Tp.

YEAR	TR	RR	RE	DB	R^u	B
1949	140·0	69·0	71·0	-	140·0	379·2
1950	139·8	69·0	70·8	-	139·8	410·9
1951	181·1	111·2	69·9	-	181·1	542·2
1952	150·3	97·0	53·3	-	150·3	513·5
1953	103·9	78·4	25·5	1·0	102·9	457·5
1954	84·3	62·6	21·7	0·3	84·0	420·2
1955	122·5	77·4	45·1	-	122·5	481·5
1956	121·4	83·7	37·7	0·4	121·0	518·1
1957	109·4	84·4	25·0	0·3	109·1	530·2
1958	89·5	79·4	10·1	8·6	80·9	562·0
1959	85·2	80·5	4·7	5·8	79·4	625·4
1960	101·2	88·3	12·9	13·0	88·2	684·2
1961	108·8	104·7	4·1	18·9	89·9	751·6
1962	138·8	111·1	27·7	5·9	132·9	851·8
1963	128·3	120·4	7·9	9·5	118·8	910·8
1964	149·4	147·1	2·3	25·4	124·0	985·0
1965	181·1	174·3	6·8	30·0	151·1	1067·6
1966	185·5	183·9	1·6	22·3	163·2	1058·5
1967	171·9	171·7	0·2	48·7	123·2	1093·1
1968	206·2	204·0	2·2	93·3	112·9	1230·4
1969	201·7	199·2	2·5	115·6	86·1	1273·5
1970	234·3	227·4	6·9	209·4	24·9	1318·6

TR: Total Reserves. It consists of deposits with Central Bank plus till cash set apart as reserves.

RR: Required Reserves on demand and time deposits.

RE: Excess Reserves defined as: TR-RR.

DB: Discount Borrowings of Commercial Banks from the Central Bank.

R^u: Unborrowd Reserves defined as: TR-DB .

B: Monetary Base defined as: Cp+TR .

YEAR	CL^S	TB	GS	TD	ODEP	FB
1949	131·5	16·5	187·3	634·4	228·7	101·5
1950	164·2	47·5	189·2	669·9	130·1	154·0
1951	219·5	45·0	218·1	848·1	118·4	170·8
1952	239·7	38·6	235·6	753·5	85·9	89·9
1953	247·0	55·1	235·0	676·9	74·6	43·9
1954	280·9	60·2	220·7	686·6	40·4	54·5
1955	338·5	50·8	245·4	869·2	85·1	111·6
1956	366·1	38·8	291·1	940·5	94·7	116·4
1957	440·3	34·4	307·7	964·5	109·6	72·1
1958	478·5	15·5	296·8	925·2	124·6	50·0
1959	514·8	24·2	284·6	954·6	107·7	51·7
1960	544·5	28·5	284·2	997·6	69·7	57·7
1961	557·1	51·1	289·6	1034·0	87·2	53·7
1962	613·6	89·2	302·6	1103·8	73·4	54·9
1963	607·4	127·8	313·5	1205·7	109·1	44·0
1964	756·9	73·1	330·0	1347·7	135·8	48·8
1965	842·3	89·3	329·4	1479·7	178·2	55·3
1966	857·5	123·6	329·7	1556·5	144·8	61·8
1967	1007·8	79·7	299·6	1538·0	93·3	57·4
1968	1251·8	102·1	274·3	1752·1	141·6	71·5
1969	1481·4	41·0	270·6	1844·6	123·1	63·0
1970	1632·6	72·9	282·3	2011·0	117·1	37·1

CL^S: Commercial Loans. It includes total Loans and Advances provided by the Commercial Banks to the Private Sector.

TB: Holdings of Treasury Bills by Commercial Banks.

GS: Holdings of Government Securities by Commercial Banks.

TD: Total Deposits subject to reserve requirements.

ODEP: Other Deposits defined as: TD-DDp-Tp.

FB: Foreign Balances of Commercial Banks.

YEAR	C	I	Ex	Im
1949	2370·0	192·4	1113·1	1138·7
1950	3234·3	229·3	1566·0	1320·0
1951	3806·9	335·8	1905·7	1706·1
1952	3909·2	379·5	1515·4	1823·4
1953	3927·4	279·7	1644·6	1743·0
1954	3812·2	270·7	1853·9	1512·5
1955	4230·7	367·9	2005·2	1629·0
1956	4033·1	540·2	1787·7	1824·2
1957	4408·9	673·2	1738·9	2020·6
1958	4431·8	615·0	1851·8	1965·4
1959	4691·8	782·3	2016·0	2208·5
1960	5079·3	705·0	2010·6	2175·7
1961	4911·7	696·3	1907·2	1972·0
1962	5009·6	737·2	1971·0	2070·3
1963	5339·1	711·3	1902·6	2030·9
1964	5754·8	779·0	1937·1	2101·9
1965	5880·9	663·3	2094·5	2060·9
1966	6273·7	798·4	1864·9	2154·7
1967	6677·0	924·3	1848·7	2105·6
1968	7696·7	1101·3	2210·0	2527·6
1969	8412·4	1711·7	2151·5	2878·8
1970	8728·3	1871·5	2237·4	2548·7

C: Total Private Consumption at current market prices.

I: Total Private Gross Investment at current market prices.

Ex: Exports of goods and non-factor services at current market prices.

Im: Imports of goods and non-factor services at current market prices.

YEAR	GNP	GNP_f	GNP_{nf}	$(GNP_{nf})d$
1949	3159·6	1548·0	1611·6	1501·1
1950	4019·7	1963·7	2056·0	1939·0
1951	4702·3	2247·0	2455·3	2320·3
1952	4404·3	2034·3	2370·0	2165·2
1953	4711·1	2275·0	2436·1	2203·7
1954	4862·5	2406·7	2455·8	2238·0
1955	5594·1	2772·8	2821·3	2614·9
1956	4977·3	2069·0	2908·3	2612·2
1957	5333·2	2300·6	3032·6	2764·3
1958	5647·9	2446·9	3201·0	2939·0
1959	5893·3	2302·4	3590·9	3389·6
1960	6286·8	2389·7	3897·1	3702·7
1961	6313·3	2456·1	3857·2	3588·3
1962	6502·5	2392·3	4110·2	3819·0
1963	6796·7	2600·2	4196·5	3911·5
1964	7290·5	2663·5	5627·0	4336·0
1965	7483·5	2522·5	4961·0	4665·1
1966	7704·5	2613·6	5090·9	4813·3
1967	8264·5	2939·9	5324·6	5012·3
1968	9876·0	3691·1	6184·9	5867·3
1969	10747·7	3731·8	7015·9	6672·0
1970	11617·8	3948·7	7669·1	7228·0

GNP: Gross National Product valued at current factor cost prices.

GNP_f: Gross National Product of Farm Sector valued at current factor cost prices. It includes: Agriculture, Forestry, Hunting and Fishing.

GNP_{nf}: Gross National Product of non-farm Sector $GNP-GNP_f$.

$(GNP_{nf})d$ Gross Disposable Product of the non-farm sector $GNP_{nf} - T_y$.

YEAR	GE	OE	T_y	T_e	T_m
1949	688·0	326·9	110·5	392·1	180·2
1950	717·5	13·5	117·0	420·9	188·3
1951	898·9	73·4	135·0	612·3	245·0
1952	1146·6	-157·5	204·8	565·5	259·9
1953	1044·5	94·5	232·4	536·6	250·6
1954	911·2	130·9	217·8	603·9	244·2
1955	1034·2	309·4	206·4	724·3	258·2
1956	1165·0	-11·6	296·1	713·0	286·3
1957	1287·0	-14·0	268·3	740·2	303·6
1958	1474·7	-10·9	262·0	749·1	292·0
1959	1605·0	-144·6	201·3	848·7	397·0
1960	1649·7	-65·9	194·4	916·2	406·5
1961	1761·5	-58·5	268·9	933·1	435·3
1962	1848·8	1·2	291·2	995·0	465·0
1963	2116·2	-92·2	285·0	1149·4	397·8
1964	2207·8	-141·0	291·0	1145·3	481·6
1965	2334·7	-127·0	295·9	1302·0	435·9
1966	2414·9	-183·7	277·6	1309·0	476·9
1967	2594·4	-244·2	312·3	1430·1	544·3
1968	2936·9	82·7	317·6	1624·0	514·0
1969	3241·0	15·0	343·9	1905·1	460·2
1970	3476·0	-108·9	441·1	2037·8	306·5

GE: Government Expendirures It includes: consumption expenditure plus domestic capital formation of the Government and Public enterprises plus transfer payments.

OE: Other Expenditure, as a residual in the GNP identity. It includes: Net factor income from abroad plus changes in stocks plus other unidentified elements.

T_y: Direct Taxes It includes taxes from personal income and taxes on corporate income.

T_e: Indirect Taxes It includes taxes on production and expenditure.

T_m: Import Duties.

YEAR	FF	BPsec	EIG	BG	OR
1949	-	43·6	62·8	-106·4	79·0
1950	-	9·4	151·2	-160·6	19·0
1951	-	162·4	-114·6	- 47·8	103·8
1952	-	49·8	207·3	-257·1	119·2
1953	-	127·4	104·5	-231·9	43·6
1954	63·3	-15·8	-81·2	33·7	186·5
1955	12·1	59·6	-199·3	127·6	243·2
1956	1·7	-7·4	6·9	- 1·2	156·4
1957	15·1	32·9	148·4	-196·4	97·2
1958	20·4	107·0	94·9	-222·3	261·7
1959	35·5	137·0	241·0	-413·4	177·1
1960	29·3	141·2	247·1	-417·5	150·9
1961	26·6	194·6	241·4	-462·6	123·5
1962	55·8	213·9	186·4	-456·1	162·3
1963	93·5	119·7	178·5	-391·7	383·6
1964	95·4	205·7	160·6	-461·7	405·2
1965	99·7	293·5	37·2	-430·4	406·1
1966	118·0	368·1	79·9	-566·0	380·3
1967	208·6	369·3	28·9	-606·8	453·8
1968	190·2	258·1	267·4	-715·7	469·8
1969	353·6	254·7	179·3	-787·6	558·0
1970	226·2	281·5	427·9	-935·6	287·7

FF: Foreign Finance.

BPsec: Domestic Borrowing from the non-banking Public Sector
It includes: Market borrowing from non-bank sources (including Savings Institutions) plus Domestic non-market borrowing (administrative borrowing).

EIG: Expansionary Impact of Government Deficit It includes: Domestic borrowing from the banking system (Central Bank and Commercial Banks), plus decline in cash balances and foreign aid counterpart funds.

BG: Budget of the Government, net cash surplus or deficit.

OR: Other Revenue calculated as a residual in the budget identity 18.

YEAR	ΔO	NCFL	K	P	FR
1949	-328·9	-46	192·4	91·4	441·4
1950	-328·9	-46	421·7	99·8	472·1
1951	- 46·1	-70	757·5	103·6	661·6
1952	7·2	15	1137·0	94·7	527·0
1953	-238·5	48	1416·7	95·8	320·4
1954	-322·0	41	1687·4	98·1	420·7
1955	- 83·9	-91	2055·3	103·3	609·0
1956	82·2	- 9	2595·5	101·6	705·4
1957	92·6	20	3268·7	99·5	638·9
1958	- 81·8	16	3883·7	99·8	540·1
1959	-216·3	97	4666·0	100·0	466·3
1960	-185·6	14	5371·0	99·9	295·9
1961	-322·7	13	6067·3	98·3	203·7
1962	-224·8	37	6804·5	96·9	167·4
1963	-192·5	78	7515·8	98·5	192·1
1964	-309·2	166	8294·8	99·0	107·5
1965	-380·3	94	8958·1	99·1	212·1
1966	-231·6	72	9757·5	98·5	189·9
1967	-296·1	163	10680·8	100·7	180·4
1968	-313·2	98	11782·1	111·0	213·3
1969	-126·9	441	13493·8	115·4	166·1
1970	-796·8	350	15365·3	119·8	188·9

ΔO: Other Changes in the Base calculated as a residual from the identity 21.

NCFL: Net Capital Flows It includes: Net foreign private capital flows plus Net foreign capital on Government accounts.

K: Capital Stock defined as $\sum_{t=1}^{t-1} I_t$ 1=1949

P: GNP Implicit Price Deflator 1959=100

FR: Foreign Reserves at the Central Bank.

YEAR	r_d	r_{tb}	r_b	r_t	r_{cl}
1949	2·5	0·52	3·01	2·50	8·0
1950	2·5	0·52	3·04	2·50	8·0
1951	2·5	0·48	2·81	2·50	8·0
1952	2·5	0·92	2·93	0·75	8·0
1953	3·0	2·48	3·54	1·50	8·0
1954	2·5	0·87	3·59	0·75	8·0
1955	2·5	0·76	3·10	0·50	8·0
1956	2·5	0·64	3·02	0·50	8·0
1957	2·5	1·22	2·99	2·00	8·0
1958	2·5	1·76	2·91	2·00	8·0
1959	2·5	2·02	2·76	2·00	8·0
1960	4·0	2·60	2·90	2·50	8·0
1961	4·0	2·68	3·47	2·50	8·0
1962	4·0	2·80	3·99	2·50	8·0
1963	4·0	2·80	4·52	2·50	8·0
1964	4·0	2·80	4·53	2·50	8·0
1965	5·0	3·00	4·45	3·25	9·0
1966	5·0	3·00	4·40	3·25	9·0
1967	5·0	3·20	4·35	3·25	9·0
1968	5·5	3·64	5·10	3·50	9·5
1969	5·5	4·10	5·34	4·00	11·0
1970	6·5	4·76	7·58	4·75	12·0

r_d: Discount rate The rate set by the Central Bank for advances to COmmercial Banks.

r_{tb}: Treasury Bill rate The rate on the 90 days Treasury bills.

r_b: Bond rate Government bond yield. The yield to maturity (or to the first call date when price is above par) of the 4·5 pe cent loan of 1985-1989 'H' series.
Before March 1965 the 'C' series, and before April 1964 the 3 per cent National development loan of 1965-70.

r_t: Time Deposits rate. The rate on fixed deposits of 6 months (max.).

r_{cl}: Commercial Loan rate. The rate on Commercial Banks' Loans and overdrafts secured by Stocks in trade (max).

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